Oregon State University
College of Engineering

CS Capstone Design Document

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BLAMO Problem Statement

Prepared for

Oregon State University School of Civil and Construction Engineering

Matt Evans _____ Signature _____ Date

Prepared by

Group 36
BLAMO

James Trotter _____ Signature _____ Date

Evan Amaya _____ Signature _____ Date

Sean Spink _____ Signature _____ Date

Alex Smith _____ Signature _____ Date

Abstract

Data is crucial to the development of society. Scientists use data to enforce theories and develop hypothesis. Physical paper data logging provides issues with trace-ability, reliability, and consistency. Paper is bound to degrade, humans make data entry errors, and handwriting can be difficult to read. This leads to misrepresentation and loss of critical data. There already exists systems to ensure data integrity is maintained however these systems either come at a cost outside of the user's budget, or are not available to them out in the field. Additionally, overhead costs in the sciences is always an obstacle to overcome so the fields can focus their funds on more critical equipment.

In borehole logging, data is required to log core sample locations, make up, and depth. Currently, OSU uses paper logging on the field, and return to their offices to manually reenter the data written down. This process can lead to inaccurate data entry, holes in data, and incomprehensible data. Thus, we aim to automate the process of data collection using forums, digital interfaces, and databases. Digitizing the process of recording data reduces the possibility for data holes, standardizes the text entry in forms everyone is familiar with, and reduces the amount of work required to transcribe data.

Contents

1 Problem Description

This is an introduction to the problem using physical paper data logging in scientific fields. Geological surveys are critical to understanding the natural Sciences and the planet we live on. The foundation of any scientific field is the data it can stand on, implying reliable data collection is crucial to the advancement, development, and approval of a scientific field. Humans are error prone, and because of this data can get lost in transit, destroyed by liquids (surprisingly, it rains in Oregon), and be illegible due to handwriting styles. Thus, the problem of data logging calls for three crucial categories of consideration:

- Ease of Use
- Trace-ability
- Reliability

These three categories should be addressed to ensure a solid foundation, not simply for geology, but science in general. Having a strong foundation of data allows scientists to experiment, theorize, and link together concepts to further understand the world we live in.

Currently, geological data collection for OSU is done with paper forms and pencil. When student/geologists go out into the field, they log the data and store it until it's called upon again for entry into a digital system. A lot can take place between logging, and entry of data. A gap between the transcription of data increases the likely-hood of transcribing discrepancies (Holes in data, Damaged papers, etc.).

2 Proposed Solution

A purposed solution to the problem of data entry is to produce a mobile (Android or iOS) application for the students and scientists logging data in the field. This application would emulate forms the scientists are already familiar with, including sections for location data, identifying soil composition at specific depths, and tests taken at a given depth. This form can then be easily stored on a ruggedized portable device while the user is out in the field. When the user connects to a network the application will handle transcribing the logged data into ArcGIS or gINT readable forms, and automatically upload to the user's database.

One of the benefits of digitizing data logging is the dependability it provides to the user. When data is logged on a digital device it is difficult to destroy, even if the device is damaged the storage typically persists. Persistent and reliable data allows the user to have an eased mind and focus more on their work. Another benefit of digitizing the data collection process is the ability to quickly and easily interface with other digital platforms (Like ArcGIS or gINT), in turn saving the user valuable time from manually logging the data into those systems. Lastly, legibility is addressed by the digital interface. Digital interfaces provide a standardized structure, style, and font to data. Having standardized data makes it easier for other scientist to interpret and cite data, helping in improving H-Index's, Data trails, and scientific understanding. As an additional benefit, digitizing data logging will reduce cost to the department for paper, printing, and time. Reducing department cost ensures that finances can be focused elsewhere into more critical areas.

3 Performance Metrics

Performance metrics will allow us to tell when our application is complete, and can be submitted to the client for users to begin interfacing with. To gauge the performance of the application we will be looking at a few criteria:

- Persistence of data after power cycles (The data is auto saved after every change)
- Interfacing with gINT or ArcGIS to import the data stored from field work
- Usability of the Mobile Application (to be measure with real user tests)
- Reliability of data transmission upon connection to the network
- Crash free user experience (Reliability Score)
- Portability of data into other forms (PDF)

Persistence of data after power cycling will ensure the client has a reliable and forgiving experience, while interfacing with the clients externally used programs will ensure they have a smooth transition from paper to paper-less. Lastly, as a user of business proprietary software, it always leaves a lot to be desired, so making it a pleasant experience to use (Prioritizing front page menus to reduce menu browsing) is critical to our success in this project. Meeting these performance metrics will ensure our client is satisfied with the product and can begin using it on the field. The list of performance metrics will also help us as developers to define when we are upholding our end of the contract, and our quality as a team of developers.

In order to guarantee customer satisfaction, we will maintain an open communication channel with Dr. Evans and update criteria as needed. This will reinforce the understanding between the clients needs and the development team, which will ensure the criteria and performance metrics are all being touched on.