

Stage II - Project Proposal and Specifications

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Team Name: Pollution Prognosticators

Project Name: Pollution Prediction

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Problem Statement:

The problem that we are attempting to solve is that there is currently no way to determine the amount of pollution at a lot that has not yet been chemically tested. Chemical testing is an expensive process and it is not feasible to test every area that Habitat for Humanity is looking into for housing projects. It would be extremely beneficial for organizations like Habitat for Humanity if they were able to approximate the level of pollution at a certain lot before they spend money to test it. For example, if neighboring lots were very polluted Habitat for Humanity might decide that they should not consider that lot because of the high pollution risk. However, if it can be determined that a lot is unlikely to be polluted, it would be worth it for these organizations to invest money into further testing.

Module Objective:

The completed module will accurately display polluted areas, both explicit and predicted sites of pollution. The severity and the prediction of the polluted areas will be accomplished with the help of an algorithm that will take in data about the polluted sites as an input and output the predicted polluted sites, with information on the severity of the pollution. This information will be displayed on the map module of the SOAP system, allowing users of SOAP to easily assess polluted areas and see areas that have a strong chance of being polluted and dangerous.

End Product Description:

The final design of the product should successfully predict the pollution level of any location chosen on the SOAP pollution map. The map module should be interactive and take into consideration a pollution prediction module and algorithm. The algorithm will use local pollution data, such as proximity, intensity, and chemical composition, in order to successfully

predict the degree of the pollution on the desired lot. The feature will work in correspondence with the other modules of SOAP in order to help upkeep the standard of usability and quality.

Importance and Need for Module:

The module is important because there is no way to visibly observe if a piece of land is polluted or not. A piece of land that looks green and healthy on the surface can be considered a brownfield because of the chemicals that are hidden within the soil. This makes it difficult to predict what pieces of land will be good candidates for organizations like Habitat for Humanity without using historical data of the area or data from surrounding areas. The historical data is not always available or accurate enough to provide a good prediction, so using data from surrounding areas may be the most accurate solution. This information is vital to the primary use of SOAP. Therefore, this module is an important addition to the project.

Similar Systems/Approaches:

The current SOAP systems that are most similar to our module are the map and the list of sites. These systems display data about lots that have already been chemically tested. They take the existing data and directly plot it on the map or display it on a page. Other systems that are more similar to our module have been worked on in the past but have not been completed. For example, Thomas Borgia has implemented an algorithm similar to the team's end objective, yet it has not been fully implemented in the SOAP system. The focus of our project will be on continuing his previous work and not creating a new algorithm. A similar approach besides the current SOAP project is the Cleanups in My Community (CIMC) tool provided by the United States Environmental Protection Agency (EPA). Even though this system does not predict pollution levels at any location, it is similar to our project because it shows what pollution information is relevant for a given location. Another similar system is the AirNow system that estimates air quality at different locations. Our system will be dealing with ground pollution, but the prediction algorithm that the AirNow system uses could be something that we learn from and add to Thomas Borgia's current algorithm.

Why is the Module Innovative?

The module is innovative because it uses an algorithm to predict pollution levels based on current pollution and geographical data. Current related SOAP modules include a map of

the previously tested sites and a list of current pollution data, including chemicals that were found, at each site. These modules are helpful for someone that is looking for information at these specific locations, but they do not provide any information for new locations that have not yet been tested. The proposed module will solve this problem and provide a way to determine what future locations are worth testing.

Technologies and Concepts Needed:

The team will need to learn the languages and systems that makeup the current SOAP system, which includes HTML5/CSS3, JavaScript, PHP5, PostgreSQL and CakePHP (since the module will not include Twitter support, Twitter Bootstrap will not be necessary to learn for our completed module). For concepts, the team will need to understand prediction algorithms and how they can be applied to accurately predict pollution. The team will have SOAP contributor Thomas Borgia as a resource for the previous work on this algorithm.

Diagram:

