

# Stakeholders, Goals and Task Analysis

TEAM VOLCANO - EVALUATION ASSIGNMENT 1  
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# 1 SYSTEM DESCRIPTION

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The as-yet-unnamed volcano app will allow users to submit data about Pacaya, a volcano in Guatemala. There will be multiple types of data likely including numerical estimations (i.e., plume height), enumerated data selections (i.e., plume color), images, and free-form text. GPS data will be extracted from the photos when possible, which is expected to be particularly valuable for tracking the location of lava flows and possibly fumaroles. There will be options for users of different familiarity with the volcano to submit more or less detailed data. To help motivate and reward submitting data, the app will also feature historical data, information about the volcano, and a pleasing aesthetic that utilizes existing images of Pacaya.

## 2 STAKEHOLDERS

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### 2.1 STAKEHOLDER ONION DIAGRAM

For clarity and easy of layout, I've used a table rather than the traditional circular diagram to represent the onion diagram.

System	Primary	Secondary	Tertiary
The app	Tour guides Tourists	Michigan Tech Scientists Guatemalan officials	Developers Broader scientific community

### 2.2 STAKEHOLDER DESCRIPTIONS

#### 2.2.1 The App

The web app and back-end will collect the data, present it to the admins, and allow for it to be curated and exported.

#### 2.2.2 Tour Guides

Local and bilingual guides visit the volcano regularly and can input accurate data with observations of changes over time.

#### 2.2.3 Tourists

Visitors to the national park tour Pacaya. They likely come only once and may not see all of the volcano.

#### 2.2.4 Michigan Tech Scientists

Dr. Waite, Dr. Escobar Wolf, and potentially graduate students will curate and analyze the data.

### 2.2.5 Guatemalan Officials

A national park official and scientist at INSIVUMEH, a Guatemalan government agency responsible for monitoring the volcano, may be interested in viewing the data.

### 2.2.6 Developers

The current group will create the initial app. Other developers will inherit the app for maintenance and potential expansion.

### 2.2.7 Scientific Community

Long term, the app should produce data that can be used for publication and to improve understanding of Pacaya that might impact research in volcanology.

## 2.3 STAKEHOLDER GOAL INFLUENCE TABLE

### 2.3.1 Stakeholder Goal Influence Table

Name	Goal	Contributing Influences	Constraining Influences
Tour guides	Input data	Observations	Easy and fast interaction Spanish interface
Tourists	Input data Learn about volcano	Observations Photos	Easy to learn interactions Error prone data and interactions English interface
MTU scientists	Use data	Expertise Translation Curation	Admin view Export data Filter and remove erroneous input
Guatemalan officials	View data	Awareness	View only access to data
Developers	Make a functional app in a semester		Time to develop
Scientific community	Reliable data and conclusions		

### 2.3.2 Stakeholder Goal Influence Table Summary

The most significant contributing influences come from the tour guides and tourists who have the data we want to gather. In particular, tourists are expected to be rich sources for photographic data, though tour guides could also provide photos. Tour guides, however, are expected to have more accurate observations and to be able to identify important changes over time. The scientists are contributing their expertise to the design of the app and writing the background information that is expected to help draw users to the site. They are also providing translation and glossary information. Once data collection begins in earnest, they will be the admins of the site and curate the data

being gathered for analysis. The officials are largely being given access to the data in the interests of courtesy and collaboration. We are not expecting significant contributions from them, but it is possible that they will raise the visibility of the app in the local area and potentially drive traffic to the site.

The tour guides, tourists, and scientists provide most of the constraints. Tour guides provide the requirement that the app be bilingual. Tourists provide most of the other constraints that relate to front-end user experience. Since these users will likely only visit Pacaya once, they aren't going to be motivated to spend time learning how to use the app. They are also more likely to make mistakes either in using the app or in the data they input. They are unlikely to be volcano experts and might be using the app in a second or third language, so terminology is likely to need clarification. The scientists need access to the data for analysis and clean up. Some submissions will inevitably be spam, others will be user errors that the scientists will need to identify and either correct or discard. In particular, this will be a significant endeavor for evaluating photos. They also need to export the data in a consistent format for analysis in external tools. Finally, the development team, and in turn the app, is constrained by the limited development time available for a class project.

## 3 PERSONAS

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### 3.1 JUAN GUÍA

- Age: 22
- Occupation: Pacaya tour guide
- Residence: Guatemala
- Languages: Spanish, a little English
- Tech savvy: Advanced beginner - Comfortable with his smartphone and browsing

Juan is a local tour guide in his early 20s. It's been a couple years since he started leading tours and he's intimately familiar with the volcano. Since he makes his living from Pacaya and his family lives nearby, he has intrinsic motivation to begin logging data about the volcano that might help scientists better understand and predict it. However, he's busy and entering the same info day after day can get tedious, so he might need some help staying motivated to submit data. He's comfortable using his smartphone to run his business and has good local cell service. He prefers to interact in Spanish.

### 3.2 LISBET TOURING

- Age: 69
- Occupation: Retired nurse
- Residence: Denmark
- Languages: Danish, German, enough English to get by

- Tech savvy: Novice – She can use her smartphone, but it might take a minute and she doesn't really understand it

Mrs. Touring is a retired tourist in her late 60s visiting Guatemala on a long vacation from Denmark. She and her husband are staying in Antigua and decided to come see Pacaya on a tour with a bilingual guide. It's her first and only visit. She isn't particularly invested in the volcano, it's just something interesting to do for a few hours. She and some of the others on her tour are not in the greatest shape and didn't really pack clothes suitable for climbing a volcano, so their tour stays near the base. She can use her smartphone and loves to take pictures, but doesn't really count herself as tech savvy. Since she's using an international data plan, she doesn't want to spend too much time using the site while she's at the park. She's most comfortable in Danish and German, but can handle some English too. Spanish isn't really an option.

## 4 HIERARCHICAL TASK ANALYSIS (HTA)

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The exact division of the tasks in this app is still being discussed. Consider the following very tentative.

### 4.1 SIMPLIFIED HIERARCHICAL TASK ANALYSIS

#### Form Page

Input simple data

Lava flow

Location info

Add pictures – Go to pictures page

Confirm submission

Feedback/Thank you

#### Pictures Page

Select pictures to upload

Tag pictures (plume, lava flow, etc.)

Confirm upload

Feedback/Thank you

Return to form

#### Background Info Page

Read about Pacaya

Glossary Page

Select a word

Scroll through the list

## **4.2 SUMMARY OF HIERARCHICAL TASK ANALYSIS**

This app is fairly simple in structure. As I envision it, there are four main sections or views in the app: the form, the picture tool, the background information, and the glossary.

The first is the main page from a development perspective, but not necessarily from a user's perspective. It might be better to use the background view as the initial page for users. The form has two main purposes: allow users to input data and route them to the pictures view if necessary. Inputting the data should be fairly straight forward and optimized for mobile usage. Indicating the presence of a lava flow should reveal otherwise hidden questions since lava flows are infrequent and the questions would be obtrusive and confusing if left permanently visible. If users indicate they want to upload photos, the page should route them to the picture tool. Most importantly, the page should offer feedback and thanks as these users are getting nothing else for their help.

The pictures page contains a separate form or tool for uploading pictures. It should allow users to select multiple pictures and to remove pictures they have accidentally selected. It may also allow a few simple tags to help organize the pictures for analysis. (The tagging idea has not been discussed with the group at this time.) It should also allow for some sort of confirmation before final submission of the photos to help avoid accidental uploads. Then it should return users to the form page. Ideally, the only way to access the photos page is through the form page to encourage users to fill in the other data.

The background info page should be a simple, passive page with good aesthetics and easy to read information about Pacaya. The purpose of this page is to offer value to users visiting the site and attract tourists to the site.

The glossary page should allow users to scroll through a list of volcanology terms defined in simple language for the convenience of second language users and those who lack scientific education. It should also allow jargon words on other pages to be linked to the relevant definition, perhaps by a small popup when the word is tapped or a traditional hyperlink directly to the entry on the glossary page. Depending on the length of the list, a search feature might be useful.

Finally, a significant omission from this task analysis is switching languages between English and Spanish. The technical means for localization has not been determined yet to my knowledge and it remains to be seen if and how we might give users the option to switch the language of the interface.

## 5 APPENDICES

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### 5.1 APPENDIX A: NOTES FROM JANUARY 21, 2016 MEETING WITH DR. GREGORY WAITE

January 21, 2016 2:00-2:30 pm Dow 633

Individuals present:

- Dr. Gregory Waite
- Graduate Students
  - Jaclyn Barnes
  - Ridwan Kahn
- Undergraduate Students
  - Johnathen Booth
  - Dalton Shoebridge
  - Steven Tracey

Purpose of the meeting: Initial meeting and requirements gathering

The background of the app and Dr. Waite's research was discussed. There are three active volcanos in Guatemala that do not have sufficient monitoring. The app will be specifically focused on the Pacaya volcano. The app will allow users to make notes of current conditions and changes to supplement the data gathered from the sensors that do exist.

Dr. Waite will send out an email that details the data points he is looking to track. Some examples include the existence and color of the plume, location of lava flows, and free form comments. Some relatively infrequent events, such as lava flows, would require different questions. The ability to upload photos, particularly with GPS and timestamp scraping, are also desired.

The data should be displayed in graphs and charts as much as possible for the scientists to analyze, while also allowing access to the raw data.

The app should be bilingual (English and Spanish). Wording should be simple with a glossary of technical terms to accommodate users who may be working in a non-native language or otherwise have difficulty with complicated language. Dr. Waite offered to help with the translation. None of the students involved speak Spanish.

Dr. Waite is considering writing copy about the history of the Pacaya volcano to make the app more attractive to users.

There are no specific suggestions or requirements regarding the app's appearance.

To make reporting easy and accessible, particularly for tourists, user accounts will not be used. However, for frequent respondents like tour guides, including some sort of identifier field would be useful to filter data.



Users may submit reports in the field. There is sufficient cell coverage in the national park. Tourists however might report after the fact, such as after returning to their hotels for Wi-Fi access. A feature that allows users to note if they are reporting after the fact may be useful to categorize the reliability of the data on the assumption that memory is more likely to be flawed.

Anticipated users include:

- Tour guides, who may make several trips to the site a day and are likely to be more comfortable working in Spanish
- Tourists, often English speaking from the US, Canada, and Western Europe
- Officials in Guatemala
  - The Pacaya national park director
  - Individuals from the Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología “INSIVUMEH”, the Guatemalan equivalent of the USGS
- Scientists at Michigan Tech
  - Dr. Waite
  - Rudiger Escobar Wolf, a post-doc
  - A graduate student, potentially

Tour guides and tourists will need permission to add reports, but not edit them. Guatemalan officials will have read-only access to the results. The Michigan Tech scientists should have read-write access to the data to allow necessary clean-up and modifications.

Action items:

- Dr. Waite will send out email with details of required data points today.
- The undergrads will brainstorm and present ideas at the next meeting.
- The second meeting was confirmed for Tuesday, January 26, 2016 at 2 pm in Dow 633 as originally planned.
- The following meeting was scheduled for Thursday, February 11, 2016 at 6 pm. The location of that meeting was not discussed.

## **5.2 APPENDIX B: NOTES FROM JANUARY 26, 2016 MEETING WITH DR. GREGORY WAITE**

January 26, 2016 2:00-2:30 pm Dow 633

Individuals present:

- Dr. Gregory Waite
- Dr. Rudiger Escobar
- Graduate Students
  - Jaclyn Barnes
  - Ridwan Kahn

- Undergraduate Students
  - Johnathen Booth
  - Dalton Shoebridge
  - Steven Tracey
  - Alexis Kuprel

Purpose of the meeting: Continuing discussing goals of the app and gather more information about users

Tours last a few hours with an approximate maximum length of four hours if the tour goes all the way to the summit. It's fairly unusual to do so since many tourists aren't dressed appropriately to climb a volcano. A tour has at least a local Spanish speaking guide who knows the terrain, but some groups will arrange for a bilingual English speaking guide as well. Local guides tend to be young men who run their businesses from their smartphones.

The tourists vary a lot. Some are local Guatemalans. Some are American students on Spring Break. Others are Western European vacations. A fair number are brought open from the popular vacation destination Antigua.

The front-end needs to be in English and Spanish to handle both locals and tourists, but the back-end can be English only as even the Guatemalan officials who will be viewing the data are comfortable in English.

Fumaroles were raised as something that guides could track since the interesting detail there is changes over time. However, using photos and GPS, it might be feasible to have tourists track them too.

Otherwise, there is still not a good solution to the issue of tracking who submits data without requiring a log-in that will discourage one-off submissions from tourists. It would be useful to be able to distinguish tour guides from tourists and possibly present them different forms.

Motivation will be an issue. For tour guides, the issue will likely be continuing motivation over time. For tourists, it will be a matter of both simply knowing about the app and giving some sort of value to visiting. One possibility is to give users access to historical data and to include background information about the volcano. There is some sensor data available from INSIVUMEH online, but the site is unreliable and might be difficult to link.

The guides will probably be introduced to the app in person once it's created. Introducing the tourists to the app will likely be a combination of the guides demonstrating it and potentially some advertising among the tour agencies.

The numerical and text dataset will be imported into Matlab for analysis, so any export format that is suitable will work. Image data will need to be handled manually at this point.

Action items:

- Sending the scientists links to our documents
- Next meeting Thursday, February 11, 2019 at 6 pm