

# Usability Test Plan

TEAM VOLCANO - EVALUATION ASSIGNMENT 6  
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# 1 INTRODUCTION

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## 1.1 USER INTERFACE DESIGN

The user interface (UI) design features a flat orange, white, and charcoal color scheme that is both clean and thematically appropriate for a volcano app. The home page features a paragraph of text about the volcano and a button to reach the form selection page. The form selection page offers a button for each of three event observation forms. The forms have simple inputs for photos and other data depending on the event.

The forms can be accessed without a login via a button on the home screen or an option in the menu. The admin page, which is also accessible through the menu but requires a login, allows the administrator to download the data.

## 1.2 DEVELOPMENT TEAM DOCUMENTS

The undergraduate team's website (<http://www.csl.mtu.edu/classes/cs4760/www/projects/s16/group1/www/>) contains design details ([http://www.csl.mtu.edu/classes/cs4760/www/projects/s16/group1/www/design\\_docs.html](http://www.csl.mtu.edu/classes/cs4760/www/projects/s16/group1/www/design_docs.html)) and other documentation.

## 1.3 TEST GOALS

The usability test was conducted to evaluate the UI for ease of use by untrained users, to identify potential usability problems, and find bugs in the system. The usability test did not specifically test for security or backend implementation issues.

# 2 USABILITY TESTS

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On occasion, my original test plans were not feasible due to technical problems both with the app and with the phone used during testing. The tests actually conducted are included here with comments as to modifications from the original.

## 2.1 COMMON SETUP

Participants were seated at a desk in a university office with the UX expert and two undergraduate observers. All tests were conducted on a Motorola Moto X (2014) Android smartphone. Photos of the volcano environment were displayed on the Linux computer. When users needed to take a picture of an event, they took a picture of the computer display. While it was slightly unnatural, participants were asked to hold the phone low and away from their bodies so that all present could see the screen.

Participants began by reading and signing a consent form. Next, the purpose of usability testing and the purpose of the app were explained. Afterward, a

prequestionnaire was completed electronically on a Google Form. Then, the scenarios were given in the same order. Finally, the participants completed the post-questionnaire, were given an opportunity to bring up any remaining concerns, thanked, and excused.

## **2.2 TEST SCENARIO 1: EXPLOSION FORM**

### **2.2.1 Testing Procedure**

A picture of a smoking crater was displayed on the monitor. Participants were read the description below, then handed the phone with the browser already open to the site's home page. Participants were timed from when they received the phone until they pressed the button to submit their observations. For the same amount of time, steps taken and navigation were also tracked.

Participants were expected to:

- Navigate from the home page to the form selection page
- Select explosion form
- Select a visible and audible explosion
- Upload picture
- Submit form

A number of participants reported the explosion as visible only rather than visible and audible. This seems to have been a matter of not recalling that the verbal description mention it was audible. It has not been considered a usability problem, but rather a problem with the usability test design.

### **2.2.2 Scenario Description**

You are a tourist visiting the Guatemalan volcano Pacaya. The tour guide mentioned a website that gathers visitors observations about the volcano and you have it open on your smart phone. You see and hear an explosion. You are at a safe distance and can stay for a while. Please submit your observations.

### **2.2.3 Test Goals**

The goals of this test were to verify data entry, picture upload, and navigation for the explosion form. It was also to observe how people interacted with the app without being instructed to take a picture.

## **2.3 TEST SCENARIO 2: LAVA FLOW FORM**

### **2.3.1 Testing Procedure**

A video of the lava flow was displayed on the monitor and paused to keep the image visible. Participants were read the description below, then handed the phone with the browser open to the form selection page. Participants were timed from when they received the phone until they pressed the button to submit their observations. For the same amount of time, steps taken and navigation were also tracked.

Participants were expected to:

- Select lava flow form
- Enter a height and width for the lava flow
- Take a picture and upload it
- Submit form

### **2.3.2 Scenario Description**

You've come across the lava flow shown here <point to desktop>. Please submit your observations with a new photo.

### **2.3.3 Test Goals**

The goal of this test was to verify data entry, camera app integration, and navigation for the lava flow form.

## **2.4 TEST SCENARIO 3: PLUME FORM**

### **2.4.1 Testing Procedure**

A picture of a plume was displayed on the monitor. Participants were read the description below, then handed the phone with the browser open to the form selection page. Participants were timed from when they received the phone until they pressed the button to submit their observations. For the same amount of time, steps taken and navigation were also tracked.

The original testing scenario called for participants to upload a picture from the gallery, but the phone used for testing defaulted directly to the camera app without giving an option to access the gallery.

Participants were expected to:

- Select lava plume form
- Enter a color for the plume and a direction
- Take a picture and upload it
- Submit form

### **2.4.2 Scenario Description**

The volcano is emitting the plume shown here <point to desktop>. Please submit your observations with a photo. Assume forward is north, right is east, etc.

### **2.4.3 Test Goals**

The goal of this test was to verify data entry, camera app integration, and navigation for the lava flow form.

## 2.5 TEST SCENARIO 4: ADMIN DOWNLOAD

### 2.5.1 Testing Procedure

Participants were read the description below, then handed the phone with the browser open to the form selection page. Participants were timed from when they received the phone until they pressed the button to submit their observations. For the same amount of time, steps taken and navigation were also tracked.

The original testing scenario called for participants to use the desktop, login, and download the CSV file. The desktop interface was unfinished and participants were unable to download the CSV, so we used the phone instead to test navigation and login.

Participants were expected to:

- Navigate to and open the menu
- Select admin page
- Log in

### 2.5.2 Scenario Description

You're a scientist who wants to work with the data people have submitted about the volcano. Please login using username "admin" and password "password".

### 2.5.3 Test Goals

The goal of this test was to evaluate navigation to the admin page and the login.

## 3 RESULTS

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Six individuals, all undergraduates in Michigan Tech's Department of Computer Science, participated in the usability test. The average and median years of experience with a smart phone was 3 years.

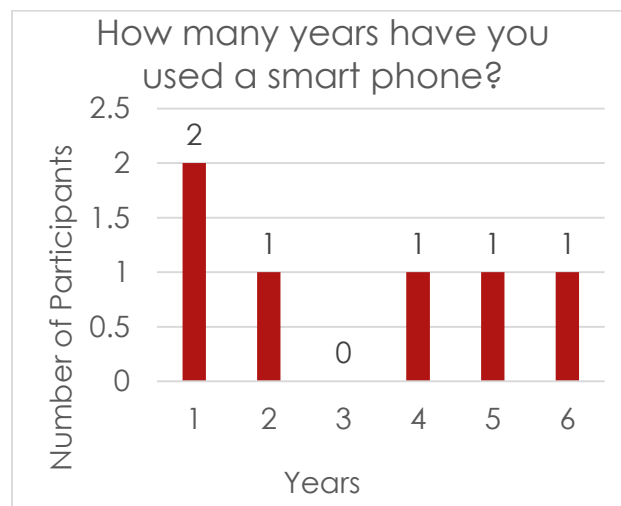


Table 1 Years of Smart Phone Use

Given the importance of photos in the app, participants were also asked how many photos they take on average. The median and average were the same at “Less than one a week”. Unsurprisingly given the relative lack of familiarity with taking smartphone pictures, some problems using the camera app were observed. These issues were not considered usability problems with the volcano monitor application; however, they did contribute to the overall time/steps measured during interactions.

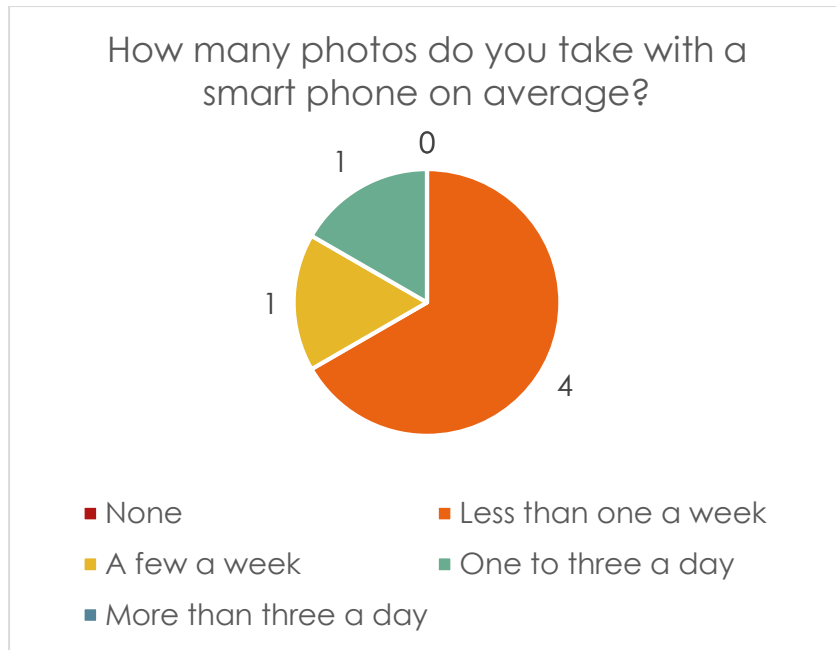


Table 2 Smart Phone Picture Frequency

All participants were familiar with Android OS on which the tests were conducted. In the actual application, individuals will be using their own smartphones, so they can be expected to have roughly the same level of familiarity.

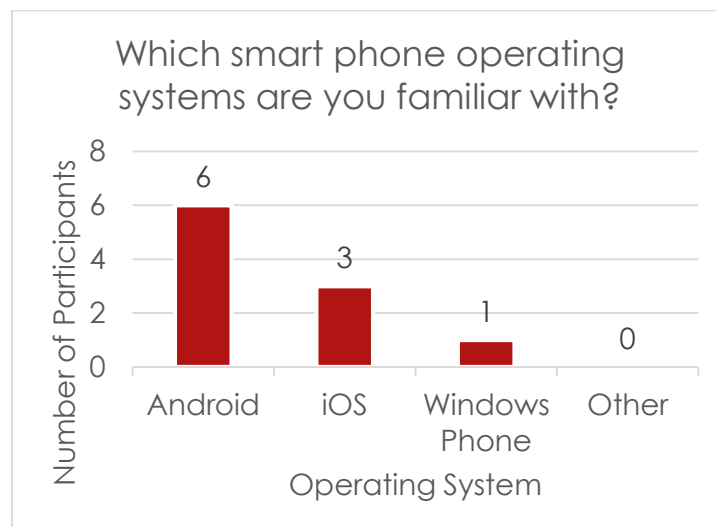


Table 3 Operating System Familiarity

Participants were asked about their interest in the testing. One of the six participants disagreed with a statement of “very interest”, but the other five were neutral or better. All participants were neutral or better for questions about finding the application easy, enjoyable, and being willing to use the app again. The responses to the statement “I would use this application again.” are interesting in that it is extremely unlikely these participants will ever use the application again. It may indicate bias toward answers the participants believe the evaluators wanted.

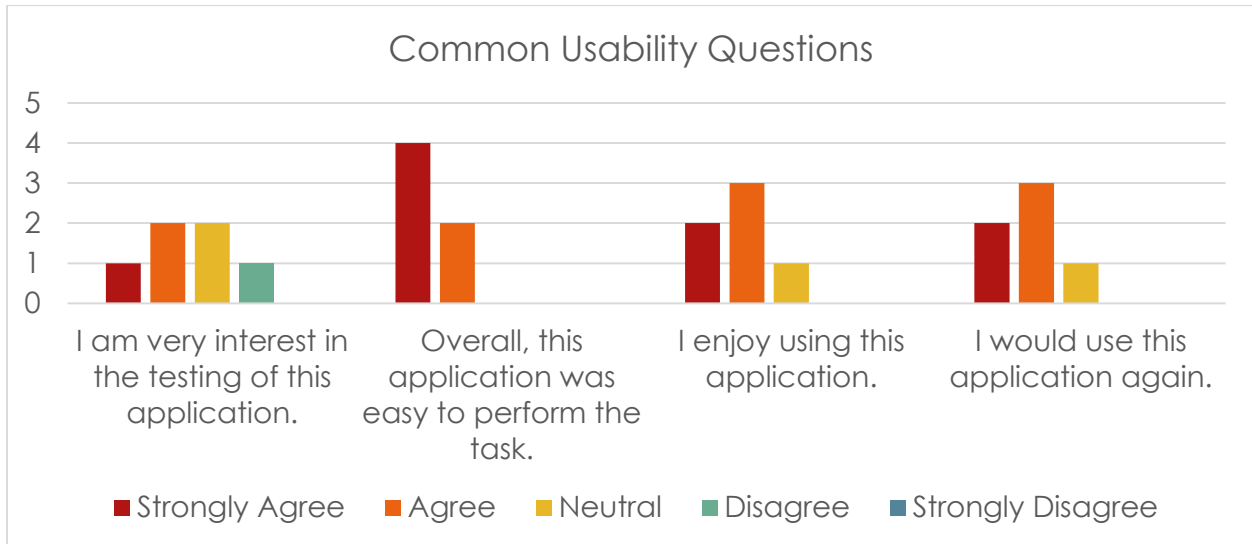


Table 4 Common Usability Questions

For questions about the clarity of the interface (what to do and where to go), the responses were universally positive. For a negatively weighted question about finding the app confusing, responses were suitably neutral or worse. Finally, five of the six participants indicated they would want to use the app if they visited Pacaya. However, one participant indicated disagreement and the majority of responses were a muted “Agree” rather than “Strongly Agree” as was common for a number of the other questions.



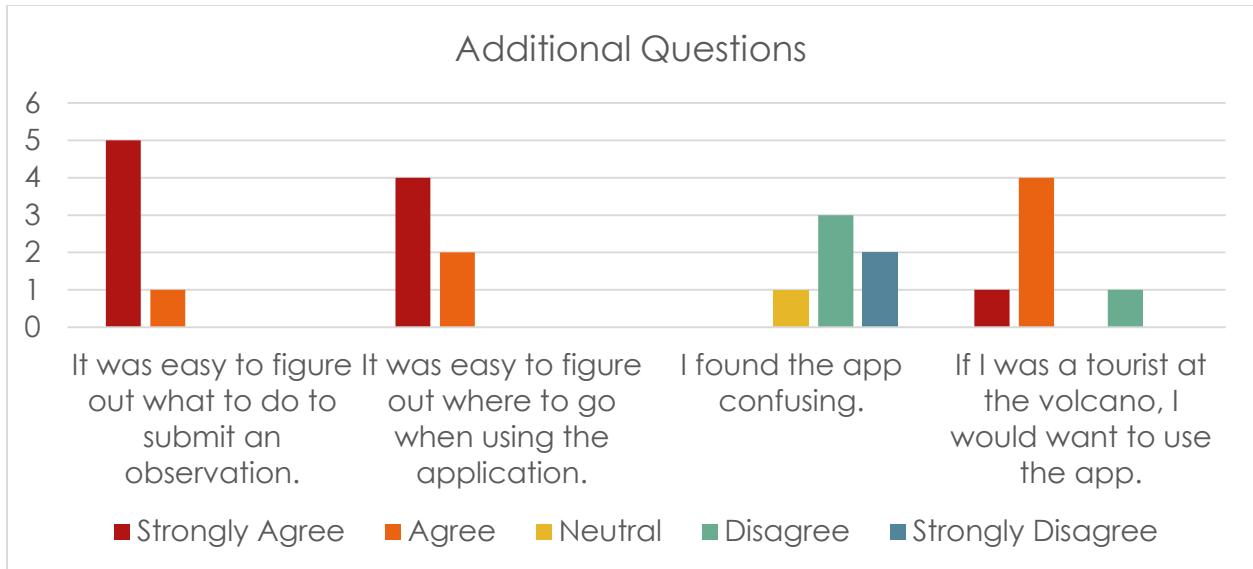


Table 5 Additional Post-Questions

Participant times for the first scenario were longer than the other scenarios, which is unsurprising given that most participants read the introductory text on the home page at the beginning of scenario one. The admin scenario was the shortest, also unsurprising because it involved the least steps. Finally, between the lava flow and plume scenarios (two and three), the lava flow scenario took an average of nearly 16 seconds longer. Both required the same number of steps and inputs. One observable difference during testing and mentioned by participants was that the options for the lava flow form were confusing, which may have taken more time.

| Scenario    | P1    | P2    | P3    | P4    | P5    | P6    | Average       | Median        |
|-------------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| 1 Explosion | 34.78 | 82.12 | 76    | 65.26 | 54.36 | 57.05 | <b>61.595</b> | <b>61.155</b> |
| 2 Lava Flow | 55.29 | 51.28 | 40    | 57.52 | 62.47 | 38.43 | <b>50.832</b> | <b>53.285</b> |
| 3 Plume     | 25.25 | 50.03 | 24.02 | 49.5  | 35.55 | 25.32 | <b>34.945</b> | <b>30.435</b> |
| 4 Admin     | 42.75 | 24.31 | 23.45 | 22.37 | 18.07 | 39.69 | <b>28.44</b>  | <b>23.88</b>  |

Table 6 Time (sec) per scenario by participant

Counts of steps taken in the various scenarios showed variability more between participants than between scenarios. One likely explanation seems to be that steps were counted differently by different observers.

| Scenario    | P1 | P2 | P3 | P4 | P5 | P6 | Average      | Median     |
|-------------|----|----|----|----|----|----|--------------|------------|
| 1 Explosion | 5  | 7  | 9  | 6  | 6  | 12 | <b>7.5</b>   | <b>6.5</b> |
| 2 Lava Flow | 5  | 5  | 3  | 6  | 6  | 12 | <b>6.167</b> | <b>5.5</b> |

|   |       |   |   |   |    |   |    |   |     |
|---|-------|---|---|---|----|---|----|---|-----|
| 3 | Plume | 5 | 8 | 3 | 8  | 7 | 11 | 7 | 7.5 |
| 4 | Admin | 5 | 6 | 4 | 11 | 5 | 11 | 7 | 5.5 |

*Table 7 Steps taken per scenario by participant*

While navigation errors were counted, they were very rare and inconsistent. They have been omitted here as unhelpful.

## 4 CONCLUSIONS

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The most significant usability problem outside of true bugs (which are listed in Appendix B) was confusion surrounding the term “Height” when referring to a lava flow. Users inconsistently interpreted height from the ground vertically to the upper surface and as the length from the beginning to the end of the lava flow. Changing the label of the field to “Depth” may reduce this confusion. At least one user had difficulty with giving measurements in meters and entered feet instead.

Some users did not immediately realize that the camera button was a button during the first scenario where about half of participants failed to submit a photo. Many expressed surprise that they were not given a preview of their pictures on the forms after attaching them. This lack of feedback is significant. Adding a preview of the picture, perhaps by replacing part of the camera icon with a portion of the image, is recommended.

Adding a selector for plume color is also recommended. There are just a few colors the plume is expected to be, so adding a selector either in a dropdown or slider is feasible. It would be both easier to enter and to analyze the data with discrete options. Also on the plume form, the intercardinal directions should be written as one word instead of two, i.e. “Northwest” not “North west”.

The radio buttons used for audible/visible explosion selection were too small and did not quite fit the design of the rest of the app. It may be better to have two large checkboxes instead. Also, the form selection page includes the text “What do you see?”, so it confused some participants to be asked about an audible explosion.

The introductory text on the home page mentioned the dangers and deaths at Payaca. This was disturbing to some participants. Some users also had difficulty scrolling to the page to the begin observations button, which was awkwardly just below the displayed area.

Overall, the app is well designed and easy to use as was the goal. Presuming implementation is finished as planned, the current design seems likely to fulfil the requirements.

## 5 APPENDIX A: UNDERGRADUATE ATTENDANCE

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All undergraduates attended the tests as scheduled.

| Day of Week | Date      | Time      | Location  | Undergrad 1 | Undergrad 2 |
|-------------|-----------|-----------|-----------|-------------|-------------|
| Monday      | 4/11/2016 | 3:00: PM  | Rekhi 106 | Alexis      | Jon         |
| Tuesday     | 4/12/2016 | 5:00: PM  | Rekhi 106 | Matt        | Dalton      |
| Wednesday   | 4/13/2016 | 10:00: AM | Rekhi 106 | Alexis      | Jon         |
| Wednesday   | 4/13/2016 | 11:00: AM | Rekhi 106 | Steven      | Matt        |
| Friday      | 4/15/2016 | 10:00: AM | Rekhi 106 | Matt        | Steven      |
| Friday      | 4/15/2016 | 1:00: PM  | Rekhi 106 | Micah       | Dillon      |

## 6 APPENDIX B: CONSOLIDATED BUG REPORT

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Bugs I found were labeled with odd numbers and bugs found in Ridwan's testing were labeled with even numbers to prevent duplication of identifiers if we choose to report our findings together.

| Bug # | # of Participants Encountering Bug | Bug Name                | Location             | Description   |
|-------|------------------------------------|-------------------------|----------------------|---|
| 1     | 1                                  | Admin missing           | Form pages           | The menu on the form pages does not include an option for the admin pages. After conversation with the developers, this found to be deliberate and not a bug. |
| 3     | 4                                  | Broken hamburger menu   | Form selection pages | The hamburger menu button does not work on the main form selection page or the thank you form selection page  |
| 5     | 6                                  | Help icon not rendering | Form pages           | The "?" help icon was replaced with an x'd out box on all form pages.   |
| 7     | 0                                  | Rotation color change   | All pages            | When the phone is rotated horizontally, the layout of the page switches to desktop with an obvious and distracting change to orange.                          |