

Interactive Website for Values Diagnostic Reporting and Analysis

CS 4624: Multimedia, Hypertext, and Information Access

Final Report

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Executive Summary

The goal of this project is to help sustainability professionals and students learn about their values and biases that impact their work as facilitators. The project will help them understand their own preferences for alternative futures and to understand and navigate the assumptions and beliefs of others. The final product will consist of a website which will collect answers to questions from an established values diagnostic survey. The site will conduct an analysis of those inputs and generate a report for the user to compare their results to others who have previously taken it. The survey will also be able to compare groups of users' results before a scheduled date. It is important to know what a person's sustainability values are in order to collaborate with others who may have different values. Sustainability professionals can create alternative futures. They influence development of possible futures by helping stakeholders use strategies to influence systems. Leaders must navigate these differences to avoid polarization and inaction that derail the direction, alignment, and commitment required for sustainable development.

The project is broken up into three different parts: the website platform, data input and the data output. The website platform needs to be easy manageable because the client, Dr. Bruce Hull, does not have any experience with web development. Dr. Hull does have experience managing his own blog site through WordPress. WordPress is a free and open-source content management system, so naturally it was the best choice. The Qualtrics survey is the main source of data input. The survey will be static to ensure accurate comparisons of previous data to a user's current data. It contains two different types of questions: in the first type, the user will be asked to allocate a total global budget of \$100 among six choices to determine the outcomes of sustainable development efforts, while in the second type the user is given different scenarios and they must choose their degree of agreement on a scale from strongly disagree to strongly agree. The data analytics will be automated using the Qualtrics API and the Pandas library in Python. The data output is a report which clearly communicates the user's values and biases, while also displaying how they compare to previous users. We will accomplish these tasks to efficiently and effectively assist the user in learning about their stance on sustainability.

The site is hosted by BlueHost via WordPress at the domain name purchased by Dr. Hull, www.sustainabilityvalues.com. The site is composed of plugins provided by WordPress. For example, Jetpack is a plugin which records data, such as site visits and Interactions, and it also provides security for the site. We also added a login reCAPTCHA on the administrator login to deny access to any automated scripts. The

site has the Qualtrics survey embedded for easy access. The user will be able to view their results in a PDF delivered to their email.

1. Introduction

At the very basic level of this project, our group is trying to create a website for our client, Dr. Hull, so that sustainability professionals can take a survey to determine their sustainability levels.

1.1. Objective

The title of this project is called *Interactive Website for Values Diagnostic Reporting and Analysis*, or *Sustainability Values Diagnostic* for short. Sustainability professionals, who may be students in Dr. Hull's class, companies who ask him for advice, or people who attend meeting, seminars, or workshops on sustainability will be interested in their values and biases that impact their work as facilitators. To accomplish this, they must understand their own preferences for alternative futures and navigate the assumptions and beliefs of others.

The main goal of this project is to save our client and his wife time, so they do not have to parse all this data and create survey results/outputs by hand. Currently, our client is getting his users to take his survey on Qualtrics. He sends them the Qualtrics link and then after they take the survey, he can download a CSV file with everyone's results; his wife then parses the data with Excel using specific calculations to create a final PDF output for each individual survey taker. This process takes several weeks to complete. With our solution, we will not only save our client and his wife time, but we will provide the results to the sustainability professionals taking the survey much faster than the previous method.

1.2. Client

Our client is Dr. Bruce Hull, a professor of Sustainability in the Department of Forest Resources and Environmental Conservation. He is also a Senior Fellow in the Center for Leadership in Global Sustainability and is on the advisory committee for the Global Change Center (Bruce Hull, 2017). Dr. Hull is heavily involved in the sustainability community, having published two books and two blogs.

He has been using Qualtrics for his surveys since 2014 and has about 600 people taking his survey a year. With so many people using his service, he wants to have an easier way for both himself and his wife to produce outputs, and he wants his sustainability professionals to receive their results faster, so they can benefit from this leadership consulting tool more quickly and more often.

1.3. Constraints

Constraints for this project in order to meet the objectives include an easily manageable website, a consistent and understandable way for survey takers to read results after taking a survey, and a way to see past results and to retake surveys.

An easily manageable website also includes great documentation so that if there is some sort of issue with the site or survey, Dr. Hull will be able to fix it himself. This also means that users taking the survey will be able to complete the steps without any issues or questions, as it will be an easy process. This is related to the consistent and understandable way for survey takers to read results. Without an easy-to-read result output, the survey would be a waste of time. The survey takers need to easily interpret their results in order to grow within the sustainability field.

Lastly, survey takers need a way to log back into the website and see past results. This will lead to their ability to retake surveys to see their personal growth. A main reason for the creation of this website is so that people can better themselves within sustainability. Hence, the ability to retake the survey is a huge plus.

1.4. Definitions

1. Compositionalist - An advocate of the content which composes the landscape. They tend to focus on the integrity, authenticity, and natural conditions of a system and want to save native biodiversity, as well as, natural places like untrammelled parks and wilderness areas.
2. Ecosystem Services - Provide basic services (i.e. energy, water) that support human life, civilization, and economy.
3. Functionalists - Someone who focuses on the functions performed and may be comfortable exchanging part of nature (i.e. species), as long as the desired functions get performed.
4. Natural Capital - The world's stocks of natural assets which include geology, soil, air, water and all living things from which humans derive ecosystem services.
5. Social Capital - Builds the capacity to solve problems, reduce pollution, find substitutes for scarce resource, cure ills created by environmental degradation,

adapt to climate changes, etc. Social capital allows one generation to pass to the next generation the capacity to sustain flows of desired goods and services.

6. Species and Biodiversity - The variety of life in the world or in a particular habitat or ecosystem.
7. Sustainability - Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

1.5. Roles

There are different roles related to this project: the roles related to the using of the website, and the roles related to the making of the website. We will go into detail about all of the different roles, as they all have impact on each other.

1.5.1. User Roles

The roles related to using this website are the survey takers and our client, Dr. Hull. Both roles benefit from the results, but in different ways. The survey takers benefit in that they can see where they fall on the sustainability scale and grow from those results. Dr. Hull benefits since he can collect results from many people and groups and build his survey off these results. The survey taker results can also enable him to better understand why people choose certain answers on his survey in order to see why people fall into different sustainability categories.

1.5.2. Project Roles

In order to complete this project and reach all of the objectives associated with the project, we had to come up with different key project roles and lead roles. These roles are as follows:

Group Members	Roles
Caroline	Lead on first two presentations. In charge of back-end implementation, which includes database design and implementation to create a secure centralized location to store any and all personal information for any given user.

	This also includes ensuring the parsing of CSV files is correct and efficient.
Sunny	Lead on last two presentations. In charge of prototyping, which includes the creation of the prototype and ensuring Dr. Hull likes the outcome. Along with Harsh, is also in charge of testing the final product by comparing survey results with data we already have. This also includes making sure report generation shows clear and concise results that are easily readable for users of all ages.
Harsh	Lead on reports and VTechWorks Submissions. In charge of design, which includes figuring out what tools to use that meet requirements. Along with Sunny, is also in charge of testing the final product by comparing survey results with data we already have. This also includes making sure report generation shows clear and concise results that are easily readable for users of all ages.
Xavier	Lead on note taking. In charge of front-end implementation, which includes making sure the front-end meets the requirements. This also includes making sure the interface works with the survey and displays correctly. Also, assisted in backend management

	including databases, servers and the virtual machine.
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Table 1: Group Roles

1.6. Scope

This Sustainability Values Diagnostic project is a semester-long project that follows the key principles of software design: requirements, design, prototyping, implementation, and testing. A main goal of reaching the scope of this project is to keep everything flexible and easy to integrate. Since there are a lot of moving parts, from the survey to the website to the parsing, everything needs to be easily changed in order for all the parts to fit.

We created the following milestones in order to complete our project before the end of the semester for our client:

Date	Specification
February 1	Requirements due: includes creating requirements along with understanding scope and objectives
February 13	Presentation 1 (on requirements of project)
March 12	Design due: includes WordPress setup, mockup website, survey creation, starting of parsing

March 15	Presentation 2 (on design of project)
April 3	Prototyping due: includes completed parsing of survey and basic integration of parsing script and survey on WordPress
April 5	Presentation 3 (on prototyping of project)
April 23	Implementation due: includes login and security setup, back-end integrated with WordPress, and output format completed
April 26	Presentation 4 (on implementation and final product)

Table 2: Milestones for project

2. Requirements

We developed these requirements after meeting with our client at the beginning of the semester. Based off of his goals, we decided we needed to make several design and implementation choices in order to make this project a success. First, we needed to find a website platform that could be secure and host his survey at the same time. We also needed to figure out how we'd collect answers to users' questions, and how to manipulate that data. Security was also a consideration in the requirements phase. Admin-only access and user login security is very important in this project. Lastly, we discussed how we would be outputting all of this data so that it made sense to survey-takers.

2.1. Website Platform

The website platform for this project is WordPress (www.wordpress.org). WordPress is a great tool for web development; it is robust and rich with thousands of plugins. Additionally, WordPress is easily manageable, and does not require a technical background to use. This is a key requirement because the client, Dr. Hull, is not of a technical background. Also, WordPress is free, an aspect that Dr. Hull said he preferred. Furthermore, Dr. Hull has a subscription to BlueHost (www.bluehost.com), a web hosting service that has a partnership with WordPress.

2.2. Survey

The survey is one of the most important requirements of this project. The survey-creating software needs to be able to handle input and verify it. For example, the survey must not let the user move forward to the next question until he or she had completed the current question wholly. Additionally, the survey website must have an API that can be used in order to programmatically request and download the survey results in order to show users their results on the website. Furthermore, the survey must have a "group survey" option, where a group of participants may take it, and check their responses against their peers.

2.3. Parsing

The website uses Python to parse through the survey data, which is in the form of a CSV file. Python is the programming language of choice because of its rich parsing ability, as well as its toolkits and support for parsing. We researched several different toolkits and packages that could potentially be used to parse CSV files. The two toolkits we were deciding between were XLRD and Pandas (Harrison). We chose to use Pandas since more people in the group had experience with it, along with the fact that it

had more functionality like more dynamic outputting options; it is also the most common package for manipulating Excel sheets. Three out of the four group members have experience with parsing Excel files using Python, so we all agreed it would be the most efficient way to do our calculations from the survey results.

2.4. Group Functionality

The survey may be used to poll groups of participants, so there must be a group option. For example, if Dr. Hull would like to use the survey for one of his classes, the survey must be able to accept a “group ID” and report each individual’s scores against the rest of the group’s averages. Additionally, there must be a way to mute the results of group results, until a certain number of participants have taken the survey. This will keep the data static when the results are out, rather than updating the averages every time the survey is taken by a new group member.

2.5. Authentication

This survey has sensitive information about the participants, such as their name, email address, and age, as well as their answers. This information must not be shared with anyone other than the individual, so authentication is extremely important. Each individual can create their own account using their own email address; this allows the user to store their individual results with their own email, so no one else can access the data.

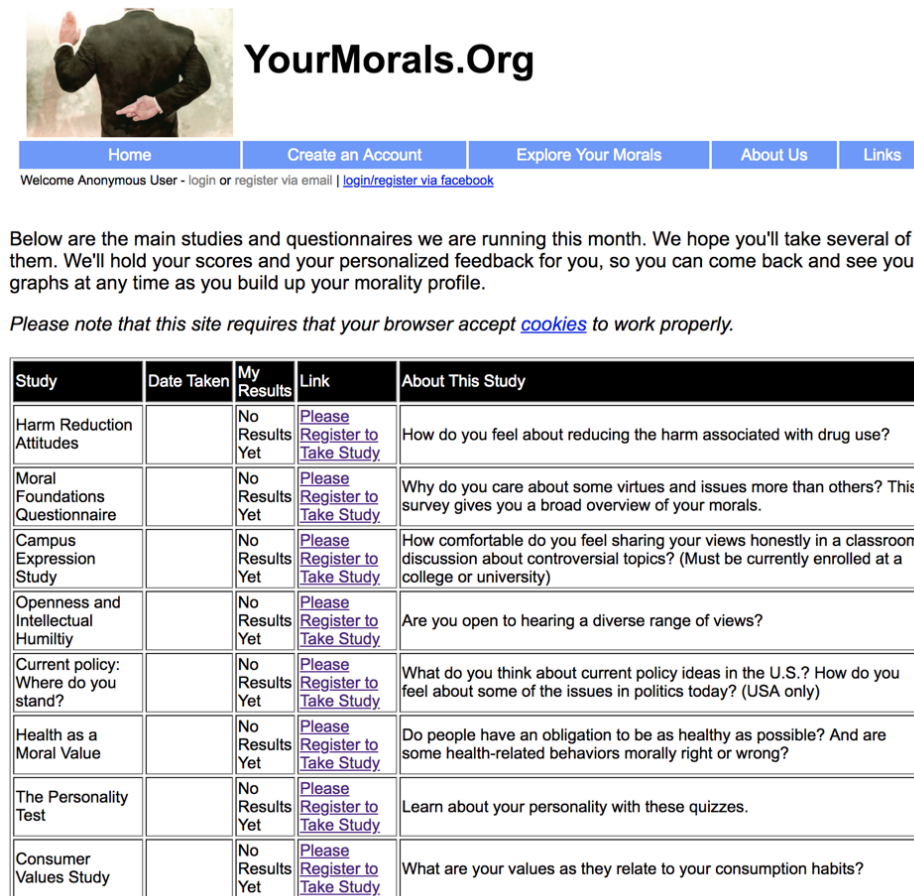
2.6. Administrator Access

Dr. Hull must be able to edit the website without any assistance. Dr. Hull is not of a technology background, so editing the website must not involve any programming. To solve this problem, the website must be created on a platform that requires no coding, preferably a drag-and-drop website builder. Moreover, Dr. Hull must be the only one with administrator access, because the website contains the results of the survey, and the data is sensitive.

3. Design

Our client, Dr. Bruce Hull, had certain specifications to the way this website needed to be designed. He wanted something similar to the [“http://www.yourmorals.org/explore.php”](http://www.yourmorals.org/explore.php) website in terms of functionality; as long as it had the functionality he asked for, he did not care what the website looked like. This

website is simple and easy to navigate; however, we intend to add more features and make this more visually appealing to the users. These specifications include: Group Functionality, Authentication, and Outputs. **Figure 1** is the website that Dr. Hull loosely wanted the website to look like, once it's created.



Want to see how you compare to others in your organization? Want to examine your organization's values? [Create a group and invite others to explore their morals.](#)

Below are some other studies and questionnaires that you might be interested in taking. *If you cannot find a study you are looking for, you can also visit our [complete list of studies](#).*

Figure 1: Envisioned Website (YourMorals.org)

As you can see, the website (**Figure 1**) is a straightforward website, as this includes a Home, Create an Account, Explore Your Morals (Survey), Contact Information (About Us), and Links for further in-depth knowledge on morals.

We created a mockup website of the envisioned website using Balsamiq (software that allows users to create mockup applications or websites). Below in **Figure 2** illustrates the home page of the website. When a user visits this website, they will first see an image representing the site's values and below that will be a block of text explaining why the website exists.

3.1. Mockup



Figure 2: Home Page (Not Signed in)

After that, there will be a title of Dr. Hull's choosing on the top left, and below will be buttons leading to 'Home', 'Survey', 'Links', and 'Contact Us'. The most important thing for this is signing in, which is on the top right, because without this no one can take the survey.

A Web Page

http://

VT Sustainability Values

Sign in

Home

Survey

Links

Contact Us

Username: Student1

Password: *****

Login

Don't have an account? Sign up

Figure 3: Sign In Page

When the user wants to sign in to their account they will need to click 'Sign in.' From here, they will be directed to the sign in page. The user will need to enter their username and password, then click Login or press 'Enter,' as seen in **Figure 3**. However, if the user does not have an account, they will need to sign up.

VT Sustainability Values

Sign in

Home
Survey
Links
Contact Us

Register

Username:
Password:
Confirm Password:
Email:

Register

Already Registered? Login

Figure 4: Register Page

The next step the user will take is choosing a Username; after choosing their username, they will type their password, confirm their password, and enter their email (**Figure 4**). Once those four requirements have been satisfied, then they can select 'Register' and the account will be created.



Figure 5: Logged in Home page

Figure 5 illustrates the home page after a person has signed in. The only difference is that on top right you can see the user's name; they will now be able to access the Survey.

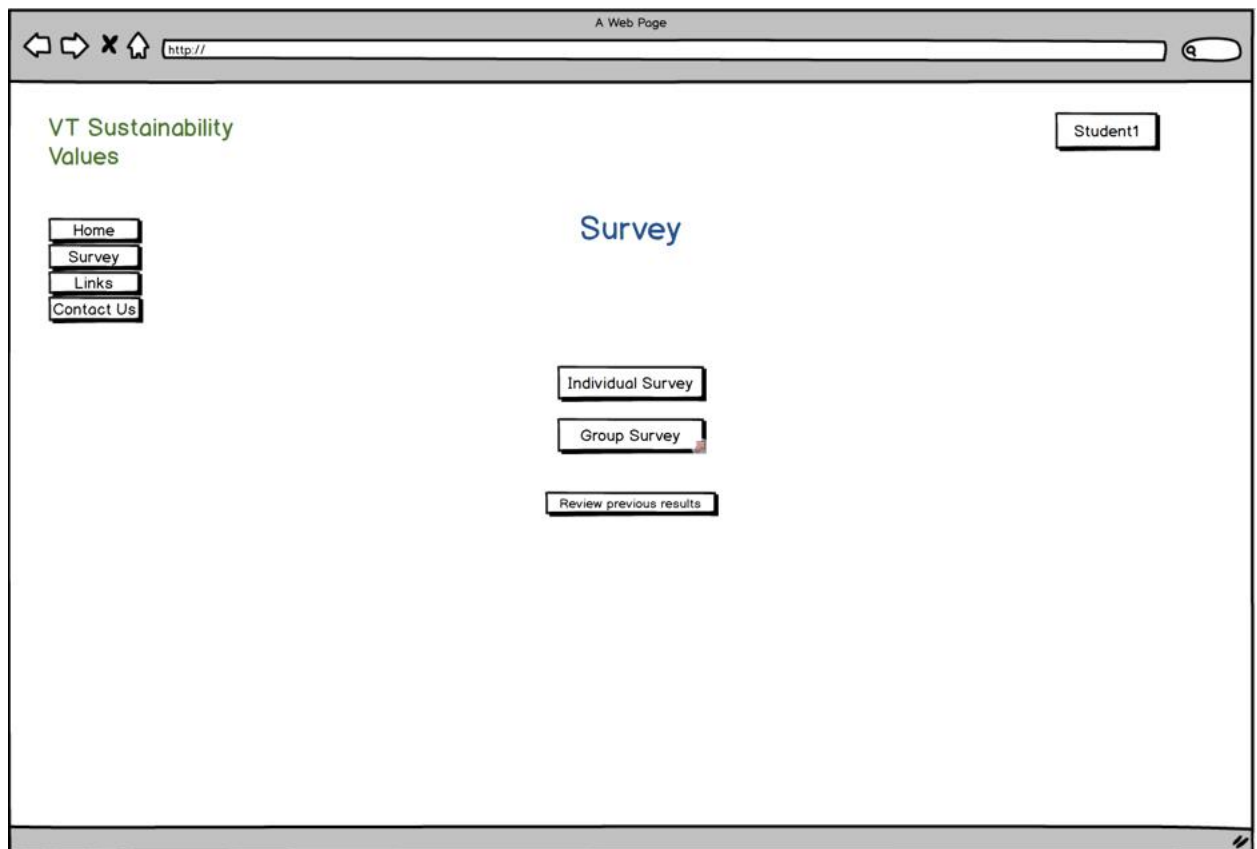


Figure 6: Survey Page

The main reason to build the website is to help automate survey results. As you can see in **Figure 6**, there are three options: Individual Survey, Group Survey, and Review previous results.

The image is a screenshot of a web browser window. The title bar at the top says "A Web Page". The address bar shows "http://". The main content area has a header "VT Sustainability Values" on the left and a login box labeled "Student1" on the right. In the center, the text "Group Survey" is displayed. Below this, there is a "Password:" label next to a text input field, and an "Enter" button below the input field. On the left side, there is a vertical menu with four buttons: "Home", "Survey", "Links", and "Contact Us".

Figure 7: Group Survey Password

The Group Survey is one of the features that Dr. Hull specifically requested for this website. In this (**Figure 7**) feature, Dr. Hull will specifically give out a password to the group he wishes to survey. From this, the client can get exact results for the group that was surveyed and have them recorded.

VT Sustainability Values

Student1

Home
Survey
Links
Contact Us

Q5

Demographics
The following questions are used to examine and report how sustainability values vary by demographic.

Gender

☐ Male
☐ Female

For most of my life I lived...

☐ in rural areas
☐ in suburban areas
☐ in urban areas

Politically, I tend to be...

☐ more conservative than liberal on most issues
☐ more liberal than conservative on most issues

International travel experience

☐ Have not traveled outside my country of birth
☐ Visited 3 or fewer different countries
☐ Visited more than 3 different countries

Age

Finish

Figure 8: End of Survey

For both the Individual and Group survey, the questions will be the same (**Figure 8**). They will be able to click Finish, which is located at the bottom left. A graph will be generated, including PDF and HTML written results.

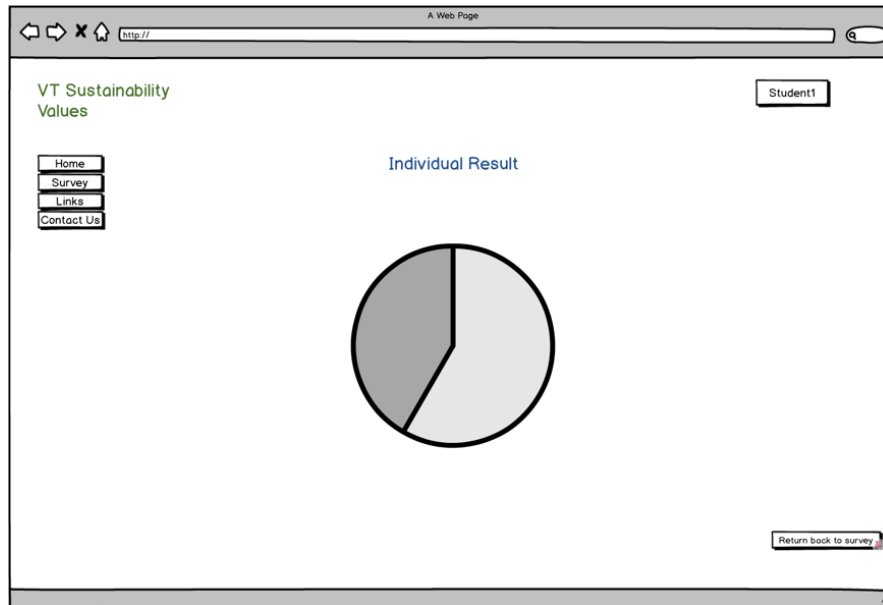


Figure 9: Individual Result

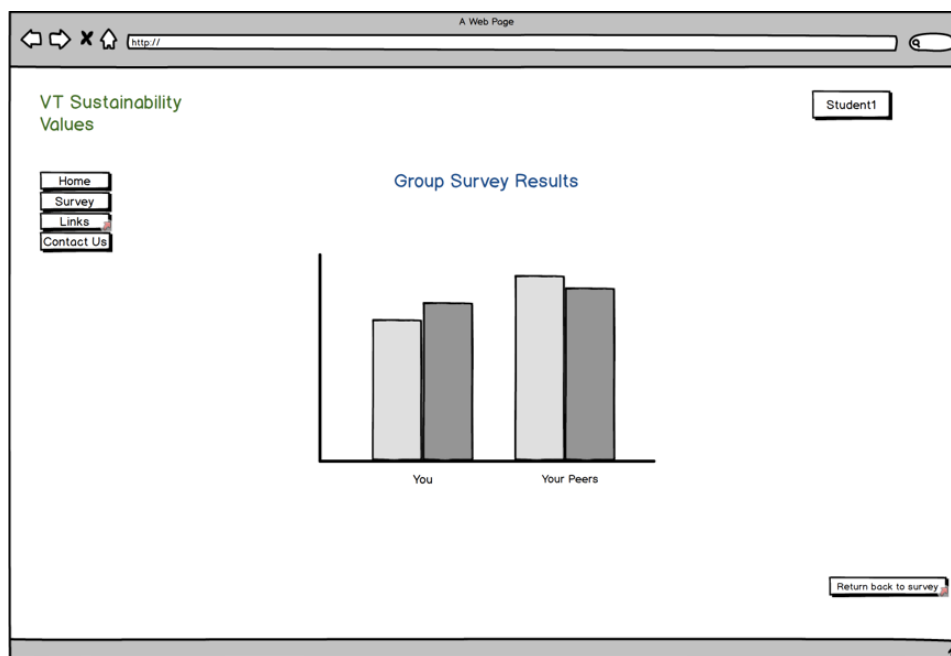


Figure 10: Group Survey Result

The graph outputs are straightforward. For the Individual Survey there will be a single graph that will be displayed, hence something similar to the pie chart in **Figure 9**. For the Group Survey there will be a graph for the user and then the rest will be for the other group members that took the survey (**Figure 10**). The user will be able to select 'Return back to survey' on the bottom right and would be able to take the survey again or check previous results.

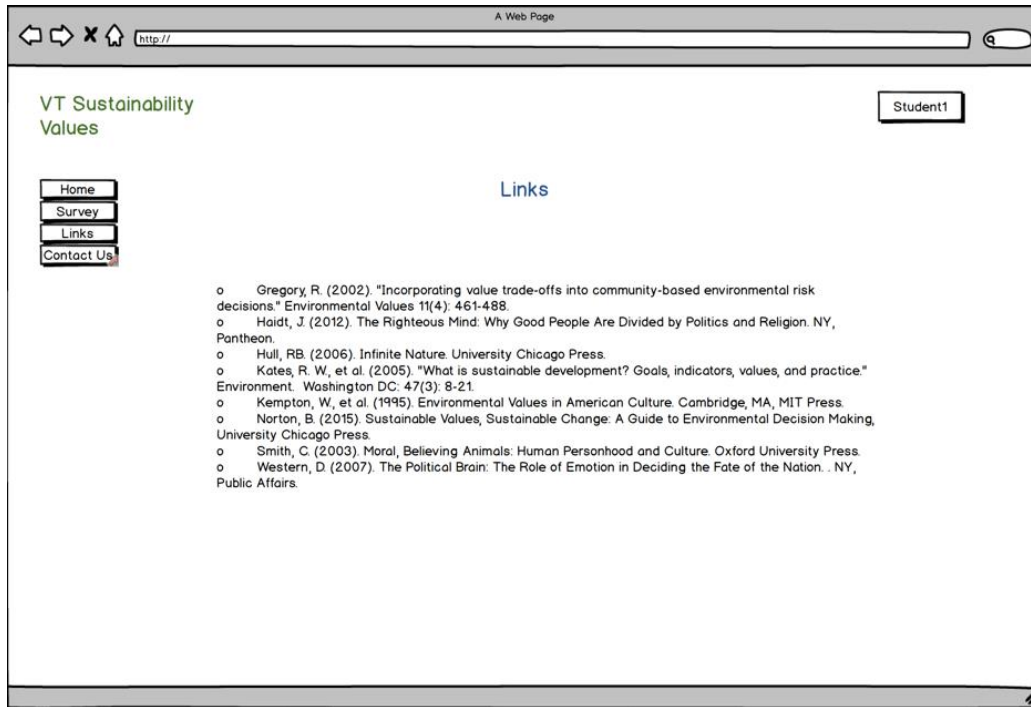


Figure 11: Links (More Resources) page

The Links page in **Figure 11** allows Dr. Hull's students' or anonymous users to be educated on their moral thinking and different points of view, essentially giving them both sides of the story. These links redirect the user go to a book or research paper (currently only citations).

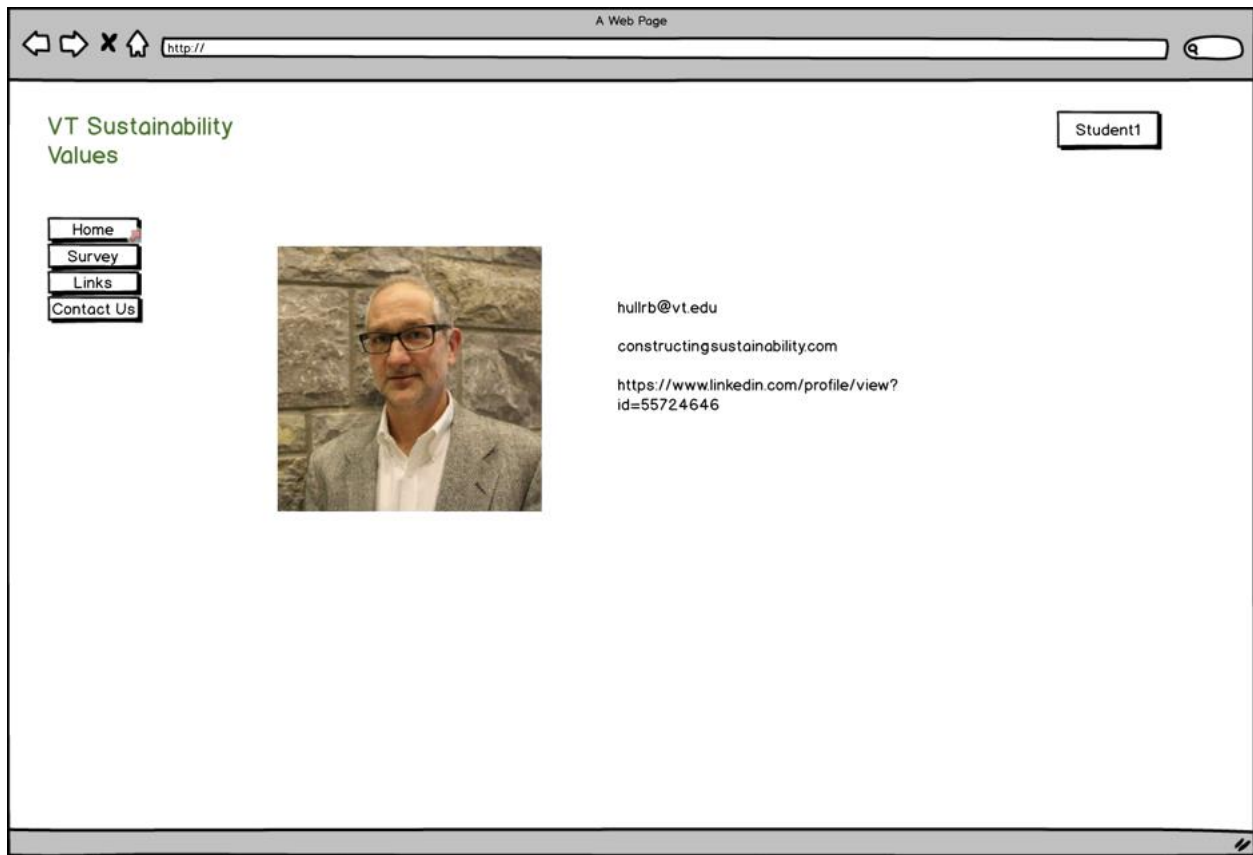


Figure 12: Contact Us page

Lastly, the Contact Us page (**Figure 12**) will have information on Dr. Hull. This will include his email, website, LinkedIn information, and a background on his work and life.

3.2. Website

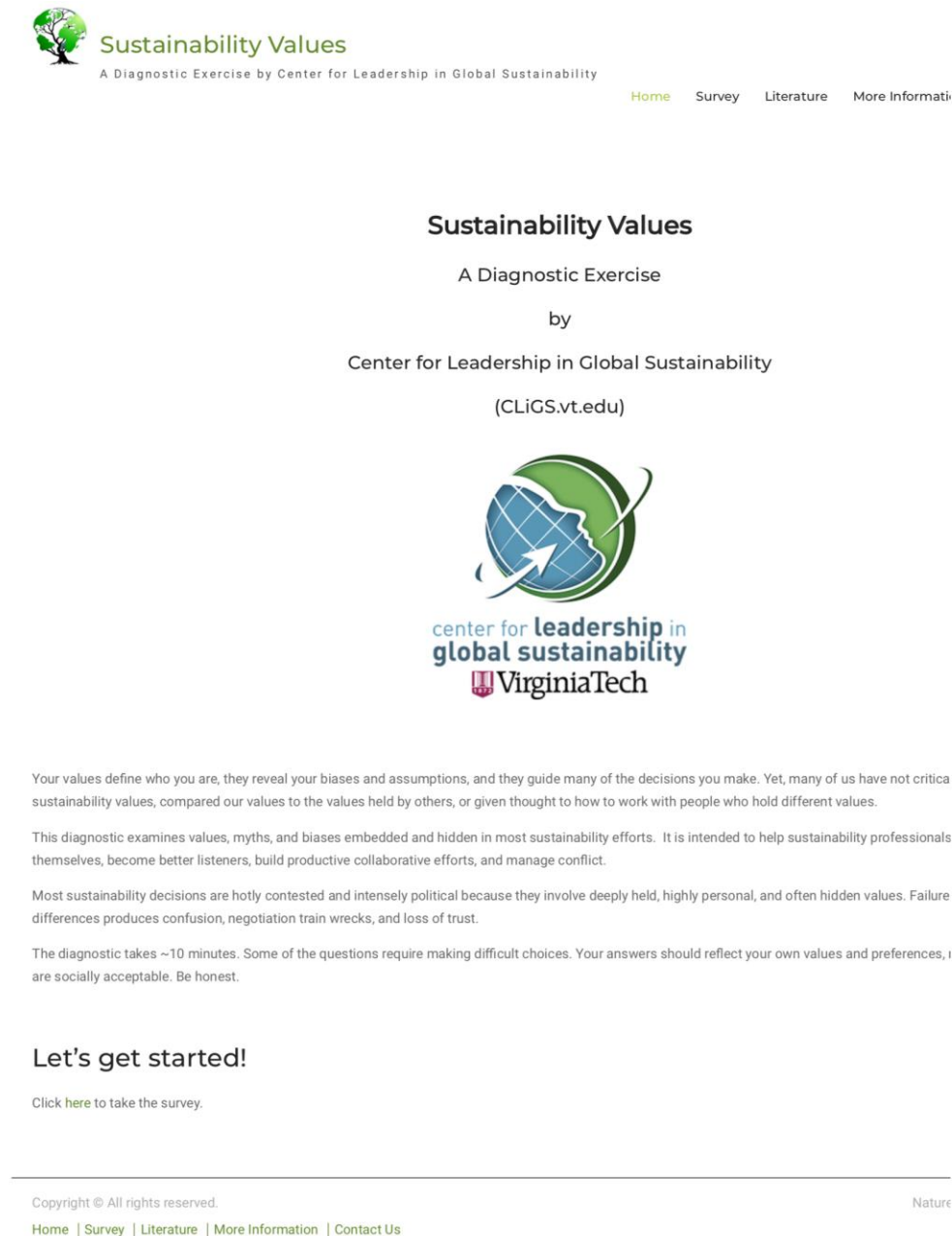


Figure 13: Home Page

Figure 13 illustrates the website that was created using WordPress. As you can see in **Figure 13**, there are 4 tabs: Home, Survey, Literature, More Information, and Contact

Us. Below that is a background description on the ideas behind sustainability values and then there is a link to the survey.

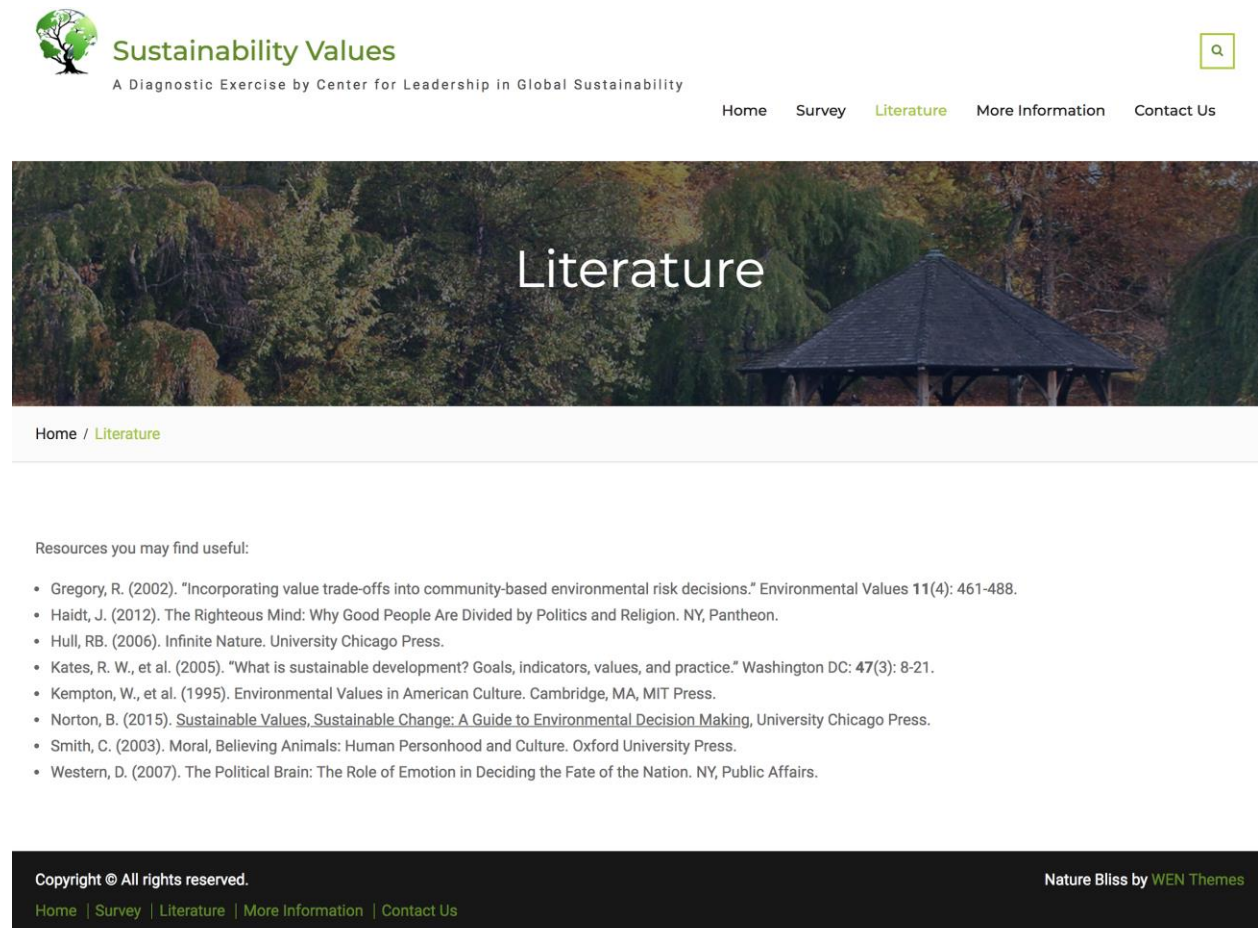
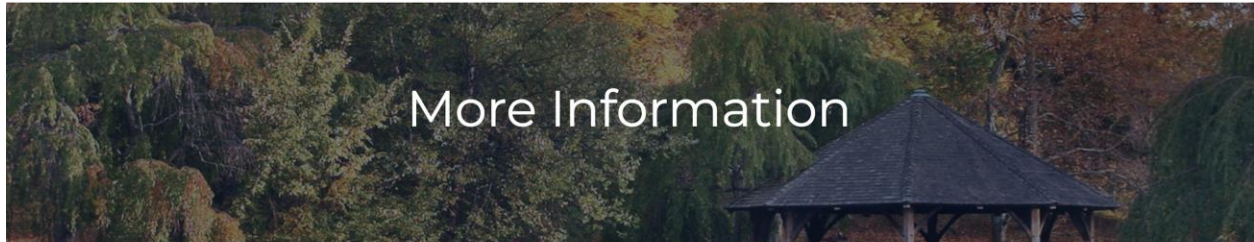


Figure 14: Literature Page

In the Literature page, Dr. Bruce Hull wanted links that students or any of his mentees could go to, to learn more about sustainability values, basically, readings on ideas and different viewpoints.



[Home](#) / [More Information](#)

By completing this diagnostic exercise followed by a bit of coaching and practice, you should be better able to:

- Describe attributes of human psychology that make rational decision making difficult and make hidden values and biases powerful and problematic.
- Describe why value conflicts contribute to wicked problems being wicked.
- Explain your own values and assumptions associated with key sustainability controversies.
- Be able to listen for, identify, and respect the values of others.
- Practice navigating and leveraging similarities and differences in these values to work constructively to resolve controversies of sustainable development.

Additional information about the diagnostic, coaching, workshops, and research on the topic can be found at <http://cligs.vt.edu/>

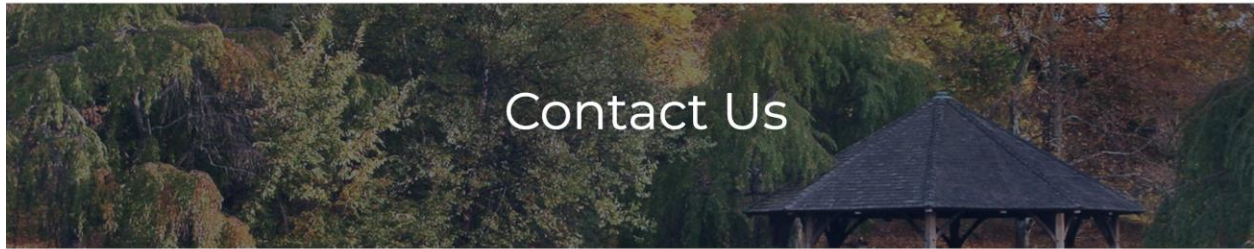
Copyright © All rights reserved.

Nature Bliss by [WEN Themes](#)

[Home](#) | [Survey](#) | [Literature](#) | [More Information](#) | [Contact Us](#)

Figure 15: More Information Page

In More Information, there are explanations that students and anyone can read on why there is a survey and what is the reasoning behind the website.



Contact Us

[Home](#) / [Contact Us](#)

Hi There,

If there are any questions you may contact me using the form below or by email at hullrb@vt.edu.

Name (required)

Email (required)

Comment (required)

SUBMIT »

Figure 16: Contact Us page

The Contact Us Page is there in case anyone has any questions for Dr. Bruce Hull or wants to reach out for any other reasons.



Survey

[Home](#) / [Survey](#)

Sustainability Values

A Diagnostic Exercise

by

Center for Leadership in Global Sustainability
(CLIGS.vt.edu)

Meeting today's pressing sustainable development challenges requires collaboration among diverse stakeholders who likely differ in their core values and desired future conditions. This diagnostic exercise is designed to help sustainability professionals understand their own values so they may better understand and navigate the values of others. Some of the questions require making difficult choices. Your answers should reflect your own values and preferences, not answers you think are socially acceptable. Be honest.

The last question asks for your name so that we can distribute the results to you. The results will be tabulated in a report that helps you interpret your values and compare them to values held by others.

Important Note

The results are not evaluative. They will not impact grades or expectations. Individual results are confidential and will be seen only by your course instructors. If you have concerns about the assessment, please contact Bruce Hull before taking it (hullrb@vt.edu).

The assessment will take 10 or so minutes to complete. Be sure to start when you have enough time to finish



Figure 17: Survey Start Page

In the page shown in **Figure 17**, the user will be able to access the survey by clicking “Survey” on the top right. The beginning of the survey is what this will look like. Below the description of the survey will be an arrow (on the bottom right) for the user to start the survey.

Demographics

The following questions are used to examine and report how sustainability values vary by demographic.

First Name

Last Name

Email (please use the SAME email as your login email)

Age

Gender

☐ Male

☐ Female

For most of my life I lived...

- ☐ in rural areas
- ☐ in suburban areas
- ☐ in urban areas

Politically, I tend to be...

- ☐ more conservative than liberal on most issues
- ☐ more liberal than conservative on most issues

International travel experience

- ☐ Have not traveled outside my country of birth
- ☐ Visited 3 or fewer different countries
- ☐ Visited more than 3 different countries



Powered by Qualtrics

Figure 18: Survey End Page

When the user finishes taking the survey, they will be asked for their names, email, age, and gender. The email will be needed so that the final results can be sent to the user. In **Figure 18**, the user can continue to submit this by clicking the arrow on the bottom right.



We thank you for your time spent taking this survey.
Your response has been recorded.

Powered by Qualtrics

Figure 19: Survey Conclusion Page

In Figure 19, the user will be notified of the submission once they have clicked the arrow on the bottom right in Figure 18. This (Figure 19) page is specifically for confirmation and thanking the user for taking the survey.

4. Implementation

We have explained the various aspects of the implementation phase of this project in this section, which includes the steps involved in creating the WordPress account and website, the Qualtrics survey, the parsing, and the output.

4.1. WordPress

As mentioned in the introduction, our client has two blogs and is heavily involved in the sustainability community. One of his blog sites, www.constructingsustainability.com, is hosted through a free WordPress.com account. Although he did not create it himself, he has experience managing it with updates. The free account is very limited but handles the blog site well. At first, we started with another free account, but quickly realized the sustainability values diagnostic website will need more functionality than a blog site. For example, the biggest obstacle of the free account was that it does not allow for plugins to be installed without upgrading to the expensive Business account. The free account also does not migrate purchased domain names for 60 days from the creation of site. Dr. Hull is paying monthly for the rights to the domain name sustainabilityvalues.com, so those two months would be a waste of money. The given domain names, sustainabilityvaluescom.WordPress.com and sustainabilityvaluesdotcom.WordPress.com, were not viable substitutes.

The switch to a WordPress.org site became essential in order to create a more interactive site. It allows freedom to use any domain name, supports useful plugins the site will require, and allows creative themes to give a pleasant user experience. It also gives access to more powerful analytics of the site itself; the administrator has access to daily analytics through the dashboard. The migration was quick and easy because the main obstacle was already settled as a result of Dr. Hull's preexisting BlueHost account, so a simple installation was sufficient. Although WordPress.org sites allow more features for free, the admin takes on many more maintenance responsibilities. The admin must keep the site updated, keep regular backups, handle SPAM control options, and most importantly keep the site optimized. Each site has a database which must be continually optimized so it is not slowed down due to the additional plugins and themes Dr. Hull uploads. Tables are created for every upload and they are not deleted when plugins/themes are uninstalled. A database optimizer has been scheduled to run weekly, so Dr. Hull doesn't have to remember to run it periodically. Database optimization is important to prevent performance issues that would arise as more and more plugins and themes are installed.

A large obstacle we ran into with WordPress was the lack of support for Python scripts. WordPress views Python scripts as potential threats, so they reject them. This was a

problem for us because we originally intended to run a script based on a button click event after the user finished the survey. We then shifted our focus to running a CGI python script through BlueHost. We were going to run a cron job to email the user results that they could save on their computer or wherever they saw fit. The PDF and email functionalities require certain modules which require root access to install and run them. Currently, Dr. Hull does not have root access due to his shared hosting account on BlueHost. Since the upgrade (VPS hosting) is much more expensive, we wanted to continue finding alternative solutions. We went to our professor, Dr. Fox, and he and his Graduate Research Assistant Liuqing Li were able to help us set up our own Virtual Machine (VM). Now, there is a Python script constantly running and checking if there is a new record to be parsed and output.

Maintaining the WordPress (WP) site:

Sign in to the administrator dashboard by going to www.sustainabilityvalues.com/wp-admin and logging in with your email, password, and clicking the checkbox for the reCAPTCHA security.

Add/edit pages:

1. Navigate to the tab on the side menu on the WP dashboard titled “Pages”.
2. To edit: click on the title of the page you wish to edit and begin making changes in the content box displayed.
3. To add: click “Add New” and insert a title for the page.
4. Any plugins which require shortcodes for them to be displayed on a page will be placed in the content box of the desired page.
 - a. For example, there were previously used plugins (none of the current ones use them) which required shortcodes like [shortcode_name]
 - b. Different shortcodes for specific plugins can be found under the “Plugins” tab and then “View Details”.

Add/edit themes:

1. Navigate to tab on the side menu on the WP dashboard titled “Appearance”.
2. Under “Themes”, you can add new themes or edit the current theme by clicking “Customize”.
3. Customizing a theme will allow you to add any new pages created to the menu on the site and edit the header, footer, and add widgets to the site if desired.
4. CSS code can be added to create more interactive features on the site but CAUTION some themes will be disrupted if CSS code is not compatible.

Plugins:

1. Current installed plugins (default WP plugins excluded)
 - a. Login No Captcha reCAPTCHA
 - i. Provides security to administrator login.
 - b. Qualtrics Survey Embeds
 - i. Allows for the survey to be embedded on a page by pasting the URL to the survey in the content box.
 - c. WP-Optimize
 - i. Optimizes the WP databases to keep the site from being bogged down with useless files.
2. Login No Captcha reCAPTCHA
 - a. Already set up and does not need to be maintained
 - b. If you want to disable this feature, navigate to “Settings” and then “Login NoCaptcha”. There is a button to delete keys and disable.
 - c. Keys are required by Google to provide the service and can be replaced with new created keys
3. Qualtrics Survey Embeds
 - a. Embeds a Qualtrics survey on a page via a URL.
 - b. In order to edit the size of the survey on a page can be changed by navigating to “Settings” and then “Qualtrics Settings”.
4. WP-Optimize
 - a. Navigate to “WP-Optimize” on the side menu of the WP dashboard.
 - b. Optimizations can be run at any time by a clicking the “Run all selected optimizations” button; the optimizations are described in the table below the button.
 - c. It is scheduled to run every week.
 - i. The schedule can be changed under “Settings”, by selecting a different option from the drop-down menu provided.

Remaining Default Plugins

1. BlueHost
 - a. Access BlueHost capabilities without leaving the WP admin page
2. Jetpack
 - a. Has been set up to provide site analytics and prevent SPAM.
3. Insights
 - a. Needs to be authenticated through your email in order to activate Google Analytics.
4. OptinMonster

- a. Used to convert visitors into subscribers.
- b. Can be set up by following the video under “OptinMonster” then to “Support”

4.2. Survey

Many software/websites were viable options for the survey, including: SurveyMonkey, Google Forms, and WordPress Plugins. However, none of these survey sites were as powerful as Qualtrics, which has all the resources necessary to develop this website. One of the main requirements was to be able to programmatically download survey results and parse them. Qualtrics is the only website among these that has this functionality. Additionally, Dr. Hull did not want to pay to use these services, as they would not be used year-round. SurveyMonkey and WordPress required a paid membership in order to use their services, so they were not viable choices.

4.3. Parsing

On February 14, we met with Mrs. Allen, Dr. Hull’s wife, who had been doing the calculations and outputs for the past four years. We met in order to clarify how the coding sheet that we were initially given worked (**Figure 20**). To find specific sustainability values for a given survey taker, each question needs to be parsed and a formula is applied to the data.

Codes

What should be sustained?

	<i>Strong</i>	<i>Weak</i>	<i>Neutral</i>	<i>Weak</i>	<i>Strong</i>	
Natural capital (R+LS+N)- ((P+I+C)	100- 25	24.999- 5	4.99- -4.99	-5-- 24.9	-25- -100	Social capital
Ecosystem Services (LS-N)	100 - 12	11.99 - 2	1.99 - -1.99	-2 - - 11.99	-12 -100	Species and biodiversity

R = resources (1.1)
 LS= Life support (1.2)
 N= Nature (1.3)
 P = people (1.4)
 I = Institutions (1.5)
 C = culture (1.6)

Who should benefit?

	<i>Strong</i>	<i>Weak</i>	<i>Neutral</i>	<i>Weak</i>	<i>Strong</i>	
People Today (CG -FG)	100- 25	24.999- 5	4.99- -4.99	-5-- 24.9	-25- -100	People Tomorrow
Us (us - <i>Qth</i>)	100- 25	24.999- 5	4.99- -4.99	-5-- 24.9	-25- -100	Others

CG= current generation, people living today (2.1)
 FG = Future generations, (2.2)
 Us = Community where I live (3.1)
Qth = move it elsewhere (3.2)

How should we solve sustainability problems?

	<i>Strongly prefer</i>		<i>Neutral</i>		<i>Strongly NOT prefer</i>
With Technological Innovation (TI) 4.1					
By freeing market forces (FM) 4.2					
By fixing market failures (FMF) 4.3					
With strong government actions (SG) 4.4					
By educating citizens & consumers (Ed) 4.6					
By creating new institutions (NI) 4.5					

Cell entry = % of people in your group falling in that category. Your scores denoted by shaded cells.

Debatable Assumptions

	<i>Strongly Agree</i>		<i>Neutral</i>		<i>Strongly Disagree</i>
Religion: Because God created the natural world, stewardship of nature should be my religious duty. (<i>Rel</i>) 5.1					
Rights: Mammals have as much right to exist as humans (AR) 5.2					
Limits: Humanity is pushing the limits of Earth ecological systems, risking ecological collapse. (EL) 5.3					
Balance: Nature's ecology has self-correcting properties that keep it balanced and healthy. It is only when humans disturb					

Figure 20: Coding Sheet

In our meeting, she gave us some resources to be able to understand how the coding sheet worked. Over the years, she created several tables to better organize data, one of which is seen in **Figure 21**. She explained how she used Microsoft Excel to do all of her calculations, especially with the use of pivot tables. Pivot tables allow the user to reorganize and summarize rows and columns of a CSV without changing the data. Because we weren't going to use Excel or pivot tables to manipulate our data, we were mainly focused on learning how the calculations were done on each question in order to determine people's likelihood and preference towards high tech, business, government, markets, collaboration, and green mindfulness, all of which are major components of sustainability

Table of Ranges for NC_Code, ES_Code, PT_Code, UO_Code

Scale Anchors	Max	Min	Max&Min_displayed in r	CODE FOR REPORTING/Gr	Helper Column
Natural Capital_Strong	100	25	100 – 25	1	NC_Group
Natural Capital_Weak	24.99	5	24.99 – 5	2	
Natural Capital/Social Capital_Neutral	4.99	-4.99	4.99 – -4.99	3	
Social Capital_Weak	-5	-24.9	-5 – -24.9	4	
Social Capital_Strong	-25	-100	-25 – -100	5	
Ecosystems Services_Strong	100	12	100 – 12	1	ES_Group
Ecosystems Services_Weak	11.99	2	11.99 – 2	2	
Ecosystems Services/Species and biodiversity_Neutral	1.99	-1.99	1.99 – -1.99	3	
Species and biodiversity_Weak	-2	-11.99	-2 – -11.99	4	
Species and biodiversity_Strong	-12	-100	-12 – -100	5	
People Today_Strong	100	25	100 – 25	1	PT_Group
People Today_Weak	24.99	5	24.99 – 5	2	
People Today/People Tomorrow_Neutral	4.99	-4.99	4.99 – -4.99	3	
People Tomorrow_Weak	-5	-24.9	-5 – -24.9	4	
People Tomorrow_Strong	-25	-100	-25 – -100	5	
Us_Strong	100	25	100 – 25	1	US_Group
Us_Weak	24.99	5	24.99 – 5	2	
Us?Others_Neutral	4.99	-4.99	4.99 – -4.99	3	
Others_Weak	-5	-24.9	-5 – -24.9	4	
Others_Strong	-25	-100	-25 – -100	5	

Ranges-Look Up Table for NC_Code, PT_Code, UO_Code		
(ranges)	MIN	Assigned Code
-25 – -100	-100	5
-5 – -24.9	-24.9	4
4.99 – -4.99	-4.99	3
24.99 – 5	5	2
100 – 25	25	1

Ranges-Look Up Table for ES_Code		
-12 – -100	-100	5
-2 – -11.99	-11.99	4
1.99 – -1.99	-1.99	3
11.99 – 2	2	2
100 – 12	12	1

Figure 21: Resource Mrs. Allen created to easily parse CSV data

Since the output from the survey is a CSV file, we decided to do our parsing with Python. We were choosing between Pandas and XLRD (Harrison) as the package used for parsing, but went with Pandas because more people in the group were familiar with it and it had more functionality for what we needed, as explained in the requirements section of this report. When we first contacted Dr. Hull, he gave us a CSV file that contained group data - a file that will be similar to the CSV file that contains group data for this project. The example CSV file is too large to show completely here, but below in **Figure 22** is an example of the results from question 1 from the first 20 people in the group:

R	S	T	U	V	W
Q1_1	Q1_2	Q1_3	Q1_4	Q1_5	Q1_6
Assume the	Assume the	Assume the	Assume the	Assume the	Assume the
'{"ImportId'	'{"ImportId'	'{"ImportId'	'{"ImportId'	'{"ImportId'	'{"ImportId'
10	10	20	55	1	4
15	20	15	20	15	15
18	18	14	18	15	17
17	17	16	20	15	15
15	15	20	20	15	15
25	25	10	15	10	15
15	10	15	30	10	20
30	20	15	15	10	10
40	20	10	10	10	10
20	20	20	10	10	20
20	10	15	30	10	15
20	25	15	15	15	10
15	25	25	10	5	20
15	15	15	20	15	20
17	17	17	17	16	16
10	5	20	5	10	50
20	20	15	25	10	10
25		25	50	0	
15	15	15	20	20	15
10	10	20	20	20	20
16	18	20	16	15	15

Figure 22: First 20 results for question 1 of survey

We started the parsing by finding everyone's names and emails. This was placed in the print_to_output function (**Figure 24**) since the output of each question needs to be associated with a specific person. This function also calls the function that parses question 1 and will later call the parsing of other questions. Next, we parsed Q1_1 through Q1_6 from the CSV file as seen in **Figure 22**. These columns are all associated with question 1.

The question from the survey, as seen in **Figure 23**, has six different areas to allocate \$100, whether it's for resources (R), life support (LS), nature (N), people (P), institutions (I), or culture (C). How the user allocated the money will determine whether the person has a strong or weak tendency for natural or social focuses.

Assume the total global budget for worldwide sustainable development efforts is \$100, that you are the person to allocate it, and that you must allocate all of it. Assume your allocations will determine the outcomes that get emphasized by sustainable development efforts. Allocate all \$100 among the following 6 choices.

R	<u>Resources</u> : Money for programs that promote & sustain renewable & non-renewable resource inputs into the economy, including energy, biomaterials, water, fish, minerals, oil, and soil.	10
LS	<u>Life support</u> : Money for programs that promote and sustain ecosystem functions and services such as water filtration, climate moderation, crop pollination, and protection from solar radiation.	10
N	<u>Nature</u> : Money for programs that promote and sustain species, habitat, and conditions such as biodiversity, wilderness, parks, free-flowing rivers.	20
P	<u>People</u> : Money for programs that end poverty, disease, and illiteracy so as to increase people's capacity to meet challenges such as sustainable development	55
I	<u>Institutions</u> : Money for programs that promote and sustain markets, governments, media, civil society, military, health care, art, religion and other institutions that have the capacity to meet challenges and solve problems.	1
C	<u>Culture</u> : Money for programs that promote and sustain values and traditions such as freedom, equality, democracy, art, music, family values, capitalism, religion, small family farm, rural jobs, property rights, discipline, honor parents, tolerance for diversity, inclusion, opportunity, ...	4
Total		100

Figure 23: Answers from first survey taker for question 1

To parse question 1, we iteratively went through and assigned each column from **Figure 21** to a variable. For example, Q1_1 corresponded with resources in **Figure 22**, so this variable was R and is shown by the red variable name to the left of the first choice. Then, from a coding sheet and various tables given to us by Dr. Hull's wife who used to do all these calculations, Mrs. Allen, we used the following formula:

$$(R+LS+N) - (P+I+C)$$

This calculation could fall within five different areas of sustainability: strong with natural capital, weak with natural capital, neutral with natural and social capital, weak with

social capital, and strong with social capital. The survey taker above happened to have a score of -20, which put them in the category of weak with social capital since -20 falls between -5 and -24.99, as seen in **Figure 24**.

```

5 def parse_question1(df1, num_rows, num_cols):
6     q1_descr_arr = []
7     q1_calc_arr = []
8     for cell in range(2, num_rows):
9         user_arr = []
10        for i in range(0, 6):
11            Q1_ = "Q1_" + str(i+1)
12            user_output_q1 = df1.iloc[cell][Q1_]
13            if pd.isnull(user_output_q1):
14                user_output_q1 = 0
15            user_arr.append(user_output_q1)
16        R = float(user_arr[0])
17        LS = float(user_arr[1])
18        N = float(user_arr[2])
19        P = float(user_arr[3])
20        I = float(user_arr[4])
21        C = float(user_arr[5])
22        calculation = (R+LS+N)-(P+I+C)
23
24        if calculation >= 25 and calculation <= 101:
25            q1_descr_arr.append("s_Natural_Capital")
26            q1_calc_arr.append(calculation)
27            #print "s_Natural_Capital"
28        elif calculation <= 24.99 and calculation >= 5:
29            q1_descr_arr.append("w_Natural_Capital")
30            q1_calc_arr.append(calculation)
31            #print "w_Natural_Capital"
32        elif calculation <= 4.99 and calculation >= -4.99:
33            q1_descr_arr.append("n-Natural_Capital_Social_Capital")
34            q1_calc_arr.append(calculation)
35            #print "n-Natural_Capital_Social_Capital"
36        elif calculation <= -5 and calculation >= -24.99:
37            q1_descr_arr.append("w_Social Capital")
38            q1_calc_arr.append(calculation)
39            #print "w_Social Capital"
40        elif calculation <= -25 and calculation >= -100:
41            q1_descr_arr.append("s_Social Capital")
42            q1_calc_arr.append(calculation)
43            #print "s_Social Capital"
44        else:
45            q1_descr_arr.append("ERROR")
46            q1_calc_arr.append(calculation)
47            #print "ERROR"
48    return(q1_descr_arr, q1_calc_arr)

```

Figure 24: Python parsing and calculation for question 1 on survey

Figure 25 shows the function that allows us to output our data from parsing: `print_to_output`. Just to figure out our options for parsing and outputs, we have shown that we can not only print the name and result from question 1 in the console, but we can put them in an HTML and a PDF file. **Figure 26** is an example of a PDF output and **Figure 27** is an example of an HTML output.

```

63 def print_to_output(df1, num_rows, num_cols):
64     q1_descr_arr = parse_question1(df1, num_rows, num_cols)[0]
65     for cell in range(2, num_rows): #gets the individual cell in the entire COLUMN
66         name_comma_vtemail = df1.iloc[cell]["Q6"]
67         empty_arr = []
68         if pd.isnull(name_comma_vtemail):
69             name_comma_vtemail = "survey taker " + str(cell - 1) + " No Personal Info Given"
70             name = name_comma_vtemail
71         else:
72             split_cell = name_comma_vtemail.split(",")
73             #only printing name now because of changes needed to survey asking for name and email
74             name = split_cell[0]
75             if '"' in name: #removes quotes if they're in the name so that we can make an html file
76                 name = name.replace('"', '')
77             q1_descr = q1_descr_arr[cell-2]
78             user_file = open("Reports/" + name + "_report.html", 'w')
79             message = """<html>
80 <head>
81 </head>
82 <h1>Sustainability Values Diagnostic</h1>
83 <body>
84 <p>Prepared for</p>
85 <h2> %s </h2>
86 <p> How you feel about sustainability: %s </p>
87 </body>
88 </html>"""
89             whole_message = message % (name, q1_descr)
90             user_file.write(whole_message)
91             print name + ": " + q1_descr
92             user_file.close()
93
94     #UNCOMMENT FOR PDF VERSION
95     #pk.from_file(user_file.name, 'ReportsPDF/'+ name + '.pdf') #can also make pdf from html webpage
96
97     #do with like the example: pdfkit.from_url('http://google.com', 'out.pdf')
98

```

Figure 25: Python parsing name, calling parse function, and outputting to a different format

Sustainability Values Diagnostic

Prepared for

Millie Stripling

How you feel about sustainability: w_Social Capital

Figure 26: PDF output of first survey-take for question 1 on survey

Sustainability Values Diagnostic

Prepared for

Millie Stripling

How you feel about sustainability: w_Social Capital

Figure 27: HTML output of first survey-take for question 1 on survey

Next steps for this implementation would be to continue with the parsing and calculations for the rest of the questions on the survey, test, and integrate the parsing with the output.

In order for us to parse the Qualtrics data, we needed to be able to download the CSV file from Qualtrics using their API. Using the Survey ID and Dr. Hull's API key, we were able to download that data.

```

# Python 3

import requests
import zipfile
import json
import io
import time

# Setting user Parameters
apiToken = "vF9clCkK3BkbSZV3YQIeZTFjVQrTjR0XG5StcTNj"
surveyId = "SV_3WC7WLopLZjrXnL"
fileFormat = "csv"
dataCenter = 'virginiatech'

# Setting static parameters
requestCheckProgress = 0
progressStatus = "in progress"
baseUrl = "https://{0}.qualtrics.com/API/v3/responseexports/".format(dataCenter)
headers = {
    "content-type": "application/json",
    "x-api-token": apiToken,
}

# Step 1: Creating Data Export
downloadRequestUrl = baseUrl
downloadRequestPayload = '{"format":"' + fileFormat + '", "surveyId":"' + surveyId + '"}'
downloadRequestResponse = requests.request("POST", downloadRequestUrl, data=downloadRequestPayload, headers=headers)
progressId = downloadRequestResponse.json()["result"]["id"]
print(downloadRequestResponse.text)

# Step 2: Checking on Data Export Progress and waiting until export is ready
while requestCheckProgress < 100 and progressStatus is not "complete":
    requestCheckUrl = baseUrl + progressId
    requestCheckResponse = requests.request("GET", requestCheckUrl, headers=headers)
    requestCheckProgress = requestCheckResponse.json()["result"]["percentComplete"]
    print("Download is " + str(requestCheckProgress) + " complete")

# Step 3: Downloading file
requestDownloadUrl = baseUrl + progressId + '/file'
requestDownload = requests.request("GET", requestDownloadUrl, headers=headers, stream=True)

# Step 4: Unzipping the file
zipfile.ZipFile(io.BytesIO(requestDownload.content)).extractall("MyQualtricsDownload")
print('Complete')

```

Figure 28: The script to download Qualtrics data

Calling this script inside the individualParser.py script (**Figure 28**) allowed us to be able to continually check an updated CSV file. When individualParser.py (which is the name of the script that parses the CSV file) runs, it will pull an updated CSV, parse through the lines, and output a PDF of the most recent survey takers. While our original plan was to immediately open a CSV for the survey taker, the issues we ran into with authenticating user accounts presented a problem. That's why we decided to have the survey takers receive an email of their results, instead.

```
def main():
    total_users = 0
    #runs the script from API that pulls csv from qualtrics
    exec(open("downloadResults.py").read())
    email_list, full_string = read_lines()

    #reads the pulled(updated) csv to parse
    df1=pd.read_csv(full_string)
    df1 = df1.fillna(0)
```

Figure 29: Calling script from Qualtrics API

The send_email function, as seen in **Figure 29**, sends an email and is called inside of the main function. It includes credentials from the constructing sustainability website to send emails. To change these credentials, go to the Bluehost account, and under hosting, click email (https://my.bluehost.com/cgi/email_manager), which can be seen in **Figure 30**.

```

def send_email(email, file_to_send):
    lines = ''
    lines = r'<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 Final//EN">'
    lines += r'<html xmlns="http://www.w3.org/1999/xhtml">'
    lines += r'<h1>Below are your results.</h1>'
    lines += r'<h2>Please visit http://www.sustainabilityvalues.com/ to learn more about your results.</h2>'

    yourSmtp = 'mail.constructingsustainability.com'
    fromaddr = 'results@constructingsustainability.com'
    password = 'Babyc@Dallas17'
    toaddrs = [email]
    if '@' not in email:
        return

    msg = MIMEMultipart('alternative')
    msg['Subject'] = 'Results from Sustainability Values Diagnostic Survey'
    msg['From'] = fromaddr
    msg['Date'] = formatdate(localtime=True)
    # Record the MIME types of both parts - text/plain and text/html.
    part1 = MIMEText("text", 'plain')
    part2 = MIMEText(lines, 'html')

    # Attach parts into message container.
    # According to RFC 2046, the last part of a multipart message, in this case
    # the HTML message, is best and preferred.
    msg.attach(part1)
    msg.attach(part2)

    files = [file_to_send]
    for f in files or []:
        with open(f, "rb") as fil:
            part = MIMEApplication(
                fil.read(),
                Name=basename(f)
            )
            # After the file is closed
            part['Content-Disposition'] = 'attachment; filename="%s"' % basename(f)
            msg.attach(part)

    server = smtplib.SMTP(yourSmtp, 26)
    server.set_debuglevel(0)
    server.ehlo(yourSmtp)
    server.starttls()
    server.ehlo(yourSmtp)
    server.login(fromaddr, password)
    for toadd in toaddrs:
        msg['To'] = toadd
        server.sendmail(fromaddr, toadd, msg.as_string())
    server.quit()

```

Figure 30: send_email() function

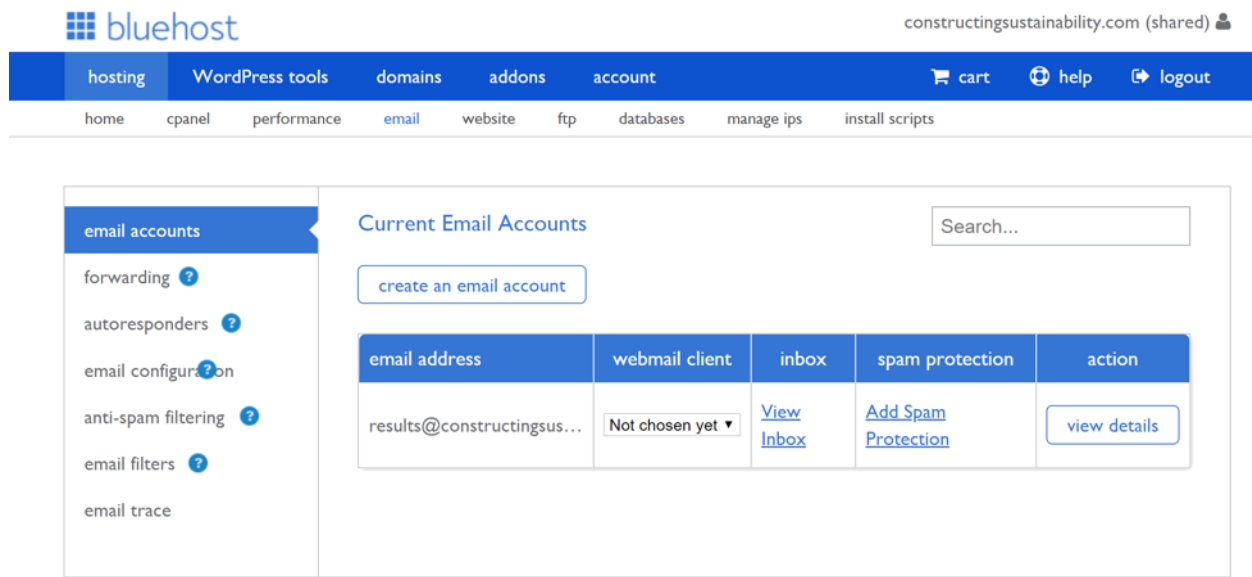


Figure 31: Bluehost email account

The code itself is parsed using the calculations on the coding sheet, as explained above. In order to display this data, we used HTML and CSS embedded inside of the `print_to_output()` function. So what we did was collect all of the results from the survey and place them inside of the HTML and CSS code so it could be accurately displayed. We used ‘%s’ to input data into the HTML and CSS that was determined from the functions above the `print_to_output()` function, which calculated things like natural capital level, who should benefit, how we should solve sustainability problems, and hotly debated beliefs. If a user fell under a strong natural capital category, this box would be shaded inside of the table created by the HTML and CSS. We were able to input these values as seen in **Figure 32**.

```
#data pulled from functions above
whole_message = message % (first_name, last_name, natural_capital_level, percent_values_arr[1], percent_values_arr[2],
percent_values_arr[3], percent_values_arr[4], percent_values_arr[5], ecosystem_services_level,
percent_values_arr[6], percent_values_arr[7], percent_values_arr[8], percent_values_arr[9], percent_values_arr[10], percent_values_arr[11], percent_values_arr[12], percent_values_arr[13], percent_values_arr[14], percent_values_arr[15],
people_benefit, percent_values_arr[16], percent_values_arr[17], percent_values_arr[18], percent_values_arr[19], percent_values_arr[20],
solve_sust[0], percent_values_arr[21], percent_values_arr[22], percent_values_arr[23], percent_values_arr[24], percent_values_arr[25],
solve_sust[1], percent_values_arr[26], percent_values_arr[27], percent_values_arr[28], percent_values_arr[29], percent_values_arr[30],
solve_sust[2], percent_values_arr[31], percent_values_arr[32], percent_values_arr[33], percent_values_arr[34], percent_values_arr[35],
solve_sust[3], percent_values_arr[36], percent_values_arr[37], percent_values_arr[38], percent_values_arr[39], percent_values_arr[40],
solve_sust[4], percent_values_arr[41], percent_values_arr[42], percent_values_arr[43], percent_values_arr[44], percent_values_arr[45],
solve_sust[5], percent_values_arr[46], percent_values_arr[47], percent_values_arr[48], percent_values_arr[49], percent_values_arr[50],
hotly_debated[0], percent_values_arr[51], percent_values_arr[52], percent_values_arr[53], percent_values_arr[54], percent_values_arr[55],
hotly_debated[1], percent_values_arr[56], percent_values_arr[57], percent_values_arr[58], percent_values_arr[59], percent_values_arr[60],
hotly_debated[2], percent_values_arr[61], percent_values_arr[62], percent_values_arr[63], percent_values_arr[64], percent_values_arr[65],
hotly_debated[3], percent_values_arr[66], percent_values_arr[67], percent_values_arr[68], percent_values_arr[69], percent_values_arr[70],
hotly_debated[4], percent_values_arr[71], percent_values_arr[72], percent_values_arr[73], percent_values_arr[74], percent_values_arr[75],
hotly_debated[5], percent_values_arr[76], percent_values_arr[77], percent_values_arr[78], percent_values_arr[79], percent_values_arr[80],
hotly_debated[6], percent_values_arr[81], percent_values_arr[82], percent_values_arr[83], percent_values_arr[84], percent_values_arr[85],
num_users)
```

Figure 32: Values inputted inside HTML and CSS

The other reason we used ‘%s’ was to update the numbers as more people took the survey.

To keep track of the results of the previous survey users, we used an 85 length list. Out of 17 questions, each one has 5 possible outcomes: strongly disagree, weak disagree, neutral, weak agree, strongly agree. There are 17x5 numbers to keep track of, which is 85. We just incremented the number at each index whenever someone was placed in a category. For example, indices 1-5 were strongly disagree to strongly agree, for the first question, etc.

In order to keep track of who had taken the survey since the last time the script ran, we have a text file located in the same directory as the script called lineNumber.txt that only counts the number of people who have taken the survey. If the script runs and this number is less than the number of rows in the CSV file, then the script will begin parsing data for the user or users who have taken it since the last time the script ran. **Figure 33** is the lineNumber.txt file, which only keeps a number that gets updated as more people take the survey.

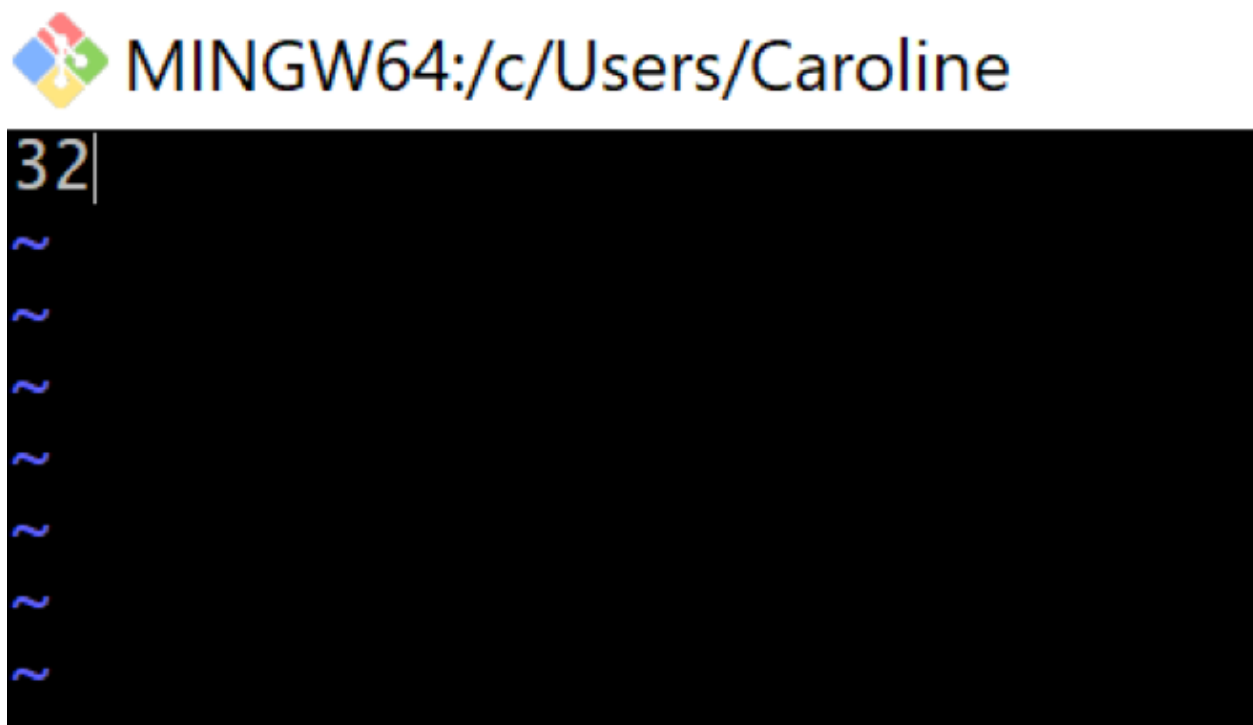


Figure 33: lineNumber.txt

To better explain what we parsed, let's walk through the 5 questions on the survey. The first question helps find out whether the survey taker would rather spend money on resources, life support, and nature or people, institutions, or culture. It also finds out your tendency to support ecosystems or biodiversity. The second question helps find out whether the survey taker believes money should be spent on people today or

people in the future The third question helps find out whether the survey taker believes money should be spent on their own community or a community where other people live The 4th question helps figure out how the survey taker thinks sustainability should be solved, which can involve technological innovation, free markets, strong governments, new institutions, or education. The last question asks about values and beliefs to dig up debated topics, like religion, evolution, ethics, and rights.

All of these questions are eventually seen in the outputted results, and when combined, can help sustainability professionals and students capture their own beliefs and assumptions, which is important because sustainability decisions can be very contested and political. Knowing where you stand can help navigate differences and help with negotiations and collaborations.

VM

Current Cron Jobs

MINUTE	HOUR	DAY	MONTH	WEEKDAY	COMMAND	ACTIONS
*	*	*	*	*	/home7/constsc0/bin/python individualParser.py	Edit Delete

Figure 34: the cron job

The script we made used a lot of imports, like for parsing, making PDF's, and sending emails, so downloading these onto the server required root access, so this took a while to get around.

The root access was also a problem when we wanted to create a cron job that (**Figure 34**) would run the script every minute and see if anyone has taken the survey so it could send them an email of their PDF. This is because the packages we had installed for our own use couldn't be reached by the cron daemon, and we couldn't change the path or import these packages for the job because the daemon was running on root.

We tried many different approaches to get the job running, from changing paths to even creating a virtual environment and it all came down to the cron job not being able to find executables from imports that it needed. We then tried to put the parser in an infinite loop and run this in a screen, but unfortunately, this also required root access.

Because of all these setbacks, we set up a Virtual Machine thanks to the help of Dr. Fox.

After getting a user created and setting up the VM, we added all of the imports needed by the individualParser. Then we moved over the script and the associated files and code. Because none of our other ideas would work on root access, we decided to make our code work in an infinite loop with this new VM. By using tmux, which stands for “terminal multiplexor,” we can run the code in the background of the VM without actually having to manually run the script. We first put the code in an infinite loop, as seen in **Figure 35**.

```
print(e)

while True:
    if __name__ == "__main__":
        main()
        time.sleep(60)
```

Figure 35: individualParser.py is now in an infinite loop

Now that the code is in an infinite loop, which runs the script every 60 seconds, we ran this script in a tmux. To set up the tmux, type ‘tmux’ into the terminal of the VM, as seen in **Figure 36**.

```
MINGW64:/c/Users/Caroline
$ tmux|
```

Figure 36: command to start a tmux

Once inside, cd into the directory the script is in. In this case, the script is inside the 'script' directory. See **Figure 37**.

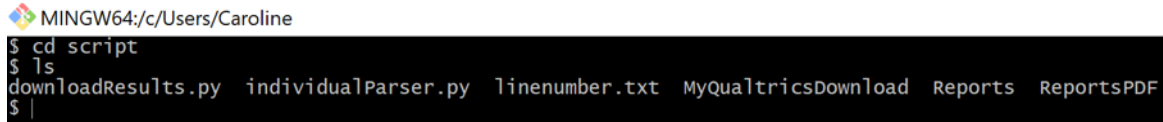
A terminal window with a black background and white text. The title bar shows 'MINGW64:/c/Users/Caroline'. The prompt is '\$'. The user enters 'cd script'. The prompt is '\$'. The user enters 'ls'. The output is 'downloadResults.py individualParser.py linenum.txt MyQualtricsDownload Reports ReportsPDF'. The prompt is '\$'.

Figure 37: once inside the tmux, cd into the directory with individualParser.py

Now that we are inside of the correct directory and the tmux is ready, we can run the Python script with the command "python3 individualParser.py". This will run the script and you can close the tmux and your terminal without worrying about the script stopping. If nobody has taken the survey since the last time the script has run, the result should look like **Figure 38**.

A terminal window with a black background and white text. The title bar shows 'MINGW64:/c/Users/Caroline'. The prompt is '\$'. The user enters 'python3 individualParser.py'. The output is '{'result': {'id': 'ES_35mgq032ncu9i9tguc6048ucr0'}, 'meta': {'httpStatus': '200 - OK', 'requestId': 'ec5950b4-9083-4b5d-871e-8ec25b9c971e'}}'. The next line is 'Download is 100.0 complete'. The next line is 'Complete'. The prompt is '\$'.

Figure 38: running the individualParser.py inside a tmux

If you want to leave the tmux so that it keeps running, click 'ctrl' + 'b' then 'd' to detach from the tmux. You can now close your terminal. If you want to open the tmux to look at outputs, then type 'tmux a' to reattach to the tmux, as seen in **Figure 39**.

 MINGW64:/c/Users/Caroline

```
$ tmux a|
```

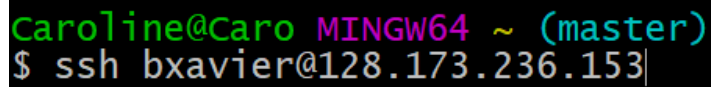
Figure 39: going back into the tmux

In the case the VM goes down, rerunning through this process will restart the script and function properly. Python3 and tmux must be installed if a new VM is set up. The following modules are imported in the individualParser.py script: Pandas, Pdfkit ("Pdfkit"), time, io, sys, smtplib, and subprocess. The modules Pandas and Pdfkit must be install separately as they are not part of the Python's standard library. This can be done by typing 'pip install [insert module name here]'. Once, all modules are installed and the script is ready to go then you are ready to start the tmux and run individualParser.

Editing Webhost

To get to the code, you will need to search for 'terminal' on your computer. This will pull up the terminal where you will type the following:

ssh bxavier@sustainability.cs.vt.edu OR ssh bxavier@128.173.236.153 (**Figure 40**)



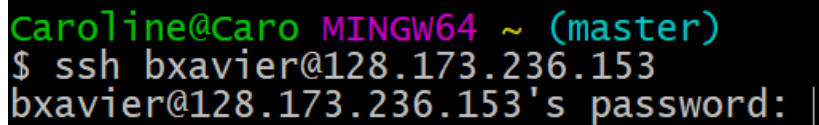
```
caroline@Caro MINGW64 ~ (master)
$ ssh bxavier@128.173.236.153|
```

Figure 40: Login to terminal (Username)

Press Enter

Next it will ask for password, which is given to Dr. Hull and Dr. Fox.

Note: typing a password here won't show any characters, so you should just type the password and press enter (**Figure 41**).



```
caroline@Caro MINGW64 ~ (master)
$ ssh bxavier@128.173.236.153
bxavier@128.173.236.153's password: |
```

Figure 41: Login to terminal (Password)

Successfully logging in will result in the following message (**Figure 42**):

```

caroline@Caro MINGW64 ~ (master)
$ ssh bxavier@128.173.236.153
bxavier@128.173.236.153's password:
welcome to Ubuntu 18.04 LTS (GNU/Linux 4.15.0-20-generic x86_64)

* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/advantage

System information as of Fri May  4 00:23:07 UTC 2018

System load:      0.0                Processes:         106
Usage of /home:   0.0% of 983.30GB   Users logged in:  1
Memory usage:     3%                IP address for ens3: 192.168.2.9
Swap usage:       0%

* Meltdown, Spectre and Ubuntu: what are the attack vectors,
  how the fixes work, and everything else you need to know
  - https://ubu.one/u2Know

* Canonical Livepatch is available for installation.
  - Reduce system reboots and improve kernel security. Activate at:
    https://ubuntu.com/livepatch

0 packages can be updated.
0 updates are security updates.

Last login: Fri May  4 00:04:06 2018 from 128.173.39.6
$ |

```

Figure 42: Inside web host VM

You are now in the web host (or “Virtual Machine”).

4.4. Output

The final output is a PDF file with the users’ results highlighted in light grey. Users receive the results in the email that they provided on the survey. **Figure 43** shows what the output looks like to the user.

Sustainability Values Diagnostic

Prepared for: Carotest Stewarttest

* ALL NUMBERS ARE BASED ON PERCENTAGES

What should be sustained?

	Strong	Weak	Neutral	Weak	Strong	
Natural capital	18	27	28	17	10	Social capital
Ecosystem Services	7	28	41	20	4	Species and biodiversity

Who should benefit?

	Strong	Weak	Neutral	Weak	Strong	
People Today	15	26	15	34	10	People Tomorrow
Us	56	6	10	5	23	Others

How should we solve sustainability problems?

	Strongly Disagree		Neutral		Strongly Agree
With technological innovation	2	4	13	53	27
By freeing market forces	10	34	30	20	6
By fixing market failures	5	7	30	49	8
With strong government actions	8	23	23	34	13
By educating citizens & consumers	1	2	5	42	50
By creating new institutions	1	9	38	43	9

Hotly Debated Beliefs

	Strongly Disagree		Neutral		Strongly Agree
Religion: Because God created the natural world, stewardship of nature should be my religious duty.	20	22	10	35	12
Rights: Mammals have as much right to exist as humans.	2	9	11	36	42
Limits: Humanity is pushing the limits of Earth's ecological systems, risking ecological collapse.	3	3	6	36	51
Population: The human population explosion presents the greatest threat to sustainable development, becomes unbalanced and unhealthy.	6	18	18	35	18
Balance: Nature's ecology has self-correcting properties that keep it balanced and healthy. It is only when humans disturb things that nature becomes unbalanced and unhealthy.	1	5	12	51	31
Nobel savage: Modern Americans have much to learn about sustainable development from the land ethics and land management of Native Americans alive before Columbus.	1	6	26	31	35
Best Evolved: Survival-of-the-fittest made humans the best-adapted, highest-evolved species and we therefore have the right to manage other species.	14	32	23	24	7

A total of 3 people have taken this survey to date

Figure 43: The output that users will receive in their emails

To change the wording of the output, the file “individualParser.py” must be accessed. Between lines 420 and 820, there is HTML code embedded in it. Dr. Hull can edit this by searching (ctrl+f) the HTML portion with the sentence he would like to change, and editing the text.

To get to “individualParser.py” you need to be in the webhost/Virtual Machine (**Figure 40**).

Once you’re in the Virtual Machine, follow these commands:

To go into the correct folder that contains the script, type “cd script”. You are now in the correct folder (**Figure 44**).

Typing “ls” allows you to view the files in this folder, as seen below (**Figure 44**):

```

$ cd script
$ ls
downloadResults.py  individualParser.py  lineNumber.txt  MyQualtricsDownload  Reports  ReportsPDF  SustainabilityValuesProject.tar
$

```

Figure 44: Finding the script on terminal (individualParser.py)

To edit the output PDF, you will need to do the following commands:

vim individualParser.py

```

$ vim individualParser.py

```

Figure 45: Command to edit file (individualParser.py)

Now you're in a text editor called Vim, which has specific commands to edit. You will need to find the HTML of this script to edit any of the output, so type ":572" (no quotations) to bring you to the start of the HTML.

```

MINGW64~/c:/Users/Caroline
{# hotly debated topics #}
table#t04 tr[hotly_debated="$"] td:first-child + td+ td +td +td +td{
  background-color: #eee;}
}
</style>
</head>
<html>
<body>
<h2>Prepared for: %s %s</h2>
<p>* ALL NUMBERS ARE BASED ON PERCENTAGES<p>
<br>
<p><b>What should be sustained?</b></p>
<!-- Everything above that has to do with table is applied here -->
<table id="t01">
<!-- The First Row -->
<tr>
<td> </td>
<td>Strong</td>
<td>Weak</td>
<td>Neutral</td>
<td>Weak</td>
<td>Strong</td>
<td> </td>
</tr>
<!--The Second Row-->
<tr id="nc" natural_capital_level = "%s" >
<td>Natural capital</td>
<td>%s</td>
<td>%s</td>
<td>%s</td>
<td>%s</td>
<td>social capital</td>
</tr>
<!--The Third Row-->
<tr id="es" ecosystem_services_level = "%s">
<td>Ecosystem Services</td>
<td>%s</td>
<td>%s</td>
<td>%s</td>
<td>%s</td>
<td>Species and biodiversity</td>
</tr>
</table>
:572
573,5 55%

```

Figure 46: First Glance on the file (individualParsey.py) in Vim

If you're looking for a specific part of the output to change, and you know a keyword or phrase, type / then the phrase. For example, I want to find the section in hotly debated beliefs on God, so I type "/Because God created" and it will bring me to the exact line (Figure 47).

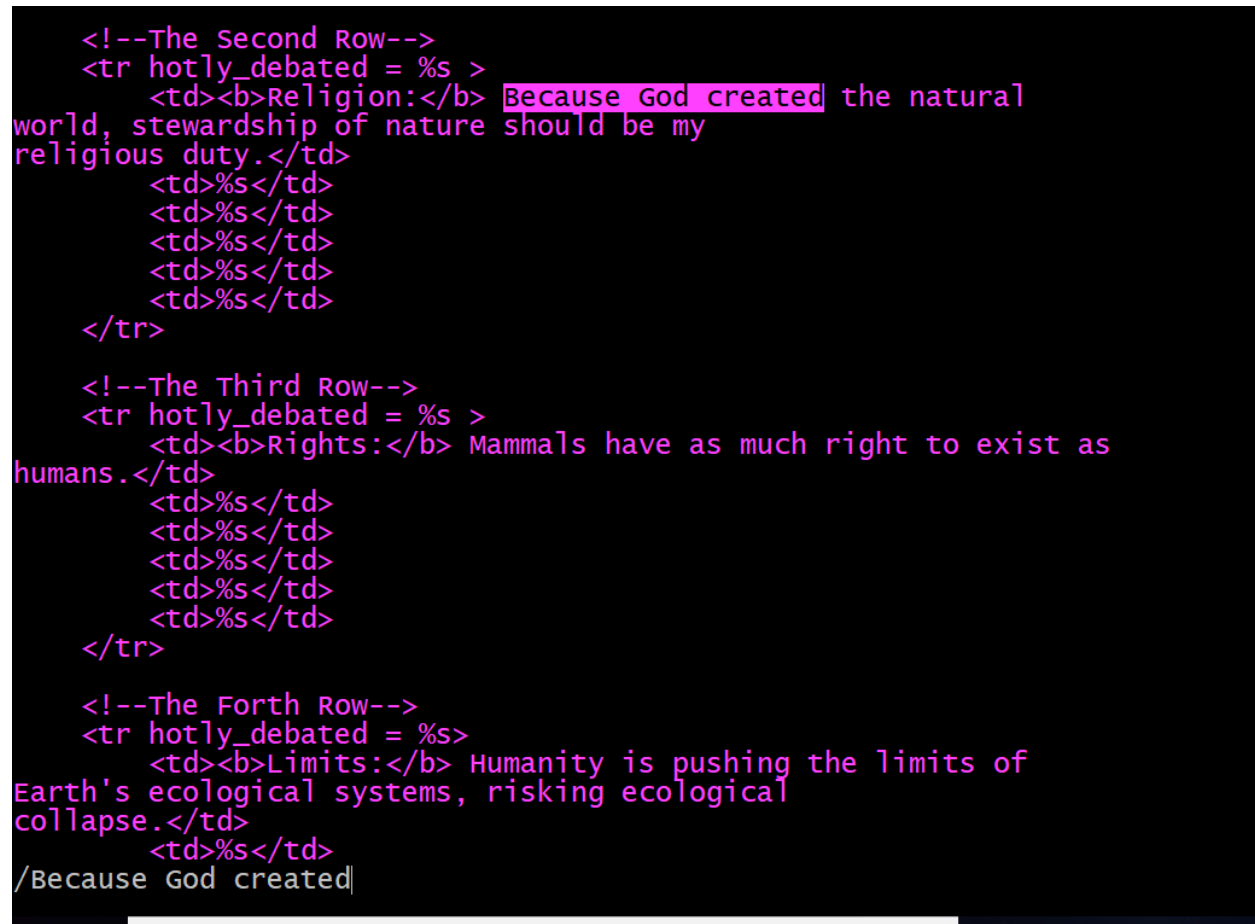
A screenshot of the Vim text editor interface. The background is black, and the text is displayed in a light blue/cyan color. The editor shows an HTML document with three rows of content, each enclosed in a `<tr hotly_debated = %s >` tag. The first row contains the text `<td><b>Religion:</b> Because God created the natural world, stewardship of nature should be my religious duty.</td>`. The second row contains `<td><b>Rights:</b> Mammals have as much right to exist as humans.</td>`. The third row contains `<td><b>Limits:</b> Humanity is pushing the limits of Earth's ecological systems, risking ecological collapse.</td>`. At the bottom of the screen, the search pattern `/Because God created` is entered, and the text `Because God created` in the first row is highlighted in yellow. The Vim status bar at the bottom shows the file name `individualParsey.py` and the current line and column `1,1`.

Figure 47: Finding Specific Words on Vim

In this picture above, what I'm searching for shows up on the bottom left of the screen, and highlights the word or phrase in the script.

Press Enter.

To edit this, press "i" and then use your arrow keys to navigate in the script. You can't use a mouse. When you're finished editing, press:

the escape key then ":wq"

This will save (write) then quit the editor.

Note: I highly recommend not doing this yourself. If you have anything that needs to be changed in terms of wording, let us know soon and we can do it.

5. Testing and Evaluation

Testing is an important aspect of this project, especially since a goal is to make the process as easy as possible for our client, Dr. Hull. We will need to test the parsing script to make sure the calculations based off of the coding sheet are correct. This will be done by hand and with unit case testing.

The biggest area of testing that we need to focus on is having accurate data from surveys in the correct format to parse. The format that we were initially given by Dr. Hull is different than the format from the survey we created, so we don't have a lot of real data to test. Therefore, we will need to take surveys to have a large enough data set in the correct format to test. Not only will we need to take the surveys individually, but we will need to take them as a group to test that functionality as well. Once we have the data, we will manually compare the results by hand to see if the parsing is correct. We will also need to test that the data is being pulled from our place of storage (folders that are saved) correctly. This has been achieved by using emails and retrieving information that we expected. As for the plugins on the site, they have all been tested and are set up to be self-maintained.

6. User Manual

The Sustainability Values Diagnostic Website will mostly be used by clients and students of Dr. Hull who want to see their societal and natural sustainability levels. There are different cases for using this site: individual and group. Below, we will delve into how each case uses the website and the benefits each group has.

6.1. Homepage

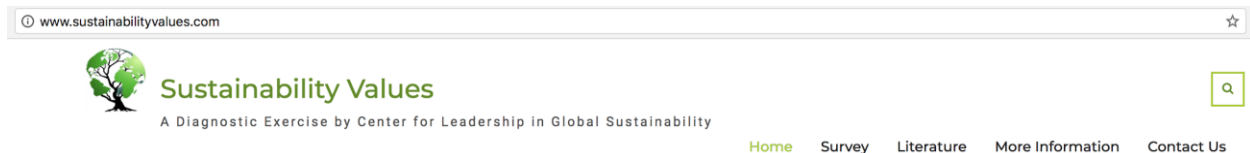


Figure 48: Website Instruction, Homepage Options

For any user that wants to go to the website they can type, "<http://www.sustainabilityvalues.com/>", as the URL. Once the user is on the website, they will be directed to the home page. From there they will have four options on the top right of the home page: Home, Survey, Literature, More Information, and Contact Us.

On the home page, the user can scroll down and there will be a description on sustainability values and the idea behind the survey. After that, there is a link that redirects the user to take the survey (**Figure 48**).



Sustainability Values

A Diagnostic Exercise by Center for Leadership in Global Sustainability

[Home](#) [Survey](#) [Literature](#) [More Information](#)

Sustainability Values

A Diagnostic Exercise

by

Center for Leadership in Global Sustainability

(CLiGS.vt.edu)



center for leadership in
global sustainability
VirginiaTech

Your values define who you are, they reveal your biases and assumptions, and they guide many of the decisions you make. Yet, many of us have not critically examined our sustainability values, compared our values to the values held by others, or given thought to how to work with people who hold different values.

This diagnostic examines values, myths, and biases embedded and hidden in most sustainability efforts. It is intended to help sustainability professionals themselves, become better listeners, build productive collaborative efforts, and manage conflict.

Most sustainability decisions are hotly contested and intensely political because they involve deeply held, highly personal, and often hidden values. Failure to address these differences produces confusion, negotiation train wrecks, and loss of trust.

The diagnostic takes ~10 minutes. Some of the questions require making difficult choices. Your answers should reflect your own values and preferences, not what you think are socially acceptable. Be honest.

Let's get started!

Click [here](#) to take the survey.



Copyright © All rights reserved.

Nature

[Home](#) | [Survey](#) | [Literature](#) | [More Information](#) | [Contact Us](#)

Figure 49: Website Instruction, Homepage Redirect to Survey

6.2. Survey

In order for the user to go to the Survey, they will have to click on the “Survey” button on the top right of the website page (**Figure 49**) or as seen in **Figure 48**.

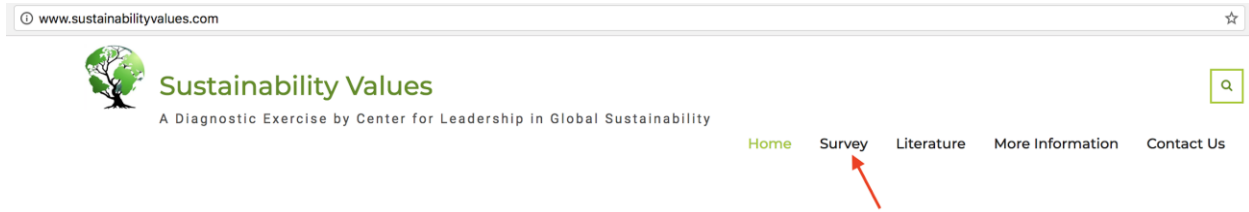
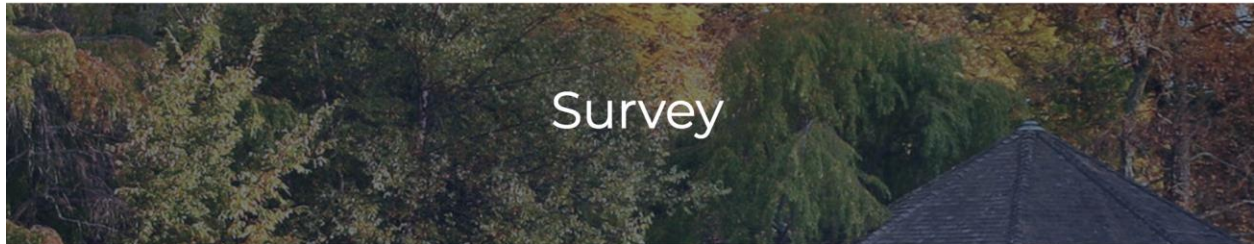


Figure 50: Website Instruction, Clicking Survey

The user will be directed to the Survey page and from then on will be able to take the survey by clicking the arrow after the description on the survey (**Figure 50**) .



Survey

[Home](#) / [Survey](#)



Sustainability Values

A Diagnostic Exercise

by

Center for Leadership in Global Sustainability
(CLiGS.vt.edu)

Meeting today's pressing sustainable development challenges requires collaboration among diverse stakeholders who likely differ in their core values and desired future conditions. This diagnostic exercise is designed to help sustainability professionals understand their own values so they may better understand and navigate the values of others. Some of the questions require making difficult choices. Your answers should reflect your own values and preferences, not answers you think are socially acceptable. Be honest.

The last question asks for your name so that we can distribute the results to you. The results will be tabulated in a report that helps you interpret your values and compare them to values held by others.

Important Note

The results are not evaluative. They will not impact grades or expectations. Individual results are confidential and will be seen only by your course instructors. If you have concerns about the assessment, please contact Bruce Hull before taking it (hullrb@vt.edu).

The assessment will take 10 or so minutes to complete. Be sure to start when you have enough time to finish



Figure 51: Website Instruction, Survey Page

Important Note

The results are not evaluative. They will not impact grades or expectations. Individual results are confidential and will be seen only by your course instructors. If you have concerns about the assessment, please contact Bruce Hull before taking it (hullrb@vt.edu).

The assessment will take 10 or so minutes to complete. Be sure to start when you have enough time to finish



Figure 52: Website Instruction, Survey Start

- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey



If you have a group code, please enter it below, otherwise enter 0. (If you are NOT part of a group, enter 0)



Figure 53: Website Instruction, Survey Code

- Entering code
 - "0" for individual survey taker
 - Assigned code for a group survey
- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey

Assume the **total global budget** for worldwide sustainable development efforts is \$100, that you are the person to allocate it, and that you must allocate all of it. Assume your allocations will determine the outcomes that get emphasized by sustainable development efforts. Allocate all \$100 among the following 6 choices.

Resources: Money for programs that promote & sustain renewable & non-renewable resource inputs into the economy, including energy, biomaterials, water, fish, minerals, oil, and soil.	\$ 15	←
Life support: Money for programs that promote and sustain ecosystem functions and services such as water filtration, climate moderation, crop pollination, and protection from solar radiation.	\$ 15	←
Nature: Money for programs that promote and sustain species, habitat, and conditions such as biodiversity, wilderness, parks, free-flowing rivers.	\$ 15	←
People: Money for programs that end poverty, disease, and illiteracy so as to increase people's capacity to meet challenges such as sustainable development	\$ 15	←
Institutions: Money for programs that promote and sustain markets, governments, media, civil society, military, health care, art, religion and other institutions that have the capacity to meet challenges and solve problems.	\$ 15	←
Culture: Money for programs that promote and sustain values and traditions such as freedom, equality, democracy, art, music, family values, capitalism, religion, small family farm, rural jobs, property rights, discipline, honor parents, tolerance for diversity, inclusion, opportunity, ...	\$ 25	←
Total	\$ 100	←



Figure 54: Website Instruction, Survey Continuation (Part 1)

- First page of the Survey
 - Enter the amount of “money” for any of the 6 options given
 - Do **NOT exceed** over \$100 in total
- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey

Assume the **total global budget** for worldwide sustainable development efforts is \$100 and that you are the person to allocate it. How would you allocate the \$100 between the following two choices? You must allocate all of the \$100.

Money for programs to help people living today who lack basic necessities such as sufficient food, shelter, economic opportunity, clean air, and clean water.

\$



Money for programs that ensure future generations have environmental and social conditions to meet their basic needs.

\$



Total

\$



Figure 55: Website Instruction, Survey Continuation (Part 2)

- Second page of the Survey
 - Enter the amount of “money” for any of the 2 options given
 - Do **NOT exceed** \$100 in total
- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey

Assume an **unwanted land use** (such as a pipeline or hazardous waste dump) were proposed for the community where you live and two organizations were asking for your donations. You have \$100. Allocate it between two organizations. Use it all.

Money for the organization with a mission to sustainably develop the proposed land use in the community where I live.	\$	50	←
Money for the organization with a mission to stop the proposed land use in my community and hence move it to where other people live.	\$	50	←
Total	\$	100	←




Figure 56: Website Instruction, Survey Continuation (Part 3)

- Third page of the Survey
 - Enter the amount of “money” for any of the 2 options given
 - Do **NOT exceed** \$100 in total
- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey

How Should Sustainability Be Achieved?

Six broad strategies exist. Which strategies do you most support?
(Glance at all six before you provide answers.)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I believe <u>technological innovation</u> is the best way to address sustainable development challenges. Human ingenuity knows no bounds. Necessity is the mother of invention. As challenges become critical, innovators offering solutions will be rewarded.	☐	☐	☐	☐	☒
I believe <u>unleashing the free market</u> is the best way to address sustainable development challenges. Businesses will overcome sustainability challenges such as degraded ecosystem services, climate change, resource scarcity, and social unrest if and when these challenges threaten business operations and profits. We need to minimize burdensome government regulations.	☐	☐	☐	☐	☒
I believe that <u>fixing market failures</u> is the best way to address sustainable development challenges. Market failures include externalities (such as pollution) and free-ridership (such as benefiting from a stable climate that others pay to maintain). These market failures wrongly reward business decisions that harm people and planet. Market fixes will require some government intervention and the cooperation of businesses.	☐	☐	☐	☐	☒
I believe <u>strong government</u> is the best way to address sustainable development challenges. Government agencies with clear performance metrics and competent staff offer the best solutions for some sustainability challenges such as climate change. Solutions to Tragedies of the Commons, such as climate change, often require mutual coercion mutually agreed upon.	☐	☐	☐	☐	☒
I believe <u>new institutions</u> will be the best way to address sustainable development challenges. New partnerships and programs, many led by civil society organizations (i.e., NGOs), will emerge to replace 20th Century institutions and solve 21st Century problems. Distinctions will blur between business, government, and civil society as new institutions emerge through cross-sector partnership and collaboration.	☐	☐	☐	☐	☒
I believe <u>education of consumers and citizens</u> is the best way to address sustainable development challenges. Sustainable development ultimately boils down to the hearts, minds, and behaviors of individuals—the daily decisions people make. People will make good decisions if they have the right information.	☐	☐	☐	☐	☒



Figure 57: Website Instruction, Survey Continuation (Part 4)

- Fourth page of the Survey
 - Click only **ONE** of the five options “Strongly Disagree”, “Disagree”, “Neutral”, “Agree”, or “Strongly Agree” for the six questions given

- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey



Values and Beliefs

Rate how much you agree with each of the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
My religious faith and practice motivate my environmental stewardship.	☐	☐	☐	☐	☐	←
Other mammals have as much right to exist as humans.	☐	☐	☐	☐	☐	←
Humanity is pushing the limits of Earth's ecological systems, risking ecological collapse.	☐	☐	☐	☐	☐	←
The human population explosion presents the greatest threat to sustainable development.	☐	☐	☐	☐	☐	←
Nature's ecology has self-correcting properties that keep it balanced and healthy. If humans disturb this balance, then nature becomes less healthy.	☐	☐	☐	☐	☐	←
The land ethics of native and aboriginal people (i.e., Native Americans alive before Columbus) were more "sustainable" than the land ethics of middle class people alive today.	☐	☐	☐	☐	☐	←
Evolution (survival-of-the-fittest) made humans the best-adapted, highest-evolved species and we therefore have earned the right to manage other species.	☐	☐	☐	☐	☐	←



Figure 58: Website Instruction, Survey Continuation (Part 5)

- Fifth page of the Survey
 - Click only **ONE** of the five options "Strongly Disagree", "Disagree", "Neutral", "Agree", or "Strongly Agree" for the seven questions given
- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey

Demographics

The following questions are used to examine and report how sustainability values vary by demographic.

First Name

Last Name

Email (please use the SAME email as your login email)

Age

Gender

☐ Male

☐ Female

For most of my life I lived...

☐ in rural areas

☐ in suburban areas

☐ in urban areas

Politically, I tend to be...

☐ more conservative than liberal on most issues

☐ more liberal than conservative on most issues

International travel experience

☐ Have not traveled outside my country of birth

☐ Visited 3 or fewer different countries

☐ Visited more than 3 different countries



Powered by Qualtrics

Figure 59: Website Instruction, Survey Continuation (Part 6)

- Fifth page of the Survey
 - Enter First Name
 - Enter Last Name
 - **MUST** enter email address in order to get results
 - Enter Age

- Choose Gender
 - Choose Location
 - Choose Political Stance
 - Choose International Travel Experience
- Click the black arrow on the bottom right of the page (Red Arrow) to continue the Survey



We thank you for your time spent taking this survey.
Your response has been recorded.

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Figure 60: Website Instruction, Survey End

- Confirmation of the completed survey

6.3. Literature

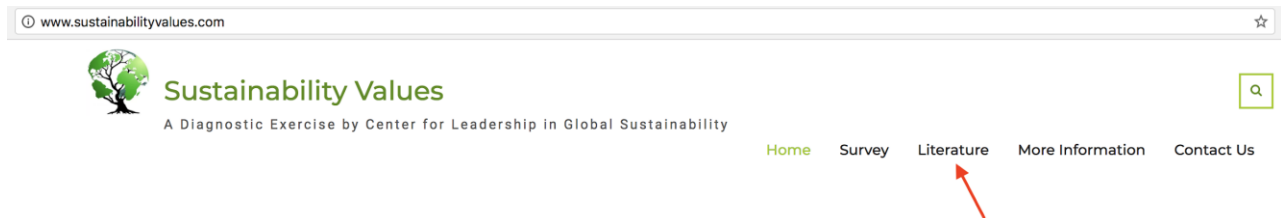


Figure 61: Literature Navigation

- To navigate to the Literature page, simply click above where the red arrow is pointing (**Figure 61**)

When you have successfully clicked the Literature button, the website should look like **Figure 62**.

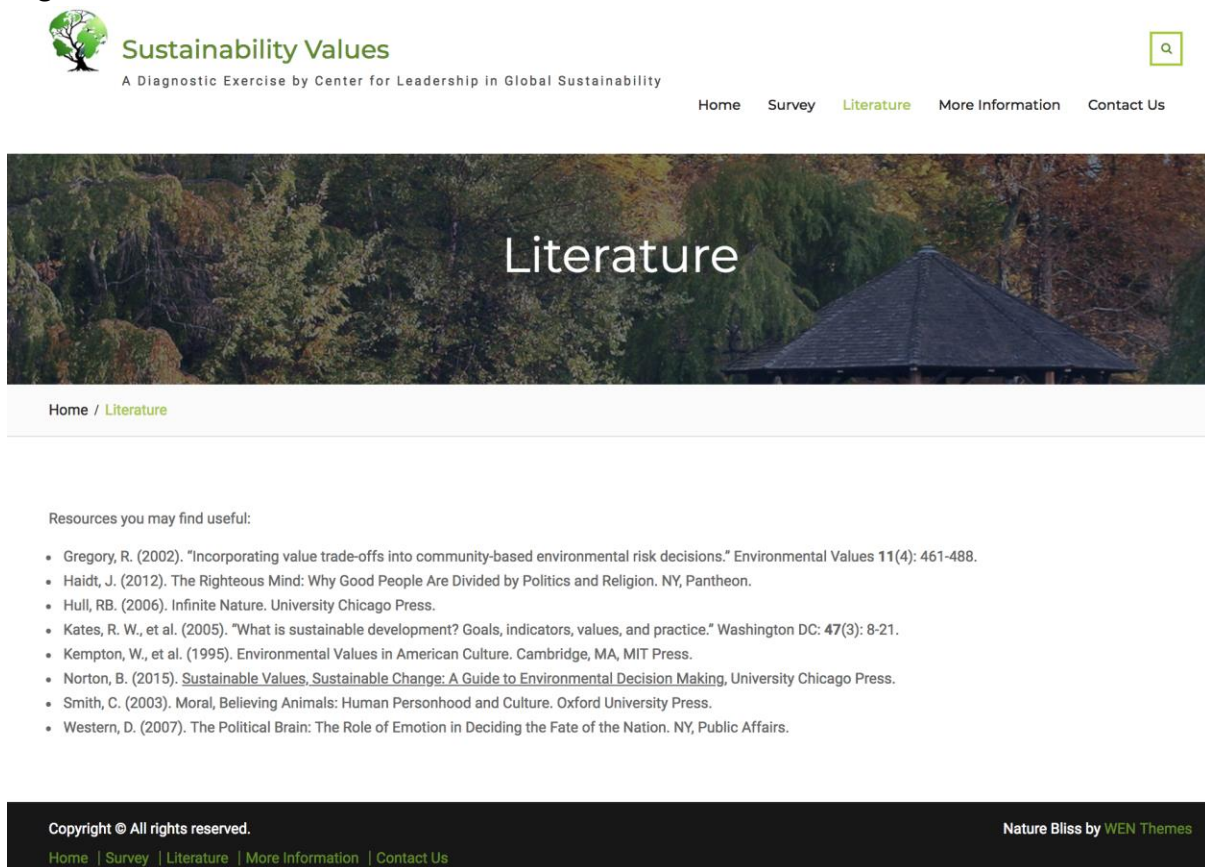


Figure 62: Literature Page

6.4. More Information

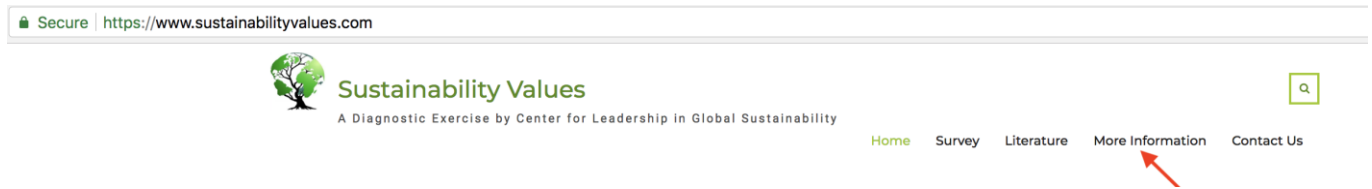


Figure 63: More Information Navigation

- To navigate to the More Information page, simply click above where the red arrow is pointing (**Figure 63**)

When you have successfully clicked the More Information button, the website should look like **Figure 64**.

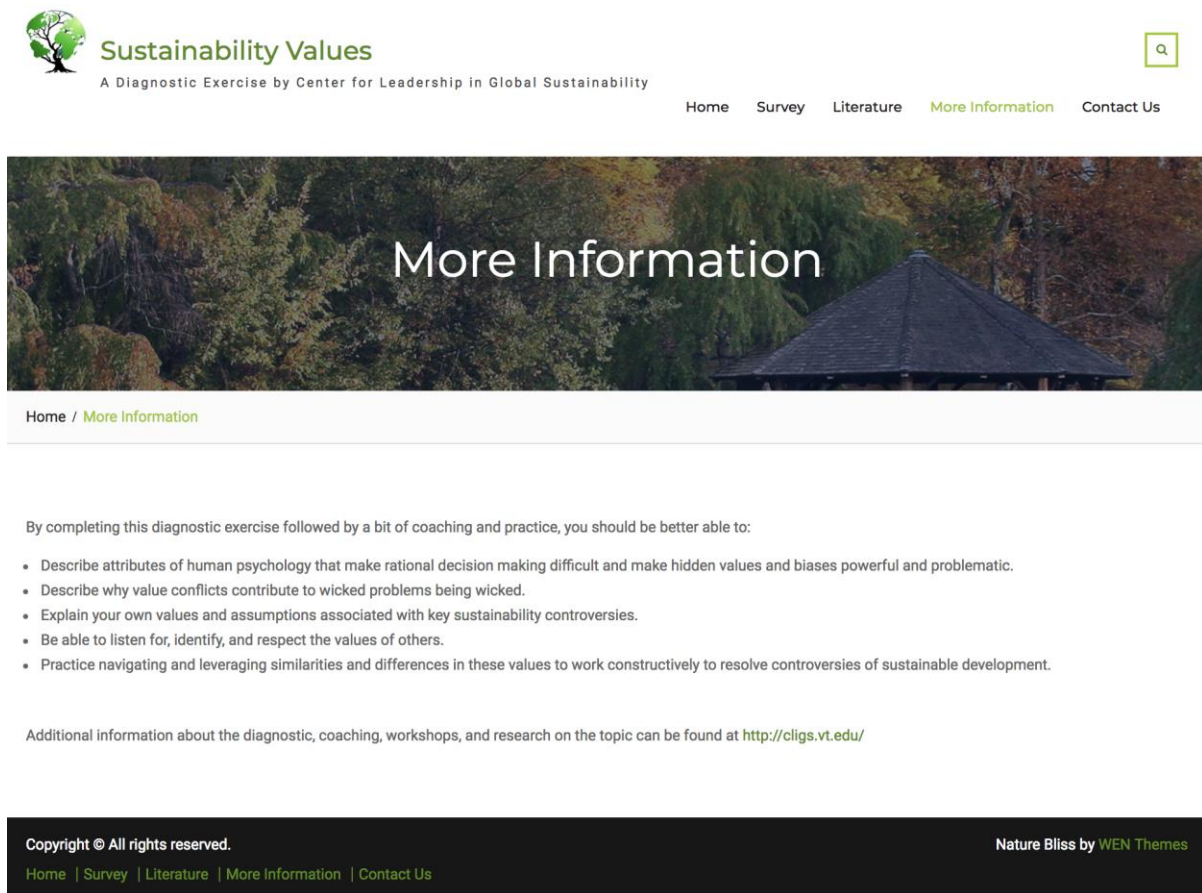


Figure 64: More Information Page

6.5. Contact Us

<https://www.sustainabilityvalues.com>



Figure 65: Contact Us Navigation

- To navigate to the More Information page, simply click above where the red arrow is pointing (**Figure 65**)

When you have successfully clicked the Contact Us button, the website should look like **Figure 66**.

The image shows the "Contact Us" page of the Sustainability Values website. At the top is the same header as in Figure 65, but the "Contact Us" link in the navigation bar is highlighted in green. Below the header is a large banner image of a forest with a wooden pavilion roof. The text "Contact Us" is overlaid on the banner in white. Below the banner is a breadcrumb trail: "Home / Contact Us". The main content area contains a greeting "Hi There," followed by the text "If there are any questions you may contact me using the form below or by email at hullrb@vt.edu." Below this is a contact form with three fields: "Name (required)" with a text input box, "Email (required)" with a text input box, and "Comment (required)" with a larger text area. At the bottom left of the form is a green "SUBMIT" button with a right-pointing arrow.

Figure 66: Contact Us Page

- Enter Name
- Enter Email

- Enter Description on the reason for the contact
- Click Green Submit

7. Developer's Manual

This project is very open ended. There are many ways to improve it. We were not able to include group functionality, or accounts for users. Those two features are the biggest features that can be implemented in the future.

In order to change the wording on the survey, Dr. Hull must go into his Qualtrics account, and edit the survey. To change the wording of the output, the file "individualParser.py" must be accessed. Between lines 420 and 820, there is HTML code embedded in it. Dr. Hull can edit this by searching (ctrl+f) the HTML portion with the sentence he would like to change and editing the text.

In order to manually get the results, Dr. Hull will have to download the project folder, and go to "lineNumber.txt". This file contains the last line number on the CSV that has a user on it. So, if Dr. Hull wants to run it on every single person, he will have to set it to 3; this will give him results from users, to the last person who took it. Be careful with this, there may be thousands of users on the survey, so it's best to check on Qualtrics first to get a more accurate number.

Using the Qualtrics API is pretty straightforward. It's the same thing as using any other API. The link to it is <https://api.qualtrics.com/>.

8. Lessons Learned

This project was a huge learning experience. First off, the timeline was way off for us. This is because we ran into a lot of problems with user permissions regarding access to the hosting account, etc. BlueHost would not let us get higher level access to run the code we needed to; this was a big setback and took almost one to two weeks to figure out.

WordPress was also a huge pain to work with, with its limited templates and functionality. WordPress is an easy to use website builder but does not have the customizability that we would like. It also would not let us run Python scripts on it, rendering our previously written code useless. This also set us back a few days, because we needed to figure out how to run the Python script on WordPress.

Originally, we used BlueHost to host our website, but it turns out that BlueHost does not allow for root access, so we could not run our Python script on it. Moreover, in order for us to submit PDF results, we were using a Python PDF library, but it was not installed on the BlueHost servers. We tried to install it but could not because we did not have root access.

In the future, using Amazon Web Services is highly recommended. With their seamless integration of web hosting, server support and hosting, and technical support, this project would have been much more viable. Features like authentication, root access, and user accounts would have been possible within the given time frame/deadline.

9. Acknowledgements

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