



Heuristic Evaluation

Project Client: Science World at TELUS World of Science

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Simon Fraser University

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## EXECUTIVE SUMMARY

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This report documents a heuristic evaluation of both the Science World website and its dedicated resource site. The goal of the evaluation is to use Jakob Nielsen's revised heuristic principles to create a prioritized list of usability problems to bring to the developer's attention, followed by a set of recommended solutions to guide future changes to the website. The following is a list of problems that were encountered along with their suggested improvements, respectively.

### Problems

- Site structure
- Arduous Check Out Process
- Missing Information
- Navigation Consistency
- Following conventions

### Solutions:

- Improve site organization
- Improve ticket checkout process
- Include valuable information
- Fix navigation inconsistencies
- Follow conventions

## 1. SCENARIO

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### Introduction

This report is written to describe the heuristic evaluation process using Jakob Nielsen's revised heuristic principles and documents the evaluation of the September 14, 2013 version of the Science World main website and Science World resource website. This report will discuss the role of our product evaluation team and the goals of this evaluation, followed by an analysis of our evaluations. After describing the problem areas of the websites according to their priority, we provide a list of suggested improvements to improve the sites' usability.

### Product Description

ScienceWorld.ca is the main website of Science World at TELUS World of Science, which is a non-profit organization that connects people in BC with science and technology. Science World's main website offers information for its visitors including special events that are hosted, pricing, operation time and much more.

Resources.ScienceWorld.ca is the resource website of Science World. It's the sub-website under the Science World's main website. Unlike the main website, the resource site is rich with activities, knowledge, scientific experiments etc. Visitors can register and download resources for free.

## Role of Evaluation Team & Objectives

As a product evaluation team, our role is to analyze the products' usability using Jakob Nielsen's heuristic evaluation methods. We need to define 5 tasks that we feel are common tasks among users that would help us to effectively evaluate the system. Our ultimate goal is to provide a list of recommendations which would help the web-developers improve the Science World sites to give users a great user experience. Apart from this, we are aiming to submit this evaluation to Science-World's web-development team, and to learn from experience how our approach can be improved for future studies.

## 2. METHODOLOGY

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Our product evaluation team used Jakob Nielsen's heuristic principles to evaluate the Science World websites. Our experts first defined 5 usability tasks that reflect how users frequently use the websites.

#	Task	Rationale
1	Book a summer camp field trip for 40 children and 4 camp leaders on Thursday, preferably at 9:30 AM (Main Website)	We came up with this task because booking trips for large groups of children is a frequent task that occurs during summer time.
2	Look for special events/exhibitions being held, note the display period and time that it's available. (Main Website)	Many visitors would like to know what is being shown at the Science World before visiting and would want to know when the exhibitions change
3	Purchase tickets (Main Website)	Science World has a dedicated ticket website that is given high importance on the main page. This is also a common task among visitors who do not wish to wait in line for tickets.
4	Download Balloon Hovercraft (Resource Website)	Downloading resources is an essential part of the resource site and we want to make sure the users are able to easily find what they are looking for
5	Login/Register (Resource Website)	The resource site requires users to register in order to download resources so this is an extremely important task

After defining these five tasks, we individually evaluated the sites in order to avoid influencing each other's evaluation. We then combined our evaluations into a data summary sheet (see Appendix 2-A) and rated the severity of each problem (with 4 being the most severe cases that hinder usability). From this, we clustered the problems into five general issues and listed them according to priority level. Last but not least, we came up with recommendations for each issue. Below is a list of heuristic principles that are used to evaluate the website (for a detailed description of each principle, please see Appendix 3):

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

### 3. RESULTS & INTERPRETATION

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#### Summary

Combining our heuristic evaluations resulted in a total of 33 instances that violated Nielsen's heuristic principles (please see Appendix 2-A for the complete data summary sheet). After assessing the severity ratings and violated principles, we organized the problems into 5 distinct issues. The following chart lists these problems according to their priority (which is based on our expert consensus and the severity ratings of each problem), with 1 being the concern that should be given the highest priority. The column on the right lists the principles that are violated by each problem.

Priority	Problems	Heuristics Violated
1	Site Structure/Organization	Consistency and standards Recognition rather than recall
2	Arduous Check Out Process	Flexibility and efficiency of use User control and freedom Error prevention Help users recognize, diagnose, and recover from errors
3	Navigation Consistency	Consistency and standards User control and freedom
4	Missing Information	Help and documentation Recognition rather than recall
5	Following Conventions	Aesthetic and minimalist design Match between system and the real world

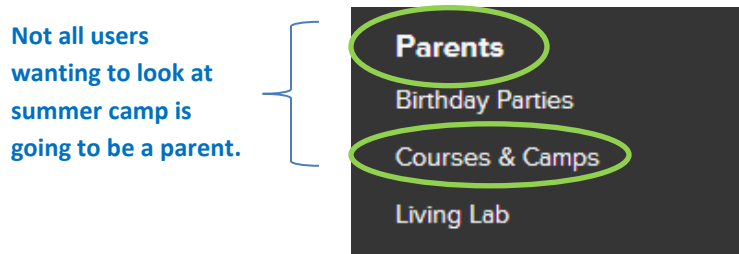
#### 1. Site Structure

While going through the tasks, the biggest issue that every evaluator came across was the fact that the structure of the site is lacking an organized separation between content. In essence, the headings do not describe the content of the sections very well. This issue is given the highest priority because the problems happen frequently, users cannot overcome them quickly, and the process to overcome the problems is inconvenient and, at times, taxing for the user. Evaluators

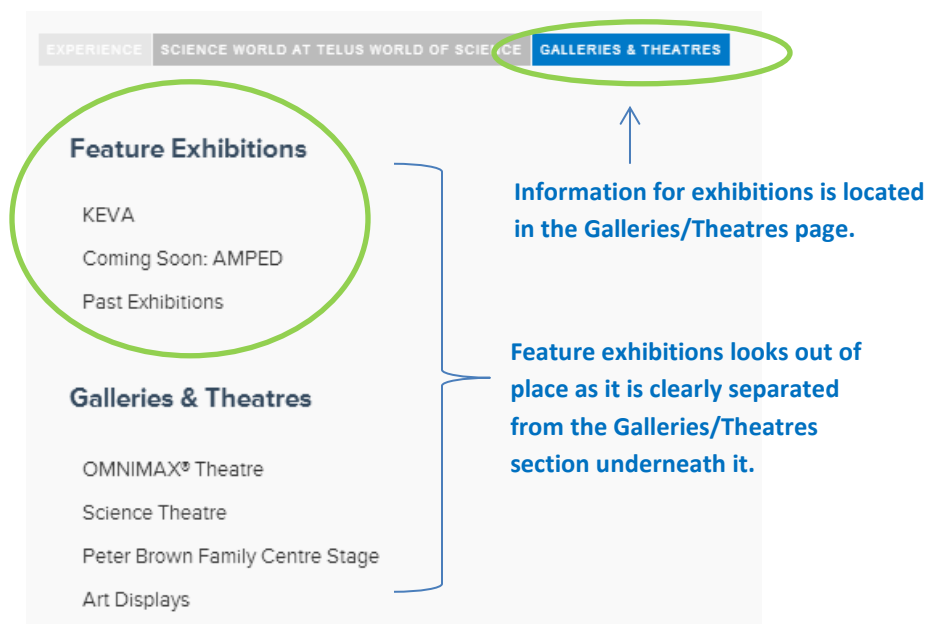
found that they had to enter a number of pages before finding the information they were looking for. General users will have to explore the site first in order to find information, and then learn to ignore headings/link labels, and remember where certain information is located for future visits.

*Examples*

The Science World site divides a number of pages under two categories: “Parents” and “Educators”. These two categories contain information for summer camps and school field trips respectively. For a young adult working as a camp leader, or who is generally responsible for bringing a large group of kids to Science World, neither of these categories is applicable which would result in the said person to completely miss out on valuable information. Moreover, booking a field trip under the educator heading only applies to school field trips, which camp leaders learn only after attempting to book the trip through the reservation page. Summer camp trips are located under “Summer Camp Science” which is hidden inside the “Courses & Camps” page under the “Parent” heading.



Another instance of a heading that does not describe the content is the case of the “Exhibitions” page. There is no section solely dedicated to exhibition information at Science World. The only clear link to the current exhibition is located on the homepage; however, users on other pages must visit the page titled, “Galleries/Theatres” to access this information – terms that are not synonymous with “Exhibitions”.



The Resource site also includes an instance of this problem. “Activity”, “Demonstration”, “Exploration”, “Game”, and “Make + Take”, are titles of pages that fall under the activities section, but are clearly not indicative of the resources contained within them.

## 2. Arduous Checkout Process

The checkout process in Science World’s tickets page violates the heuristic principles of flexibility and efficiency of use, user control and freedom, and error prevention. This issue is given the next priority because of the fact that purchasing tickets can be untimely and has the potential to annoy users. Using the tickets page is simple at first glance, but once a mistake is made, users have no easy way to correct their problems. Users are also given limited control of the system which oftentimes forces users to start the process from the beginning in order to complete tasks. While the problems can be overcome and users are able to purchase their tickets eventually, the process is drawn out and was a common complaint among evaluators, making this a high priority issue.

### Examples

At the checkout page, users are not given the ability to add more tickets. There is a 15 ticket limit at the admissions page, but users are able to go back and keep adding more tickets, rendering this limit to be useless and increasing the time it takes to complete the task. To add tickets, users have to go back to the admissions page and go through the purchasing process from the beginning. Removing tickets is just as arduous, as clicking “remove” does not give users a confirmation to delete tickets, nor are users given the ability to remove a certain number of tickets. Rather, hitting the “remove” button instantly deletes all quantities of that type of ticket and users are forced to add tickets back to their cart.

15 quantity limit each time users want to add tickets to the cart.

General Admission - Wed, Sep 18, 2013 - Exhibit Levels - Remove						
Remove	Type	Quantity	Price	Total Processing Fee	Total	
Remove	Public Adult	15	\$25.00	\$37.50	\$412.50	
General Admission - Wed, Sep 18, 2013 - Exhibit Levels - Remove						
Remove	Public Adult	15	\$25.00	\$37.50	\$412.50	
General Admission - Wed, Sep 18, 2013 - Exhibit Levels - Remove						
Remove	Public Adult	15	\$25.00	\$37.50	\$412.50	

GST: \$61.89  
Total: \$1,299.39 CDN

There is no option to change ticket quantities, and clicking the remove button instantly removes all quantities associated with the ticket on the list.

In the event that users are taking a long time to complete the purchasing process, they risk being automatically logged out of the system. There is no message box or text that appears to alert users that they have 10 minutes to complete the process. Any progress made will be lost and users are forced to start from the beginning once again.

### **3. Missing Valuable Content**

Not having information readily available for users is a major problem, and evaluators found this to be the case when completing the second task (look for special events/exhibitions). Users entering a site expecting to find information will be disappointed and frustrated when that information is not available. This breaks the heuristic principle of help and documentation as well as recognition rather than recall because users are not given proper information to complete a task, and are sometimes expected to remember information on one page because it is not presented on another. This issue is given a relatively high priority because users cannot easily overcome a problem if they come across an instance where information is unavailable.

#### *Examples*

Visitors of the site may be people looking to see what events are happening or what exhibitions are currently open, but simply reading a description of the event/exhibition is not always enough. Unfortunately, exhibition pages do not contain info regarding how long the exhibition is open for – they only contain descriptions and photos of the featured exhibition and future exhibitions. Furthermore, visitors wanting to purchase tickets are not made aware of extra fees until they finish the checkout process.

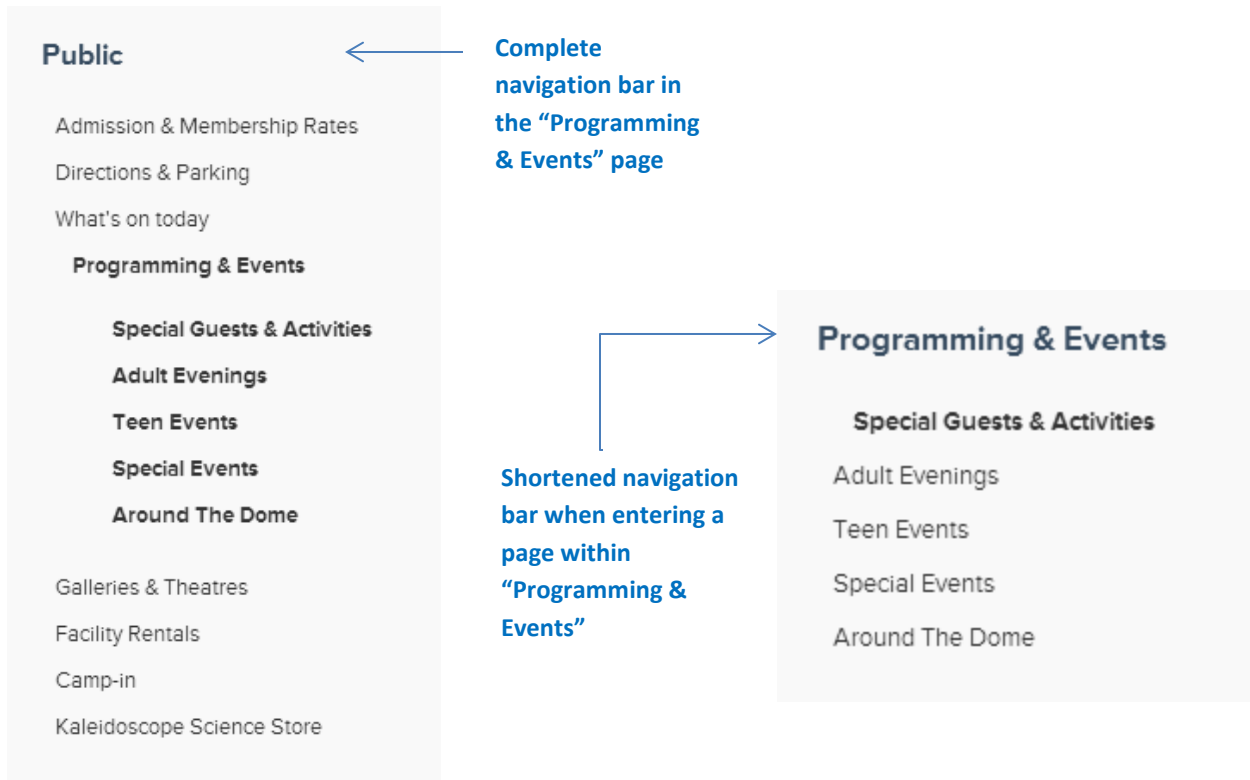
### **4. Navigation Consistency**

While the menu bar at the top of the page maintains consistency across all pages, the navigation on the left column of each page change constantly, making it difficult for users to familiarize themselves with the system. This issue breaks the heuristic principles of consistency and standards. It is given next priority on the list because it substantially extended the time it took for evaluators to complete certain tasks, having to move back and forth between using the menu bar at the top and the navigation bar on the left. Having consistent navigation on the left column is a common standard among websites, so users expect the same links to appear from page to page (if not the entire site then at least the pages within a section). When the links on the navigation bar are suddenly made unavailable, users have to go through the main menu or traverse the pages they visited to find the link they were looking for.

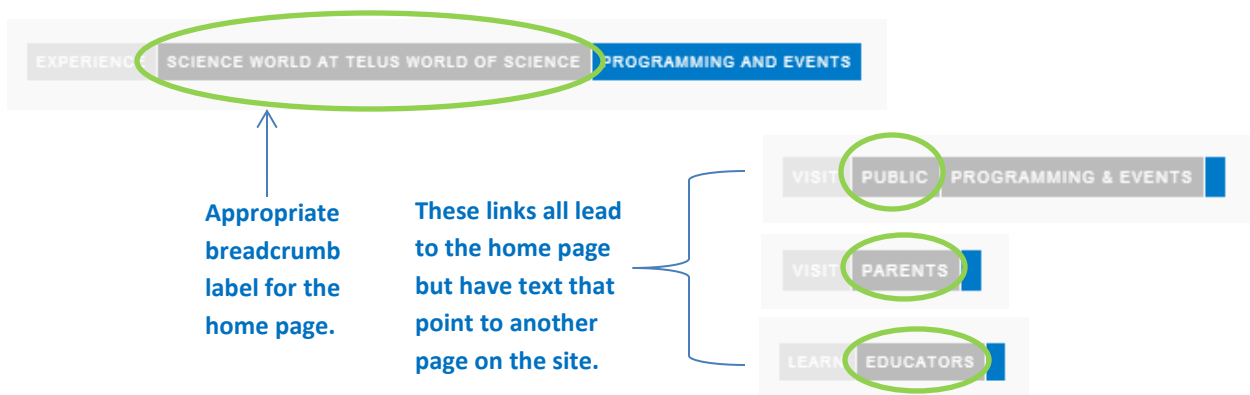
#### *Examples*

When in the “Programming & Events” page, the left navigation contains all the links that fall under the “Public” section. The link, “Programming & Events”, is subsequently bolded along with various events pages. Clicking on a sub link in “Programming & Events” (such as “Special Guests & Activities”) leads to a new page with a completely altered navigation. This new navigation has removed all the subsections of “Public”, limiting the menu to the pages within “Programming & Events”. Users wanting to look at the other pages within “Public” have to go to the top menu to see their options, or continuously hit “Back” on their browser to return to the “Public” page.





The breadcrumbs provided on the “Public” page are another example of inconsistent navigation, though the inconsistency lies in the labelling. Throughout the website, the breadcrumb link that leads to the website’s home page is oftentimes labelled “Science World at Telus World of Science”. This label changes in a number of pages throughout the site. When in “Special Guests & Activities” (which falls under “Programming & Events”), the breadcrumb that links to the home page is labelled “Public”. This is not only inconsistent, but it is misleading as users will be expecting the link to go back to the “Public” page.



### 5. Following Conventions

The issue with following conventions is simply an aesthetic problem, which can easily be fixed and does not hinder users from completing tasks, thereby making this a low priority issue. A

design that follows conventions makes it easier for users to familiarize themselves with the interface. These websites are easier to learn, consequently making tasks quicker to accomplish. All evaluators found at least once instance in the Science World website which does not follow conventions, making it harder for them to understand the interface and, at times, feel uncomfortable with the design decisions made.

*Examples*

Icons are everywhere, and there are conventions made in icon usage that allows a site to be universally accessible in the sense that language will not hinder a user from using the site. The Science World website has two cases that have issues with icon usage: the “Up” icon on every page and the icons used during registration in the resource website. Most websites use an arrow pointing up to indicate a button that leads the user back to the top of the page. The Science World website uses an icon of a dome, symbolizing Science World. While it connects to the website’s branding, it is not indicative of the button’s purpose. The icons during registration are also ambiguous and require users to hover over them to read the tooltip, or scroll to the bottom of the page to learn what they mean.

Science World’s icon to scroll back to the top



Buttons used in other websites have either an arrow or text describing the button’s function



Tumblr



Twitter



Pinterest

Other aesthetic issues include the use of colour and the positioning of information on a page. When buying tickets, users are shown bright red text that ask them to choose a date, which is not necessarily information that requires an alarming colour. Red is often used for very important information and can make users feel as if something is wrong. Additionally, the positioning of elements on a page can also take users off guard when they are used to certain conventions. For instance, the security code is placed at the beginning of the registration page as opposed to the end of the form (which is the norm in most website forms).

The security code appears at the beginning of the form

Security Code:

Enter Security Code:

First Name:

Last Name:

Email:

Username:

**Register**

⚠️ Required field | 📄 Field visible on your profile | 🚫 Field not visible on profile

**Explanation for icons does not appear until the end of the form**

Thanks for your interest in Science World Resources. If you have any questions please contact [teachersresource@scienceworld.ca](mailto:teachersresource@scienceworld.ca)

## 4. SUGGESTED IMPROVEMENTS

### 1. Improve Site Organization

Site structure is an important aspect that affects how users find their information. There are pages on the Science World main site where information and data are displayed in a logically way. However, some pages may mislead the users and cause frustrations, depending on the roles of the user.

As one of the tasks, booking a field trip in a group setting was evaluated and recommendations are suggested as follows. Booking group field trips should have its own separate section and not fall under specific categories such as “Parent” or “Educators”. First of all, summer camp leaders may consider themselves as educators, and hence, they would search under the “Educators” page. The “Field Trip Rate and Booking” title encourages them to continue their action. However, summer camp leaders will finally realize that the page is specifically designed for teachers during registration. “Courses and Camps” is also not applicable to summer camp leaders as it is designed for parents to enroll their children into the Science World camps. Although the group rate admission fee is under “Admission and Membership Rates”, that is the least area where summer camp leaders would look for when, or so it seems, relevant information under another area. Therefore, having a separate section specially designed for booking a field trip is a highly suggested method to avoid user frustrations. This page essentially centralizes group field trip information in one place for parents, teachers, and summer camp leaders.

Exhibition information seems to be well hidden in the “Galleries and Theatres” page. To users, this may not be the best approach as exhibition is quite a large subject by itself and they may not expect exhibition information under such page. Furthermore, exhibition may include and not limited to artwork display and performance art. For example, Body Works was an exhibition featuring the science of human body. However, this topic is not suitable for the “Galleries and Theatres” page. A solution to this would be giving Exhibitions its own page. The Exhibitions title suggests that the page contains related information. Another advantage is that it does not limit only to artwork and performance art, which it is currently implying on the web page.

### 2. Improve Ticket Checkout Process

Being able to purchase admission tickets online through the Science World webpage saves users’ valuable time from lining up at the door. However, ordering tickets through the page seems to be an inconvenient and arduous process.

First of all, clicking remove during checkout removes all quantities of an item, and when user wants to add tickets to the checkout, the user has to go through the entire purchasing process again. This may cause frustrations from users when they suddenly had to change tickets amount. However, the solution is that users should be able to change quantities of a ticket in the checkout page, and the amount of tickets when initially purchasing a ticket should not be limited. Furthermore, there should be a confirmation box in case of users accidentally clicking the incorrect button and leading to a devastating result.

Secondly, a user only has 10 minutes to complete an order. The main issue is that the user is not alerted about the time. He or she would have no idea when the transaction must be completed and may potentially lead to user frustrations. The solution to this is to alert users that they have a time limit when they first enter the page and provide a progress bar or timer. With a progress bar or timer, users will be able to see how much time they have left visually, and this may enhance the purchasing process.

### **3. Include valuable information**

The Science World webpage provides a full spectrum of information for parents, educators, and the general public. However, some pages are missing important information.

For example, the “Exhibitions” page does not indicate how long the exhibit is on for as well as whether special events are included in the admission fee or not. This information is important to users, and with the lack of details, it may discourage users to attend the events. Therefore, it is recommended to ensure each page includes all relevant information. This way will allow users to obtain important information without looking elsewhere or leaving the site with questions.

Furthermore, processing fee is not mentioned on ticket-related pages until the user reaches the “Complete Order” page. This could potentially frustrate and discourage users as they may think the cost stated on the page is the full price. Hence, related pages should include all additional fees so that users are not taken aback at the checkout.

### **4. Fix Navigation Inconsistencies**

The Science World main webpage provides tools, such as the navigation panel and breadcrumb, which allow users to browse by recognition than recall. However, there are problems that may mislead users.

There are numbers of inconsistencies with the navigation panel. For example, going further into the “Programming and Events” page changes the links in the navigation panel. In other words, clicking on a link narrows the menu to the special events, restricting the user from easily choosing other pages within the public section. To resolve this problem, the navigation panel should contain consistent pages and links. This will allow users to quickly browse other information without having to switch between menus. Similarly, breadcrumbs are inconsistent when you enter a specific events page. The label for home while in “Special Events” is “Public”, whereas other pages state home as “Science World at TELUS World of Science”. Users may be confused and question if the terms above having the same meaning. The solution to this is to keep breadcrumb labels consistent across the pages. Since many pages already use “Science World at TELUS World of Science” as the link to the home page, and because that text is more appropriate for a link directing users back to the entrance of the site, all other breadcrumb links should follow suit so as not to confuse users.

### **5. Follow Conventions**

The Science World main site has an innovative, clean design that attracts users. However, there are several instances that website design conventions are not followed on both the Science World main site and the Resource site. When designs do not follow conventions, users may have a

difficult time navigating and operating tasks because they have to spend time adapting to the new conditions.

The functionality of a “scroll to top” button is useful when users want to scroll to the top from the bottom of the page. The main webpage implemented such feature on the top right corner of the page. However, this button used the shape of a dome, which would represent the Science World logo. This icon leads the users to think that it takes them to the Home page. Hence, the icon should be replaced with a more commonly used arrow that points up.

Red colour often means something is incorrect or requires correction. On the Resources page, bright red colour appears when selecting the date to purchase tickets. It is alarming and looks as if something is wrong on the page. A much less serious colour, such as blue or green, would be easier on the eyes and less alerting.

Lastly, placements of items should also be placed at locations that are logical or convenient to the users. The Resource page places the login fields on the bottom left as opposed to the top right corner. Users may not be used to this placement and need to look for the login fields. Therefore, the login fields should be moved to the top right corner of the page. The security code should be placed at a logical location as well. Normally, the code is the last item being input before creating an account. This does not necessarily affect user’s ability largely. However, users are familiar with seeing this field at the bottom. Therefore, it should be placed to the end of the signup process to follow conventional standards.

## 5. RESOURCES

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Nielson, J. (1995, January 1). *10 usability heuristics for user interface design*. Retrieved from <http://www.nngroup.com/articles/ten-usability-heuristics/>

Nielson, J. (1995, January 1). *Severity ratings for usability problems*. Retrieved from <http://www.nngroup.com/articles/how-to-rate-the-severity-of-usability-problems/>

## APPENDIX 1: REFLECTION

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After finishing our evaluations, we believe this is an effective approach that we can use for future usability study. Because each of us did our own individual evaluation, we were able to work independently without influencing each other's evaluation. We also achieved greater variability of errors found on the product. Other positive aspects of the method include assessing relevant portions of the UI and ensuring features of interests are evaluated. Stepping through the interface using representative user tasks is a good method to structure the evaluation in a way that eliminates unnecessary exploration, thereby resulting in time spent on actual uses of the interface.

What we found did not work well is the fact that there were cases when evaluators had different interpretations of a task. This led to results that had to be scrapped and work that had to be redone to ensure we were on the same page. On a positive note, this led to new errors found that would not have been found otherwise.

We would definitely recommend this approach because of the unbiased and directed methods. If budget allows, we would recommend having five evaluators for a greater variability in the kinds of errors found. Having three to five evaluators ensures finding 66-75% of usability problems. Completing more tasks can also be beneficial in discovering more usability issues in the site.

## APPENDIX 2-A: DATA SUMMARY SHEET

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The severity ratings for each problem follow Nielsen's severity scale (1995). This scale ranks issues based on a combination of factors including the frequency of the problem, the difficulty level to overcome the problem, and the likelihood that repeat defects will annoy users.

- 0 = I don't agree that this is a usability problem at all*
- 1 = Cosmetic problem only: need not be fixed unless extra time is available on project*
- 2 = Minor usability problem: fixing this should be given low priority*
- 3 = Major usability problem: important to fix, so should be given high priority*
- 4 = Usability catastrophe: imperative to fix this before product can be released*

Usability Defect Description	Found by Evaluators	Evaluator's Comments Regarding Defect	Severity Rating	Recommendations
<b>Task 1:</b> No section dedicated for summer camp; rather, summer camp is available under "parents" or "admission & membership"	Lagunsad To Heng	<p>Booking events shouldn't fall under a specific title or else it prevents people from finding those sections (have general booking section as opposed to separate parent and teacher sections when it comes to children's activities)</p> <p>Summer camp leaders can be categorized as Educators and it is a field trip. Did not know I was at the wrong location until reaching School Full Name. Perhaps group summer camp and school field trips together.</p> <p>The system should provide clear and understandable tabs so it's easy to find links under any particular tab.</p>	4	Booking group trips should have its own separate section and not fall under specific categories like "Parent" or "Educators"
<b>Task 1:</b> When the user scrolls down a page, an icon appears on top right of the page. The icon looks like a dome icon which would represent the Science world logo. The user would think that this would be a button that would take the user to the Home page. However, it's not a Home button, it's actually a scroll up button. It's a great functionality that would take the user back to the top of the page without having to scroll up.	Heng	The standard icon for that would be an arrow pointing up. A dome icon is not a clear indication of a scroll up functionality.	1	Dome icon should be replaced with a more commonly used arrow pointing up
<b>Task 2:</b> Numerous inconsistencies with the navigation on the left column; Going further into "programming and events" changes the links in the navigation on the left side of the	Lagunsad To	Navigation on the left should be consistent and also contain all links pertaining to that section (sections can have sub sections, but don't get rid of other	3	Keep the left navigation consistent across all pages

page (e.g. clicking on a link narrows the menu to the special events so you can't easily choose other pages for the public)		sections when in the sub sections)  User should see consistent information on the left column and the page		
<b>Task 2:</b> Breadcrumbs are inconsistent when you enter a specific events page. Label for home while in special events is "Public", while the label for the home page on all other pages is "Science World at Telus World of Science"	Lagunsad	Breadcrumb labels should be the same if they link to the same page	2	Keep breadcrumb labels consistent across all pages
<b>Task 2:</b> Difficult to locate exhibitions because exhibition information is found under "Galleries/Theatres"	Lagunsad	Headings for pages need to describe the content better	4	Give Exhibitions its own page
<b>Task 2:</b> Pages are missing valuable information: exhibition page doesn't say how long exhibit is on for, nowhere indicates whether special events are included in admission fee or not	Lagunsad To	Exhibit pages should include more information  User should be reminded about some special events are free with admission.	4	Ensure each page includes all relevant information for users
<b>Task 2:</b> All events are listed on one page, and the page doesn't provide the user with any shortcuts. If there are 20 events on the page, the user has to scroll down and see each event one by one.	Heng	A better way to help the user look for event is to include links on the top of the page. The listed links show all the Events (can just be titles) so if the user is interested in any event, the user can click and it would scroll to that section of the page.	2	Provide links to specific events at the top of the page so that users can quickly glance at available events and easily access ones they're interested in
<b>Task 2:</b> Categorization for prices of events are "Early Bird" and "Regular" which aren't indicative of who the buyers will be	Heng	The user would want to know if he is qualified as an early bird or a regular. A question mark icon next to each of the term that the user can click and see what each term means would help the user identify himself as one of the two.	2	Move the description of the ticket next to the ticket price as opposed to underneath it so that users don't overlook the information
<b>Task 3:</b> Public student and	Lagunsad	There shouldn't be two	1	Tickets that cost the



public youth cost the same but fall under two different categories		different options for student and youth when they cost the same		same price can be grouped together to avoid confusion, especially when the options are so similar like "student" and "youth"
<b>Task 3:</b> No description for the age cut offs when buying tickets	Lagunsad	There should be indications of the actual ages that fall under the categories of "Adult" and "Youth"	2	Provide the same information from the admissions page on the page when purchasing tickets
<b>Task 3:</b> Clicking remove in checkout removes all quantities of an item, and when user wants to add tickets to the checkout, the user has to go through the entire purchasing process again. User is also limited to adding only 15 tickets at one time (but users are allowed to go through the process again to continue adding tickets to the final checkout)	Lagunsad To Heng	Users should be able to add/remove tickets without having to leave the checkout  User should be able to change quantity of tickets in chart.  Allow the user to buy more than 15 tickets without having to do it multiple times.	4	Give users the ability to change quantities of a ticket in the checkout page, and do not limit amount of tickets when initially purchasing a ticket
<b>Task 3:</b> No confirmation box when you click on remove (automatically removes the item in the checkout)	Lagunsad	Should have a confirmation box in case the remove button was accidentally clicked	2	Add a confirmation box so that users don't accidentally delete tickets
<b>Task 3:</b> Adding new items to the checkout doesn't update the current checkout, it appends the new items on the list which makes it cluttered and confusing	Lagunsad	Page should automatically update quantities with new items so that users aren't bombarded by unnecessary headings	1	Organize the checkout better by removing redundant information
<b>Task 3:</b> Processing fee is not mentioned on the General Admission Rates page until user reaches "Complete Order".	To	User should see "General Admission Rates" on the Special Event page.	2	Include all additional fees up front so that users aren't taken aback at the final checkout
<b>Task 3:</b> System displays 10 minutes limit for completing an order. The time is blended into the paragraph of text. Time does not count down. User needs to time the 10 minutes.	To	User should be alerted that s/he has _____ time left to complete an order. Display a progress bar with real-time count time.	3	Tell users that they have a time limit when they first enter the page and provide a progress bar or timer
<b>Task 3:</b> Bright red colour when selecting the date to purchase tickets is alarming and looks as if something is wrong on the page	Heng	Should use a much less serious color, blue or green would do a better job.	1	Change the text colour from red to a less alarming colour
<b>Task 3:</b> Date is repeated when	Heng	Should reduce the	1	Remove redundant

the user is selecting a day to attend an event which is unnecessary information		information presented and avoid redundancy		information by getting rid of the date duplicate
<b>Task 4:</b> No complete list of resources in alphabetical order in case the user wants to browse through all items without having to enter different categories	Lagunsad	Should have an appendix of all resources in alphabetical order	2	Provide appendix with all resources in alphabetical order
<b>Task 4:</b> No obvious difference between category names: "activity", "demonstration", "exploration", "game", and "make and take"	Lagunsad Heng	Names of resource groups should be more descriptive and explain the difference between them  Provide clear labels so the user can find specific activities easily	3	Sections should be described clearly on the home screen to prevent user confusion
<b>Task 4:</b> Page requires user to login before downloading any content but it doesn't have a shortcut to it.	To Heng	User should have be able login or register button quickly.  There should be a register button next to the error dialogue so the user and proceed. The user has to find the register button by himself which is located on the left panel.	3	Add a shortcut to the login/register button on the resource page
<b>Task 4:</b> "Objectives" of the lesson are placed after "Introduction"	To	Users want to know briefly about the lesson before going into it.	1	Move lesson intro to the begin of the page
<b>Task 4:</b> On the home page, there is an untidy block of Keywords that are not really needed and each page has a section for tags that are rarely needed	Heng	It would be a better idea to group them up or take them off.	1	De-clutter the page by removing the keywords which may not be used very frequently
<b>Task 4:</b> In every section, the user has to scroll down to find the activity that he wants. Some section has 10 to 20 activities. The system doesn't provide a shortcut for the user to access any specific activity.	Heng	There should be a links on the top of the page showing how many activities are there in that page and link those the actual activities on the page.	2	Provide links for the activities at the top of the page prior to describing the activities underneath
<b>Task 5:</b> Register button is really small on the bottom left of the page	Lagunsad	Register should be located in a more convenient spot like the upper right	1	Move the register button to a more obvious location such as the top right of the page

<b>Task 5:</b> Login section appears when signing up which is unnecessary and only clutters the page	Lagunsad	Login shouldn't appear in the sign up page because users don't need to login in yet	1	Remove the login section on the sign up page
<b>Task 5:</b> Page proceeds with registration even when one or more mandatory fields are not completed.	To	User should be alerted when the field is skipped.	3	Ensure that the registration form is complete before finishing the sign up process
<b>Task 5:</b> No explanation on icon meaning until user reaches the bottom of the page.	To	User should understand what icons mean before completing the registration.	1	Move icon descriptions to the top of the page
<b>Task 5:</b> Icon explanations are poorly displayed at the bottom of the page. Too close to the register button.	To	Each icon should occupy one line at a time to decrease visual distraction.	1	Rearrange the icons so that they don't fall on the same line
<b>Task 5:</b> Security Code is placed at the top.	To	Users are used to entering the security code last	1	Move the security code to the end of the sign up process to follow conventional standards
<b>Task 5:</b> Icons are difficult to remember	To	User should be able to grasp the meaning of the icon by first glance, instead of going back to the bottom of the page for its meaning.	1	Remove the icon that indicates what will be visible on the profile to reduce clutter, and add an asterisk to the fields that are required to follow conventional standards
<b>Task 5:</b> Registration asks for school district that user is from, but not all users are going to be teachers; this only clutters the page	Heng	Remove unnecessary information unless it pertains to the user	1	Only ask for the school district if the user is a teacher; otherwise, do not provide the drop down menu
<b>Task 5:</b> Login is located in a strange place on the bottom left	Lagunsad	Login should be located in a more convenient spot, perhaps in the top right where most sites contain the login	1	Move the login fields to a more convenient spot such as the top right of the page
<b>Task 5:</b> Once the user has logged in, the user's profile page shows up with a plenty of information about the user. It also shows "Hits" which is not a clear status of what the system tries to say. The system should speak the user's natural language. Using the word "Hits" doesn't tell the user anything.	Heng	Use the word that the user would understand. If it's not usually needed, then it shouldn't be displayed on the page for the user to see.	1	Explain what "Hits" means so that users know what information is presented to them

## APPENDIX 2-B: INDIVIDUAL DATA SHEETS

**Evaluator: Tim Heng**

<b>Task and specific location in task</b>	<b>Heuristic broken</b>	<b>Usability defect description</b>	<b>Evaluator's comments regarding defect</b>
Task 1: book a summer camp field trip for Thursday at 9:30	User control and freedom	There's no clear indication of where the user can book a field trip. The user doesn't know which tab it's in so the user has to go through every tab one by one to check.	The system should provide clear and understandable tabs so it's easy to find links under any particular tab.
	Consistency and standards	When the user scrolls down a page, an icon appear on top right of the page. The icon looks like a dome icon which would represent the Science world logo. The user would think that this would be a button that would take the user to the Home page. However, it's not a Home button, it's actually a scroll up button. It's a great functionality that would take the user back to the top of the page without having to scroll up.	The standard icon for that would be an arrow pointing up. A dome icon is not a clear indication of a scroll up functionality.
Task 2: Look for special events/exhibitions being held	Flexibility and efficiency of use	All events are listed on one page, and the page doesn't provide the user with any shortcuts. If there are 20 events on the page, the user has to scroll down and see each event one by one.	A better way to help the user look for event is to include links on the top of the page. The listed links show all the Events (can just be titles) so if the user is interested in any event, the user can click and it would scroll to that section of the page.
	Match between system and the real world	One of the events is called Science World After Dark, the website provides plenty of information about the event including the date of the event and the prices. However, for the prices the system categorizes the customers as "Early Bird" and "Regular". Who are "early	Help and documentation would help (explained down below)

		birds"? People who wake up at 6am and go to bed at 10pm? But the event is from 7pm to 10pm. And who are the regulars? Who is considered as an early bird and who is considered as a regular?	
Task 3: Buy general admission tickets for 2 adults, 2 children, and a senior	Visibility of system status	"Click icon to open/close calendar" in bright red color. Normally red color means there's an error or something's wrong. However, this is just an instruction to let the user know the user can click the calendar icon. When the user first opens this page, he would see this dialogue in red without even doing anything. It looks like the user does something wrong. It makes the user feels guilty even though there's nothing wrong.	Should use a much less serious color, blue or green would do a better job.
	Aesthetic and minimalist design	Moreover, the system repeats itself of what date the user has select. "Select Date: Sep 17, 2013" near the calendar icon yet it tells the user again just right below it. This is not necessary, too much unnecessary information.	Should reduce the information presented. Avoid redundant.
	Help users recognize, diagnose, and recover from errors	When the user selects how many tickets he would like to purchase, the dropdown menu only allows 15 tickets maximum. Why is the user limited to only 15 tickets?  The user can keep adding the additional items to get more tickets but the user cannot have more than 15 in any certain item. This also breaks Flexibility and efficiency of use.	The system should provide the user with the reason why. Allow the user to buy more than 15 tickets without having to do it multiple times.

Task 4: Download the “Balloon Hovercraft” activity	Aesthetic and minimalist design	On the home page, there is an untidy block of Keyboards that are not really needed.	It would be a better idea to group them up or take them off.
	User control and Freedom	There’s no clear indication of where the user can find “Balloon Hovercraft” activity from the listed tabs. Each page provides breadcrumbs but they’re restricted to what level the user can backtrack. The user can only click “Make + Take” so the user is restricted to only able to backtrack 1 level.	Provide clear labels so the user can find Balloon Hovercraft easily. Allows the user to navigate through pages by not restricting the breadcrumbs.
	Aesthetic and minimalist design	Every page has a block of tags which are rarely needed. They add even more unnecessary text to the page that already has a lot of text.	
	Flexibility and efficiency of use	In every section, the user has to scroll down to find the activity that he wants. Some section has 10 to 20 activities. The system doesn’t provide a shortcut for the user to access any specific activity. Currently, there are links for activities but at the bottom of the page for the activities that are on the next page. Thus, it still lacks shortcut for the activities that on the current page.	There should be a links on the top of the page showing how many activities are there in that page and link those the actual activities on the page.
	Help the users recognize, diagnose, and recover from errors	The user must be logged in to download the resources however the system doesn’t provide the user with a quick way to resolve the error.	There should be a register button next to the error dialogue so the user and proceed. The user has to find the register button by himself which is located on the left panel.
Task 5: Create a student account and then login with registered account	Aesthetic and minimalist design	The user needs to fill out the form to register and one of the field is for School District. There’s a drop down menu that the user can pick however it’s	Sort by district number if the user’s class is teacher. Otherwise, sort the list by alphabetical order so it’s easier to find for the user to find if they don’t know

		<p>a long list with lots of options. The options have numbers in front of them and sorted according to the number but not the name. For the user, these numbers have no meaning and it's hard to find a city from the list because they're not sorted or clustered.</p>	<p>the district number.</p>
	<p>Match between system and the real world</p>	<p>Once the user has logged in, the user's profile page shows up with a plenty of information about the user. It also shows "Hits" which is not a clear status of what the system tries to say. The system should speak the user's natural language. Using the word "Hits" doesn't tell the user anything.</p>	<p>Use the word that the user would understand. If it's not usually needed, then it shouldn't be displayed on the page for the user to see.</p>

**Evaluator: Michelle Lagunsad**

<b>Task and specific location in task</b>	<b>Heuristic broken</b>	<b>Usability defect description</b>	<b>Evaluator's comments regarding defect</b>
Task 1: book a summer camp field trip for Thursday at 9:30	Consistency and standards	Summer camp falls under "parents" category so I didn't see it initially since I'm not a parent (had to do a search for "summer camp")	Booking events shouldn't fall under a specific title or else it prevents people from finding those sections (have general booking section as opposed to separate parent and teacher sections when it comes to children's activities)
Task 2: Look for special events/exhibitions being held	Consistency and standards	Going further into "programming and events" changes the links in the navigation on the left side of the page (e.g. clicking on a link narrows the menu to the special events so you can't easily choose other pages for the public)	Navigation on the left should be consistent and also contain all links pertaining to that section (sections can have sub sections, but don't get rid of other sections when in the sub sections)
	Consistency and standards	Breadcrumbs are inconsistent when you enter a specific events page → tried to click on "public" while on "special guests page" to go back to the main special events page that I was in prior, but "public" led me to the home page (whereas "science world at telus world of science" was the label for the breadcrumb link on the other pages)	Breadcrumb labels should be the same if they link to the same page
	Recognition rather than recall	No easy way to access exhibitions (is located under "galleries/theatres") → I had to go to the home screen because I remembered seeing "featured exhibition" there	Headings for pages need to describe the content better
	Help and documentation	Exhibit page doesn't say how long exhibit is on for	Exhibit pages should include more information
Task 3: Buy general admission tickets for 2 adults, 2 children, and a	Consistency and standards Help and documentation	No explanation for difference between public senior/student and public	Confusing for the user; shouldn't have student/youth as



senior		youth	separate options
	Help and documentation	No description for age cut offs	"Adult" and "Youth" are not indicative of the actual ages and can confuse users
	User control and freedom	Clicking remove in checkout removes all quantities of an item and forces me to re-add a ticket	Users should be able to add/remove tickets without having to leave the checkout
	Error prevention	No confirmation box when you click on remove (automatically removes the item in the checkout)	Should have a confirmation box in case the remove button was accidentally clicked
	Aesthetic and minimalist design	Adding new items to the checkout doesn't update the current checkout, it appends the new items on the list so I have to manually calculate the quantities (also a little confusing as it looks like I'm buying tickets for a different date)	Page should automatically update quantities with new items so that users aren't bombarded by unnecessary headings
Task 4: Download the "Balloon Hovercraft" activity	Match between system and the real world	Expected to find "balloon hovercraft activity" under activities in alphabetical order but couldn't find it	Should have an appendix of all resources in alphabetical order
	Consistency and standards	No obvious difference between "activity", "demonstration", "exploration", "game", and "make and take"	Names of resource groups should be more descriptive and explain the difference between them
Task 5: Create a student account and then login with registered account	Recognition rather than recall	Register button is really small on the bottom left of the page	Register should be located in a more convenient spot
	Aesthetic and minimalist design	Login section appears when signing up which is unnecessary and only clutters the page	Login shouldn't appear in the sign up page because users don't need to login in yet
	Consistency and standards	Login is located in a strange place on the bottom left	Login should be located in a more convenient spot, perhaps in the top right where most sites contain the login

**Evaluator: Alvin To**

<b>Task &amp; specific location in task</b>	<b>Heuristic broken</b>	<b>Usability defect description</b>	<b>Evaluator's comments regarding defect</b>
Task 1: Book a field trip for 4 teen summer camp leaders + 40 children	Consistency and standards	User doesn't know summer camp field trip is under Admission & Membership. Misleading when summer camp leads see "Field Trip".	Summer camp leaders can be categorized as Educators and it is a field trip. Did not know I was at the wrong location until reaching School Full Name. Perhaps group summer camp and school field trips together.
Task 2: Look for special events/exhibitions being held at Science World	Recognition rather than recall	Nowhere indicates whether special events are included in admission fee or not.	User should be reminded about some special events are free with admission.
	Consistency and standards	"Around the Dome" is not shown on the Programming and Events page but is shown on the left column	User should see consistent information on the left column and the page
		"Courses and Camps" is not shown on the left column but is shown on the Programming and Events page	User should see consistent information on the left column and the page
Task 3: Buy tickets for 2 adults + 2 children + 1 senior on Tuesday, at 10:00am	Consistency and standards	Processing fee is not mentioned on the General Admission Rates page until user reaches "Complete Order".	User should see "General Admission Rates" on the Special Event page.
	Visibility of system status	System displays 10 minutes limit for completing an order. The time is blended into the paragraph of text. Time does not count down. User needs to time the 10 minutes.	User should be alerted that s/he has ____ time left to complete an order. Display a progress bar with real-time count time.
	Flexibility and efficiency of use	System does not allow user to add tickets to cart without going through the process again	User should be able to change quantity of tickets in cart.
Task 4: Download the "Balloon Hovercraft" activity	Flexibility and efficiency of use	Page requires user to login before downloading any content but it doesn't have a shortcut to it.	User should have be able login or register button quickly.
	Match between system and the real world	"Objectives" of the lesson are placed after "Introduction"	Users want to know briefly about the lesson before going into it.
Task 5: Register as a	Error prevention	Page proceeds with	User should be alerted

student then login with that registered account		registration even when one or more mandatory fields are not completed.	when the field is skipped.
	Match between system and the real world	No explanation on icon meaning until user reaches the bottom of the page.	User should understand what icons mean before completing the registration.
	Aesthetic and minimalist design	Icon explanations are poorly displayed at the bottom of the page. Too close to the register button.	Each icon should occupy one line at a time to decrease visual distraction.
	Consistency and standards	Security Code is placed at the top.	Users are used to entering the security code last.
	Recognition rather than recall	Icons are difficult to remember	User should be able to grasp the meaning of the icon by first glance, instead of going back to the bottom of the page for its meaning.

## APPENDIX 3: HEURISTIC PRINCIPLES

Heuristic Principle	Description
Visibility of system status	The system should notify users about whether or not it is operating, and the time remaining.
Match between system and the real world	The system should use terms, phrases and concepts that users understand. It should also display information in a natural and logical flow.
User control and freedom	The system should provide a way to exit when users accidentally choose an undesired action. This will avoid any extended dialogue after the mistake.
Consistency and standards	The system should provide consistent terminologies, actions in various situations.
Error prevention	The system should prevent a problem from occurring rather than showing an error message. Error-prone conditions should be removed when possible or present users with a confirmation option before they select an action.
Recognition rather than recall	The system should aid users with visible objects, actions, and options, rather than making them memorize any information.
Flexibility and efficiency of use	The system should provide shortcuts for expert and cater to both inexperienced and experienced users.
Aesthetic and minimalist design	The system should only provide relevant or essential information to avoid complicating users' interpretation of the message.
Help users recognize, diagnose, and recover from errors	The system should indicate the exact problem and provide a solution in understandable language.
Help and documentation	The system should provide help and documentation. Such assistance should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.