Designing The Optimal Web Store

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ABSTRACT
Design for optimizing the usability of a shopping website. This begins with an introduction to reasoning as to why a shopping website was chosen. Continues by discussing survey of four shopping technology interfaces. Identifies and describes the Usability Test. Discussion containing extrapolated information from website and gathered data. Conclusion summarizes design and top level findings.

AUTHOR KEYWORDS
Design; website; Best Buy; Alibaba; Ebay; Amazon; user interface; usability;

INTRODUCTION
In an ever more digitized and distributed world, e-commerce is becoming an increasingly important part of society. The website template ABC.com was created in order to address this demand. It utilized Norman's design principles to make the e-shopping process as quick and convenient as possible. It has multiple ways for users to search for products that they want, an apparent view of those selected items on their wish list. Another goal is to allow users easily navigate between different items and search results. Icons, buttons and other functionalities were designed to be intuitive enough for both new and returning users to recognize with emphasis on mental mappings and affordances.

RELATED WORK
A series of surveys were done in order to analyze the strengths and weaknesses of user interfaces present in existing shopping websites. The two high level tasks that were critiqued were arriving at the wish list of the user, and the ease of searching for an item.

Best Buy
Best Buy was a very dominant electronic retailer but as online shopping became more popular Best Buy has put a lot of resources into staying competitive in the online space. This critique will be looking at how user friendly it is for a user to find an item they want to purchase and accessing their wishlist and/or price watch.
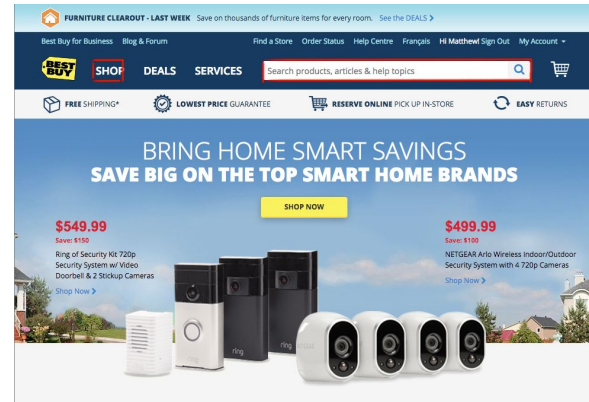

Figure 1. Best Buy.ca Home Page

The Best Buy front page is covered almost entirely by sponsored ads which severely hinder the discoverability of the page. The category menu can be opened by clicking on "SHOP" (see figure 1), but the word shop is a very vague hint of what it actually does even for experienced users. Even though the site includes another detailed category breakdown, it is situated at the bottom of the page which makes it difficult to discover. Accessing and managing the wish list is unavailable at all on the front page, and there is no hint of how to access wish list.

Amazon
Amazon is an online shopping website that offers a wide variety of products and services such as books, electronics, video games, music download and web hosting. Over the years, Amazon has evolved many times and gradually became the leading industrial standard in e-commerce.

Creating and viewing the wishlist on Amazon does not require logging in with an account. It is accomplished by using cookies on the user's browser. Such a feature is very convenient for new and less frequent users. Items inspired by the user's wish list are shown on the front page after logging in. However, the information of the actual items on the wish lists are not presented immediately. This could be viewed as a poor conceptual model by some users.
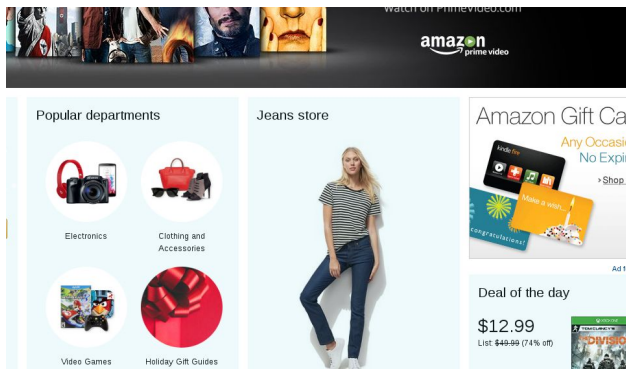
Figure 2. Amazon Home Page For New Users

One of the biggest issues is that the home page is bloated with ads for new users (Figure 2). It easily causes confusion for new users who previously had no knowledge of what amazon is selling and no prior interest history. This clearly causes a discoverability issue of what type of items Amazon is selling.

It is inconvenient to find detailed categories due to lack of further refinement of each category from the Shop by Department menu. After the initial category selection, certain important subcategory options (e.g. mouse under Computers) are missing entirely which renders users being unable to find what they want, therefore not providing enough feedback to users. Wish list items are likely the most wanted items by users but their pricing is not made apparent since there are only pictures of the items but not the prices. In order to see the actual prices users have to go to a separate wish list page. This again violates Norman's discoverability principle.

Ebay

Ebay is a shopping website that allows users to purchase various products from suppliers or other individuals that are registered users.

Two high-level goals of the user of this system are locating a specific item to purchase, and adding items to their watch list. Finding an item on Ebay is very intuitive. Ebay gives the user the option to search using their search bar if they know exactly what they are looking for, or they can search by categories to narrow down their search. The search bar is easy for both new and old users to locate due to its position at the top of the page and its large size. The search functionality is user-friendly because it is consistent with the search functionality found within other popular shopping websites, so users that are familiar with other shopping websites will not have to relearn the search process when using Ebay for the first time.

Adding an item to a watch list is implemented less effectively than searching for an item. The "add to watch
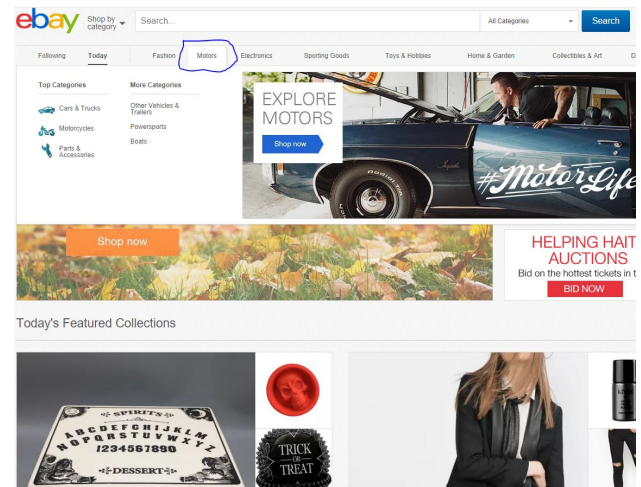

Figure 3 - Ebay's home page when hovering over a category name. The blue bubble shows the icon that could be mistaken for being a button.

list" button and the "advanced search" options are small and easy to miss. The fact that these crucial options are not right in the viewer's vision is a discoverability flaw. The button used to access the watch list is located out of the way of the user's regular areas of focus, making it difficult for the user to discover. Ebay also suffers from a lack of consistency in their interface. The styling of links and buttons varies greatly throughout the site. Any consistency in the design of many areas of the interface has been largely ignored to make the website look stylish at the cost of usability. An example of a dropdown menu that could be easily mistaken as being just a button is shown in figure 3.

Alibaba

Alibaba is a wholesale shopping website that connects suppliers and consumers through a global marketplace. Alibaba achieves its goal of allowing consumers to search their catalog easily as the search bar is readily visible on the top of the website. Once the user searches for the items the user interface allows for further narrowing of the search by letting the user add constraints, such as category, color, style, and etc. There are images of the products associated with the search to make it clear what is being selected. One issue with the search interface is the lack of initial categories in the search bar. Instead, they are listed below but that requires the user to first click on them, be taken to a different page, and then enter a search. This limits the discoverability of the products and creates an extra step for the user.

Once the user selects an item, they can view the available quotes for the price of the product, select from which supplier they are going to be purchasing from, and then
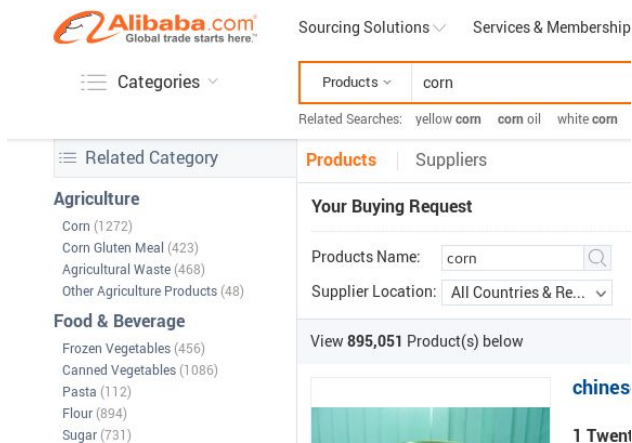
Figure 4 - Alibaba search categories

have it entered into a Buying Request queue. You can also subscribe to a Trade Alert to see trending sales. There are

two problems with the interface which decrease usability. First, the buyer needs to create an account in order to put items into a Buying Request, and second there is no way to simply add selected items into a hypothetical wish list without automatically demonstrating an intent to buy the good. This creates the problem of limiting the buyer's ability to casually monitor the status of the products that they want to purchase; it forces them to sign up and make Buying Requests if they want to maintain a watch list of goods.

USABILITY TEST

The tests were focused on evaluating the qualitative usability of the website through objective task metrics and subjective feedback. This is the list of tasks and the order in which they were performed.

The first task was navigating from the product-details.html page to to the wish list, with the process being timed to get a measure of discoverability of the wish list from any page (as the navigation bar is uniform throughout the website). Doing so takes the user to the index.html page, where the wish lists are displayed. The user was asked to evaluate how usable the process was.

The second task was asking the user to add an item to the wish list, and then to change the wishlist from wish list 1 to wish list 2. The user was asked how intuitive the process was and if the signifiers presented a good mental model of how to do so.

The third task involved the user retrieving a set piece of information from the second test item (its RAM), which was timed, and was asked if the information was easily discoverable. This was done in order to test if the mental

mapping between the location of the information, and the pages it was accessible on, was intuitive and to see if the signifiers that displayed the information were easily understood.

The fourth task was to have the user find at least four ways to arrive at the product-details.html page starting from the index.html page, and time the process. Afterwards the user was asked what their preferred method of doing so was, and if it was easily usable. The test indicated how discoverable the various ways of doing so were and their initial usability.

The fifth task was to have the user browse the three pages of the website for one minute each, in order to have them get familiar with its components and give feedback on it. The user was asked if the process of going between pages was well mapped, and if the information breakdown and compartmentalization was easily discoverable and usable.

The sixth task was to have the user repeat the fourth task. Since the user has now gained some familiarity with the website, this tested the usability of finding an item for a more experienced user, and measure if there was an improvement.

The seventh task is an alternative to the third task; the task involved the same process as the third task but was administered to a different set of users, in order to see if there was a difference in speed of them finding a laptop with having prior knowledge of the website vs without it.

RESULT

Table 1 demonstrates the numerical results for each of the timed tasks from the usability test.

For task 1, users reported the wishlist on the navigation bar being easily discoverable, as it is in the navigation menu, which is always at the top of the user's screen. The wish list on the main page was also easily discoverable as it is one of the first things that you see on the page.

For task 2, users were easily able to navigate to the other wish lists on the page by simply clicking the button with the list's name. The user first had to discover that hovering over an image of a product would display the overlay with the icons: add item to cart, view details, and add to wishlist prior to being able to add the item to the wish list. This required playing around with the page for a few seconds, but after they got the feedback of the image becoming grey they quickly were able to do so.

For task 3, users were able to find the search page and the second test item on it quickly. Two of the users got the

	Task time				
User	Task1	Task 3	Task 4	Task 6	Task 7
Asham	6.43s		2.53m	35.28s	9.96s
Ben	6.37s		57.44s	32.97s	21.36s
Haydan	19.74s	29.63s	1.55m	25.58s	
Devin	5.35s	34.81s	1.42m	23.64s	
Richard	11.35s	41.47s	1.26m	37.24s	

Table 1. Task results for each user

information from clicking on the tab on the product search page, while the others navigated to the product's detail page and found the tab there.

For task 4, users intuitively got to the product page via clicking the product image/text but had more trouble (outside of one outlier) initially discovering that if they hover over the image one of the affordances there (more info) would take them to a short product description, from which they could select "Select all features" and be taken to the full product description page.

For task 5,users reported that the information was well laid out and that the signifiers to go between pages were intuitive.

For task 6, the users were able to complete the task of finding the different ways to navigate to the product description page much faster than in task 4, indicating that more experienced users would be able to do so.

For task 7, users who did this task last (vs them doing it as task 3) were able to find the information much quicker, indicating that the website was more usable for users who were more familiar with it.

DISCUSSION
The website was intended to maximize usability, however outside of the basic functionality for a few select test cases most of the website was not filled with usable products. This is because the website was made to be a template and not a full website, as well as due to technical and time constraints. The User Interface features that maximize usability for searching for a product and going to the wish list were implemented, but most other aspects of the website were not implemented (refer to Appendix). This impacted the usability testing as users had to be told which aspects of the website they could use and what exactly was being tested. Having to do this added confusion to the tests and added bias to the test.

The following is an analysis of the test results and feedback from users.
One participant failed to notice the icons that appear within the product's image when the mouse is moved over the image. After testing, the participant stated that he might have missed the icons because he wasn't expecting them to appear and because he was clicking on the

product image immediately. It can therefore be concluded that those product icons have poor discoverability. To improve the discoverability of the icons in a future iteration, the icons could be modified so that they are visible on a product's image at all times. This modification is expected to allow users to discover the icons quickly.

While the icons for adding items to the wish list were not easily discoverable, the participants enjoyed having that option be available to them on all products after it was discovered. The consistency of using the same icons (image of shopping cart and heart) throughout the website allowed them to have a clear mental map of what they would do after they discovered them. It makes the wishlist and shopping cart more usable, compared to other shopping websites like Best Buy which don't have this feedback.

It was found that users preferred to click on the product's image in order to navigate to the product's description page more so than using the text hyperlinks, which indicates that it is easily discoverable for most people who use other shopping websites. To improve usability for more novice users, a border around the currently hovered-over image, and text that indicates that clicking it would go to the product description page could be added to the image to improve feedback.

Four of the users found using the categories to search for the laptop to be much easier than other shopping websites like Best Buy, thanks to having the images associated with the categories displayed next to them. This indicated that the images gave improved feedback regarding what is the product, and discoverability of what the categories represent.

Only two of the participants used the tabs on the search page to find the information regarding the laptop's RAM, while the others went to the product page. While that additional information on the page is useful, the discoverability of the signifiers was not good enough to have everyone notice them. To improve this, the appearance of the signifier could be changed to a button in order to make it stand out more.

The different levels of information displayed on the website (minimal for large icon, medium for list view/overlay, large for product description page) allowed users to find the information relating to the product that was most important to them, which depends on their needs. One of the users preferred using the grid-view to find the test product while the others prefered the list

view. The other changes that add more information to the grid view could improve its usability.

CONCLUSION

A shopping website was developed using HTML and Norman's principles of software design. A usability evaluation of the website was then conducted using three usability tests and five participants.

The procedures used to conduct each test, along with the results and a discussion of the findings can be found above. Analyzing the results from the tests, it has been concluded that the website in question shows signs of having a greater level of usability in the areas that were focused on during the design stage compared to current popular shopping websites such as Best Buy and Amazon. In areas which were focused on in the HTAs such as finding and using the wishlist, and accessing products, the website has a higher level of usability for technology products than websites like Amazon and Best Buy. Sections that were found to have low usability and possible modifications to increase the usability of those sections for the next iteration were discussed.

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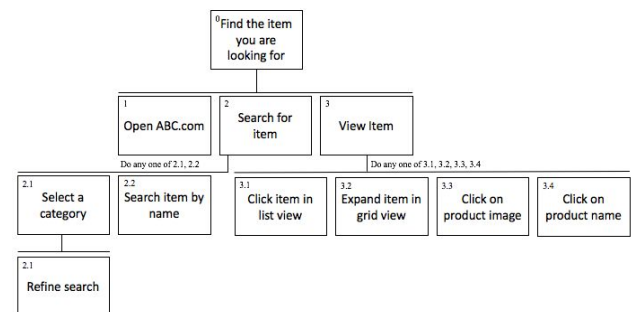11. Jhilmil - eCommerce Bootstarp Template. *Responsive Bootstrap Templates & Themes*. Retrieved December 12, 2016 from *https://shapebootstrap.net/item/1525690-jhilmil-ecommerce-bootstarp-template*

APPENDIX A

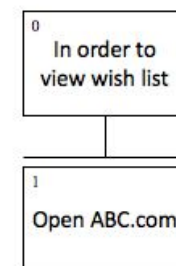**Figure 1 – ABC.com, Find Item**

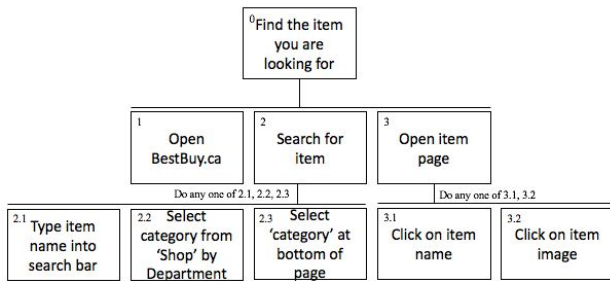**Figure 2 – ABC.com, View Wish List**
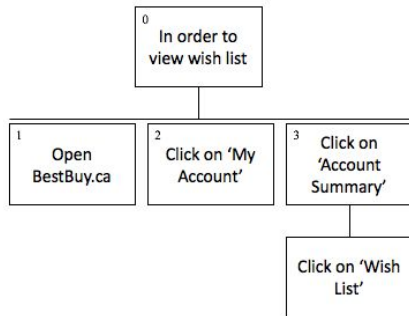

Figure 3 – Best Buy, Find Item

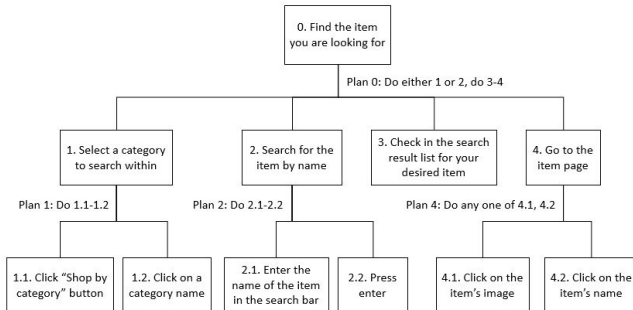**Figure 4 – Best Buy, View Wish List**

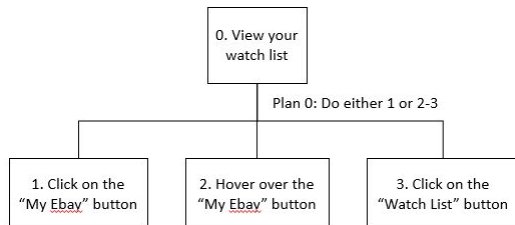**Figure 5 – Ebay, Find Item**

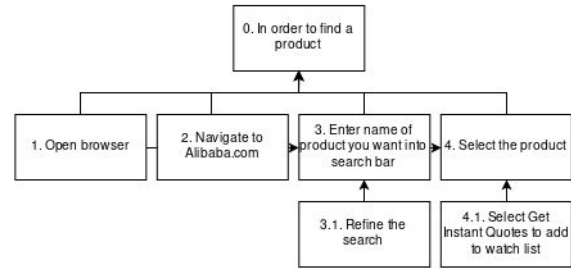**Figure 6 – Ebay, View Wish List**
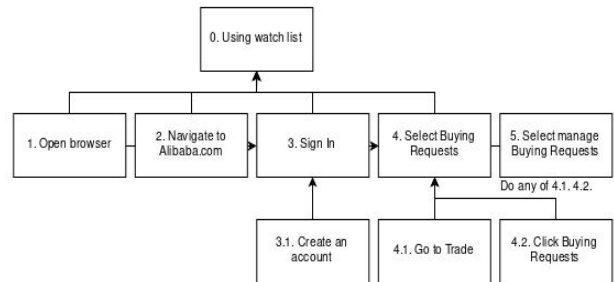
Figure 7 – Alibaba, Find Item

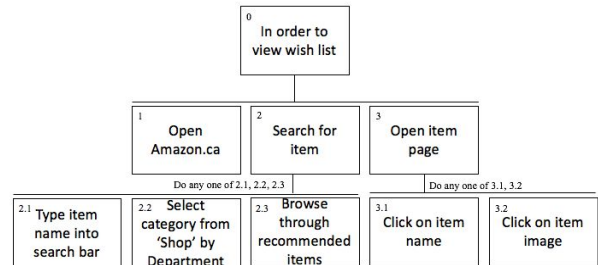**Figure 7 – Alibaba, View Wish List**
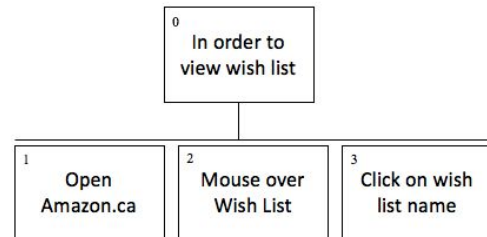

Figure 8 – Amazon, Find Item

Figure 9 – Amazon, View Wish List

APPENDIX B

Features Omitted
Due to time and technical constraints the following
features from the original design were omitted:

1. Search bar and search result suggestions drop-down panel do not function. x Pressing "Go!" will always take user to "laptop" search result page.
2. Wish list drop-down menu on the top menu bar intended to have more functionalities such as "create new wish list". Users should be able to view and manage all wish list items through the drop menu anywhere on the website.
3. Ability to hide the whole search refinement panel, ability to hide/expand refinement options were also omitted.
4. Price change in terms of percentage should be displayed besides price tags of all on sale items.
5. Adding and Deleting items from wish lists do not work.

Dead Links and Placeholders

Due to the focus of this paper is on only searching items and managing wish list , the following links/buttons do not possess any functionality:
1. Not all categories have appropriate pictures attached to it on the top menu bar.
2. None of the links under "My Account" work
3. Links inside footer area do not work
4. Icons and links regarding Shopping Cart do not work
5. Search Refinement options do not work

6. Sort option, number of items displayed on a page and page selection do not work on search result page

Website Images:

https://www.coatesvillearealibrary.org/computers-wifi/
http://bootnet.biz/computer-improvements/
https://steemit.com/games/@lovetosteemit/video-games
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https://www.choice.com.au/electronics-and-technology/home-entertainment/game-consoles