Usability Test Report for GHOST (Global Hepatitis Outbreak and Surveillance Technology)

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Usability Test Report Details

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Date of Test	: March 2, 2016
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Executive Summary

Team Casper conducted a usability test on 03/02/2016 in a private room at the CDC Visitors Center. The purpose of the usability test was to evaluate the prototype web interface of GHOST and determine the overall usability of the new implementation that was designed by our team last semester. A total of three tests were conducted, and each test ranged from 5 minutes to 10 minutes. Each test was administered to one participant on a powerpoint prototype mockup of the entire system at a time and was separately recorded for audio and screen capture.

Due to the difficulty of scheduling time for a usability study and meeting with the various analysts that were provided to us by the CDC, we ended up having to conduct a single usability test for the four analysts where we had a single member walk through the test script and noted the comments of the other analysts as we went through the test. In order to make up for this, we decided to conduct an additional two usability tests with peer Georgia Tech students acting as users of the system.

Our usability testing was administered on a powerpoint prototype mockup of the entire system and was recorded for audio and screen capture. As a result we produced three separate usability study videos that have been linked to in the appendix.

Overall, all the users did not have many problems in completing each task. However, there were several issues that caused the users' inconveniences during the tests. Some of those issues were:

- Clarity of site navigation as related to button and font sizing
- Saving screenshots of visualizations
- Interpreting the advanced features of the website

This usability test document includes more details about the test methodology, specific questions, findings and recommendations, and finally an appendix with the raw data from the tests.

Introduction

Hepatitis C is a contagious liver disease that is hard to detect and spreads rapidly. According to the Centers for Disease Control and Prevention (CDC), almost 3 million individuals in the US may be afflicted with chronic Hepatitis C. In response, the Division of Viral Hepatitis at the CDC has developed Global Hepatitis Outbreak and Surveillance Technology (GHOST), a system for the detection of Hepatitis outbreaks in the United States. The system is being used internally at the CDC as well as by affiliated State Departments of Health (SDH), who may submit “jobs” involving genomic analysis for the CDC’s high-performance computing (HPC) cluster to process. After the HPC cluster sequences the genomes, it returns a dataset to the user containing information on the relationship between potential patients, based on the similarity of those genomes.

GHOST accomplishes two goals: first, it is the front end for a database of previously sequenced patient genomes. Similarities between the genomes of two patients, A and B, imply that patient A may have infected patient B, vice versa, or that the two patients may be linked through a third patient, C. Second, once a researcher navigates to a specific genomic analysis, GHOST allows visualization of the data in the form of a node-link diagram of patient-to-patient relationships, where nodes are patients and links represent the strength of their genomic relationship.

Methodology

What happened during the usability test
Date of Test : March 2, 2016
Date of Report : March 20, 2016

The CDC usability testing was administered in a standard office meeting room within the Centers for Disease Control's Visitor Center. The participant first signed the consent form, and upon its completion was briefed according to the usability testing script, informing them of the nature and purpose of the testing, the type of tasks they would be asked to do, and thanking them for their time and participation. The additional two student tests were done in reserved conference rooms on an individual basis and underwent the same procedure that the professional analysts provided by the CDC in order to maintain the consistency of the test scenario.

The participants were placed in front of a mock up of the GHOST system. They were given a task to complete, and encouraged to say their thought process out loud. Both audio input and mouse input were recorded to be reviewed afterwards. After the initial evaluation was completed, feedback was gathered from the other health practitioners present. While the experience may not be as thorough as having every user complete the usability testing, we believed that all feedback and insight would be valuable.

Who we tested
Six participants, having the following profile characteristics, evaluated the prototype of the GHOST website.

#	Gender	Age	Nationality	Immigration Status	School Year/Employment Status
1*	F	43	USA	Citizen	Employed
1*	M	51	USA	Citizen	Employed
1*	M	42	Cameroon	Citizen	Employed
1*	F	51	USA	Citizen	Employed
2	M	20	USA	Citizen	Employed
3	M	20	USA	Citizen	Employed

Table 1. Summary of Demographic Survey Results

*Participant 1 designates CDC participants as only one usability test was conducted

Where we tested
The following is a summary of the participants' computing environment:

URL of tested website	webappx.cdc.gov/GHOST
Computer platforms	Mac OS X
Browser tested	Safari
Screen resolution	1280x800
Operating system	Mac OS X
Connection speed	N/A

Table 2. Summary of Test Environment

The physical testing environment chosen was left to the participant because they would be most comfortable testing something unknown of a place of their choosing. The only criteria requested in their choice of location was that it be minimal in distractions. As a result the usability testing was done in isolated conference rooms.

What participants did
During the usability evaluation, participants were asked to complete the following scenarios and example tasks based on activities they would perform in real life on the site. The tasks were presented in random order. The following tasks were identified from the user data collection efforts and assistance from the client.

#	Task	Detail
1	Visit the homepage	From the current screen, navigate to the homepage.
2	Submit a new raw file	On the homepage, click on the "Upload RAW files" to submit a raw file to be analyzed by the system.
3	Monitor your activities	On the homepage, click on "My Analysis" drop-down button to view previous/current files
4	Analyze your file	On the homepage, click on the "Analyze Cleaned Files" to see the previous submitted raw files and see the status of each submitted file.

5	View visualization	On the homepage, click on the “View Outbreak Visual” to be directed to the visualization.
6	Navigate to the dashboard	On the homepage, click on the “Dashboard” in the navigation menu.
7	Switch between dashboard visualizations	On the dashboard, click on any of the graph visualizations that is not the main visualization (displayed in larger size).
8	Navigate to one of the completed analyzed files	On the homepage, in the “My Analysis” section, click one of the completed analyzed files when the status says “ready”.
9	Interact with the node-link visualization (highlight a node)	On the visualization page, click one of nodes to see more detail information about the node.

Table 3. Summary of Task Descriptions

Introductory Questions and Tasks

At the beginning of each session, we asked participants these questions:

1. What strikes you about the homepage?
2. Who's site is it?
3. What can you do here?
4. What is the site for?
5. What are your overall initial impressions of the site

These questions were followed by a number of tasks

6. Submit a new raw file
7. View number of tasks submitted
8. View analyzed raw files in visualization
9. Interact with the visualization
    a. Select nodes
    b. Find more information about a node

Overall participants did not have much problem completing the tasks specified during the usability tests. Although participants' answers to questions 1 through 3 were not particularly detailed, their guesses were enough to represent their understanding of the purpose of GHOST. One participants was even able to identify the pipelined process designed to streamline data analysis within GHOST. When the participants saw the Landing page, most commented that it was fairly empty of content and its design was not indicative of its purpose. For question 4, all participants were able to clearly identify the purpose of the website and underlying GHOST system.

During the usability test of the Dashboard, participants commented that they could recognize the embedded visualizations and they did not have difficulty perceiving trends in the data through said visualizations. Moreover, participants appreciated the modular design of the Dashboard and the layout of the visualizations within it. However, one of participants commented that one of visualizations, which represents GHOST task status, might be less important for users generally. The participant suggested that it should not necessarily be displayed in the Dashboard and it should be relocated to another section of the website or at least hidden initially with the option to display in the Dashboard.

For question 8 and 9, most participants correctly responded how the visualization works without any professional knowledge about the provided data type. However, most participants also commented that it was difficult to find buttons to save and print the visualized data and suggested displaying the buttons more clearly. Lastly, all participants stated that the website navigation was understandable, but not necessarily visually apparent. Participants suggested that the navigation buttons be made more obvious by enlarging them and coloring them so that they contrast with the navigation bar background color.

Findings and Recommendations

Upon review of the feedback and insight received from the usability testing, the introduction of the collapsible landing page and limiting the number of options to three steps received favorable responses. The old landing page still being available was important to more advanced users that wanted to see details of past jobs quickly.

The bulk of the testers' frustration lay in the node visualization. Though the groupings and channels chosen to represent the data made intuitive sense, the screenshot and download widgets in the bottom right of the visualization were not obvious enough. It is therefore recommended to choose a more eye-catching icon, or perhaps have a labeled button instead.

One user questioned calling the Dashboard the "User Dashboard", because the data shown was metadata about the number of jobs performed by the GHOST system and had little to do with the user's jobs. The information may still be required at some point, so with that possibility in mind, it is recommended that the Dashboard navigation tab be moved to be under a "Systems Information" page instead.

Participant #	**Task #1**	**Task #2**	**Task #3**	**Task #4**	**Task #5**	**Task #6**	**Task #7**	**Task #8**	**Task #9**
1	N/A	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
2	N/A	Yes	Yes	No	Yes	Yes	Yes	N/A	Yes
3	N/A	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes

Table 4: Task Completion Breakdown

Participant #	**Task #1**	**Task #2**	**Task #3**	**Task #4**	**Task #5**	**Task #6**	**Task #7**	**Task #8**	**Task #9**
1	N/A	0:03	0:10	0:07	0:08	0:08	0:04	N/A	0:06
2	N/A	0:15	0:05	0:08	0:10	0:10	0:08	N/A	0:17
3	N/A	0:14	0:09	0:06	0:06	0:02	0:05	N/A	0:12

Table 5: Task Time Breakdown

Task #	Completion Rate	Average Time for Successes
1	N/A	N/A
2	100%	0:11
3	100%	0:08
4	66%	0:07
5	100%	0:08
6	100%	0:07
7	100%	0:06
8	N/A	N/A
9	100%	0:11

Table 6: Task Completion Rate and Time Summary

Exit Questions / User Impressions

1. What do you think of the dashboard?
2. Do you think the charts help visualize the data well?
3. What did you think the purpose of the visualization was?
4. What do you think about the site navigation?

The participants think that the dashboard shows all the graphs and help the participants to choose one of the different charts shown in the website, so the participants can open in and view it in more detail. The participants like the fact that they can choose one of the charts to focus on them, but still have the option to view other charts anytime they want.

The charts on the dashboard show what they need to show. However, the node-link visualization is not that intuitive for participants who are not familiar with the visualization. They can not tell what genotypes mean. They can tell that the color, size, and proximity of the nodes are telling them something, but they are not sure what it is.

One of the participant was not sure how to save a particular visualization when they want it. He thinks that it needs to be more intuitive and noticeable. The buttons should be put it somewhere more noticeable and using pictures that it intuitive.

The navigation of the website was intuitive enough because of the simplicity of the website. The participants can find where they need to go because they can directly see where they need to go from the navigation.

Conclusion

The participants were able to complete all the eight tasks without having any serious problems. By doing this usability test, our team received useful and critical feedback that we did not recognize before the test. Therefore, our team's next steps will be adding new implementations that are based on our participants' recommendations from the usability test. Clear functionality and direction will be a key of our next implementations to make GHOST being more effective and usable for its users. Our team will move forward with focusing on clarity site navigation and interpretation of advanced features.

APPENDIX A: Facilitator Script

Hi,

We are Team Casper and we are your facilitators for today's usability testing. Let me tell you a little bit about usability study so that you fully understand what's going to take place today and how valuable your input is to us.

In a nutshell, usability testing is the evaluation of a product or website based on how real users of the product or website are able to easily and successfully perform a task. This usability evaluation will be for the CDC Global Hepatitis Outbreak and Surveillance Technology website. The session will last about an hour and we have a couple of tasks we would like you to complete and a few questions we would like you to answer.

Please be assured that YOU are NOT being evaluated—we're evaluating the website. There are no wrong answers. We are not the designers or developers of the website; rather, we provide a third party non-biased website evaluation service.

You may have noticed the microphone. With your permission, we're going to record what happens on the screen and our conversation. The recording will only be used to help us figure out how to improve the site, and it won't be seen by anyone except the people working on this project. And it helps me because I don't have to take as many notes.

Your identity will stay anonymous. We are only reporting results, without identifying users. As you fit the profile of the target audience for this website, you are going to help us learn how users like yourself interact with this site, and identify what kind of additional information will be helpful to users like yourself. We encourage you to talk as you are browsing and tell us what you are thinking. It will really help us find ways to recommend improvements to the current website. Once again, we are NOT testing YOU, we're testing the website.

If you have any additional questions, please feel free to contact Ernest Lai at ernest.lai@gatech.edu.

Do you give us your consent to participate in this study?

(Have participant sign 2 copies of consent form.)

Again, we encourage you to think ALOUD and tell us your reasoning behind clicking on certain links!

Questions? Ready? Okay, let's begin.

APPENDIX B: Test Script

Before we begin the exercise, I am going to ask you to look at this home page and tell me what you make of it: what strikes you about it, whose site you think it is, what you can do here, and what it is for.

What are your initial impressions of the site?

Task 1: Submit a new raw file. You are a new user. You are trying to submit a new raw file to be analyzed by the system, where would you go to do so?

Task 2: Viewing number of tasks submitted. You have been using GHOST system for some time and have been submitting RAW files to the system. You want to know how many files you have submitted. How would you monitor your activities?

Task 3: Viewing your analyzed RAW files. Your RAW files have been analyzed by the system. How would you view the visualization?

Task 4: Playing with the visualization. You are viewing the visualization now. How would you select some of the nodes? How would you isolate some of it? How would you find more information about the nodes?

Follow up questions

What did you think of the Dashboard? Did you understand the purpose of the charts that comprised it?

- If yes: Did the charts help you perceive trends in the data? If so, what trends did you perceive?
- If no: Move on to next question.

2. What did you think of the visualization? What did you think the purpose of the visualization was?
3. What do you think of the proposed site navigation? Do you find it to be clearly labeled and easily understandable? [Have user go through the navigation and indicate what he/she would expect to find under each heading.]

Thank you for your time and your help improving this site.

APPENDIX C: Consent Forms

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Consent Form

Usability Study of Global Hepatitis Outbreak and Surveillance Technology website

I agree to participate in the usability test of the GHOST site, being conducted by Team CASPER. I understand that this participation is entirely voluntary; I can withdraw my consent at any time without penalty and have the results of the participation, to the extent that it can be identified as mine, returned to me, removed from the research records, or destroyed.

The research has been explained to me as follows:

- The purpose of the study is to evaluate the usability of certain portions of the website. The researchers wish to determine the ease of use of the site and how users perceive it.
- Participants will work at a computer that has access to the specified website and be given tasks related to accessing the site. While the participant attempts these tasks, he or she will be directly observed and videotaped so that the research team can review the participant's interactions with the instruction and the participant's comments during this interaction. The entire activity will take approximately 10-15 minutes.
- The participant's identity will be kept confidential in any transcriptions and reports generated from this research. Any comments or expressions made during the usability test may be used for the purpose of evaluating the website and showing the results of this research. All videotapes related to this research project will be retained by Team CASPER.

The researcher will answer any further questions about the research, now or during the course of the project.

Please sign both copies of this form. Keep one and return the other to the researcher.

Signature of Participant — Date: 03/02/2016

Signature of Researcher — Date: 3/2

Consent Form

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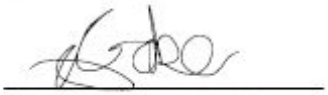
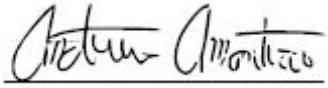
The researcher will answer any further questions about the research, now or during the course of the project.

Please sign both copies of this form. Keep one and return the other to the researcher.



Signature of Participant — Date: 03/07/2016



Signature of Researcher — Date: 03/07/2016

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Consent Form

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- Participants will work at a computer that has access to the specified website and be given tasks related to accessing the site. While the participant attempts these tasks, he or she will be directly observed and videotaped so that the research team can review the participant's interactions with the instruction and the participant's comments during this interaction. The entire activity will take approximately 10-15 minutes.
- The participant's identity will be kept confidential in any transcriptions and reports generated from this research. Any comments or expressions made during the usability test may be used for the purpose of evaluating the website and showing the results of this research. All videotapes related to this research project will be retained by Team CASPER.

The researcher will answer any further questions about the research, now or during the course of the project.

Please sign both copies of this form. Keep one and return the other to the researcher.

Signature of Participant 3/7/16 Date

Signature of Researcher 3/7/16 Date

APPENDIX D: Demographic Data

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Demographic Data

1. Gender:

Male ☐ Female ☑ I prefer not to respond ☐

2. What is your age?

51

3. What is your nationality?

American

4. What is your immigration status?

US Citizen / Resident ☑ International student/scholar – J visa ☐

International student – F visa ☐ other ☐

Either

5. If you are in a degree program, what year are you in?

Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Graduate ☐

Or

6. If not, what is your employment status?

Employed for wages ☑ Self-employed ☐ Unemployed ☐ Retired ☐ Unable to work ☐

Demographic Data

1. Gender:

Male ☑ Female ☐ I prefer not to respond ☐

2. What is your age?

19

3. What is your nationality?

United States of America

4. What is your immigration status?

US Citizen / Resident ☑ International student/scholar – J visa ☐

International student – F visa ☐ other ☐

Either

5. If you are in a degree program, what year are you in?

Freshman ☐ Sophomore ☑ Junior ☑ Senior ☐ Graduate ☐

Or

6. If not, what is your employment status?

Employed for wages ☐ Self-employed ☐ Unemployed ☐ Retired ☐ Unable to work ☐

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Demographic Data

1. Gender:

Male ☑ Female ☐ I prefer not to respond ☐

2. What is your age?

20

3. What is your nationality?

USA

4. What is your immigration status?

US Citizen / Resident ☑ International student/scholar – J visa ☐

International student – F visa ☐ other ☐

Either

5. If you are in a degree program, what year are you in?

Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Graduate ☐

Or

6. If not, what is your employment status?

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