Software Requirements Specification for Software Engineering: subtitle describing software

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Contents

Revision History

Date	Version	Notes
09-28-24	1.0	Rough draft of sections 1,2,10,24
09-29-24	1.0.1	Adds more content on sections 1,2,10,24 to further explain points

1 Purpose of the Project

1.1 User Business

This project aims to aid in the data management and analysis of an ocean alkalinity enhancement experiment process. The research is working towards a scalable process to capture CO_2 using a combination of electric fields and membranes. The experiment's efficient generation process creates a very dilute base. The product serves a niche solution, to rebalance the ocean's PH levels to be able to absorb more CO_2. As earth's temperature rises, so does the ocean's, affects its PH balance. As this process is still on a small scale, it is currently being perfected which means many more experiments must be done to be able to bring it to a global scale. However, this requires a massive production operation to do so. Optimization of the experimental data is critical to improve process efficiency. This is a big data software problem requiring the ability to find and fine-tune specific parameters.

1.2 Goals of the Project

This platform will be able to consolidate and organize the data from the experiments with proper labeling across all given data sets allowing for a centralize method of data storage that is both scalable and maintainable. On the platform users can request to see certain data points from anywhere from the inputted data sets given any specified order. Once the data is returned to the user the platform can show inter-parameter comparability to better aid data analysis. This comparability acts as a starting point to analysis and is by no means show a final analysis of the data. This will all be presented in a web interface where all the user functions will be displayed and can be shared among those involved in the experiment.

2 Stakeholders

2.1 Client

Dr. Charles De Lannoy serves as the main client for this project as he is the lead supervisor of the research study. This solution directly affects his work and is intended to be a custom solution for the problem. Bassel Abdelkader is another client of this project as he is the person that works directly with

the research data. One of his responsibilities is to record the experimental data and upload them to their current data storage system, Microsoft Excel.

2.2 Customer

Although this project is a tailored solution to one research study, its application can be extended to any other situation where large sets of data is involved. This could be shared among other researchers to aid in their data management and analysis.

2.3 Other Stakeholders

Current students and members of the lab working on the study is can also be considered stakeholders for the same reasons as the clients. However, since they will only be working with the study for a short amount of time without daily or consistent interaction, they do not serve as a main stakeholder. The founder of the study, who is currently funding the research project is another stakeholder. However, since they do not work directly with the processes of the study rather oversee the process, they may not have strong interest in the details of the solution.

2.4 Hands-On Users of the Project

Potentially not applicable or useful for this document

2.5 Personas

- John Doe is an 23 year old McMaster undergraduate student who has a research position on the ocean alkalinity research project. They have been tasked to aid the experiment data collection process. After being told that the data is being stored in a master Excel file; they find that is it hard to use. Being an engineering student without much experience with Excel, they struggle to find the data they want. Inputting data is still a manageable process but they find themselves to be spending a lot of time looking at Excel documentation which they find frustrating as that time could be allocated to being more productive during the school term. Although, they want to a better way to manage the data,

they know that it is not up to their decision on what tools are being used but suggested that there could be another better solution to use.

- Dr. Carly Kelvon is a 60 years old professor at a university and is working on her own research project for over five years. She has gathered lots of data and thankfully she has always been great at Excel. However, other the last two years she has found that Excel is becoming less sustainable. The queries are a lot slower and sifting through pages and pages of data is wasting a lot of her time. She sees this more evidently through those that work along side her as they are also facing the same struggles with even less Excel experience as her. She wants to find a more scalable solution but she fears that her lack of digital knowledge will do her more harm than good, as a result she fears that if she introduces a new platform to serve her needs better that she will find it hard and confusing to use.

- Dr. Alex Stark is a 30 year old associate professor who has recently gotten funding for his innovative research idea and has been dedicating all his time on perfecting its methodology. It has only been one year since his research started but had recently found a great application of his ideas to reach far more people and be more impactful that he had originally thought. But with his current data management set up, he quickly realises that it is not sustainable. He finds that there are many other solutions on the market but they do not exactly meet his needs and cost a lot more than what he can spend on a tool. He decided that the best way is to create his own tool but lacks the software knowledge to create something stable and reliable.

2.6 Priorities Assigned to Users

2.6.1 Primary Users

- Dr. Charles De Lannoy
- Bassel Abdelkader
- Students working on the experiment

2.6.2 Secondary Users

- Researcher with their own research studies
- The founder of the study

2.7 User Participation

Not a relevant section

2.8 Maintenance Users and Service Technicians

Not a relevant section

3 Mandated Constraints

3.1 Solution Constraints

Insert your content here.

3.2 Implementation Environment of the Current System

Insert your content here.

3.3 Partner or Collaborative Applications

Insert your content here.

3.4 Off-the-Shelf Software

Insert your content here.

3.5 Anticipated Workplace Environment

Insert your content here.

3.6 Schedule Constraints

Insert your content here.

3.7 Budget Constraints

Insert your content here.

3.8 Enterprise Constraints

Insert your content here.

4 Naming Conventions and Terminology

4.1 Glossary of All Terms, Including Acronyms, Used by Stakeholders involved in the Project

Insert your content here.

5 Relevant Facts And Assumptions

5.1 Relevant Facts

Insert your content here.

5.2 Business Rules

Insert your content here.

5.3 Assumptions

Insert your content here.

6 The Scope of the Work

6.1 The Current Situation

Insert your content here.

6.2 The Context of the Work

Insert your content here.

6.3 Work Partitioning

Insert your content here.

6.4 Specifying a Business Use Case (BUC)

Insert your content here.

7 Business Data Model and Data Dictionary

7.1 Business Data Model

Insert your content here.

7.2 Data Dictionary

Insert your content here.

8 The Scope of the Product

8.1 Product Boundary

Insert your content here.

8.2 Product Use Case Table

Insert your content here.

8.3 Individual Product Use Cases (PUC's)

Insert your content here.

9 Functional Requirements

9.1 Functional Requirements

Insert your content here.

10 Look and Feel Requirements

All subitems in this sections are the fit criterion for its respective requirements.

10.1 Appearance Requirements

AR1. The website should have a simple and organized layout, with clearly defined sections where all major functions should be easily accessible and viewable

AR1.1 A users should be able to identify all the major functions of the website within five minuets of use.

AR2. The website shall be responsive on all computer and laptop screens aside from mobile screens

AR2.1 The usability of website should be the same as the default view on big and smaller computer, laptop and monitor screens

AR3. The website's functions and buttons shall be properly labeled where no button is ambiguous to users

AR3.1 A user should be able to tell what all buttons inherently does without the needing to ask questions

AR4.1 The produced plot from the data shall be properly labeled

AR4.1 The plots should not be ambiguous. Users should be able to understand what is the plot about within five minuets of viewing it.

10.2 Style Requirements

SR1. All icons on the website must be in the artistic style

SR1.1 After a user's first encounter with the product, 90% of users should see that there is unity among all the icons on the website.

SR2. All colours must match the theme of the website

SR2.1 After a user's first encounter with the product, 80% of users should agree that there is a common theme throughout the website.

SR3. All fonts are to be consistent throughout the website

SR3.1 After a user's first encounter with the product, there should be no user who feels that any fonts do not belong on the website.

11 Usability and Humanity Requirements

11.1 Ease of Use Requirements

Insert your content here.

11.2 Personalization and Internationalization Requirements

Insert your content here.

11.3 Learning Requirements

Insert your content here.

11.4 Understandability and Politeness Requirements

Insert your content here.

11.5 Accessibility Requirements

Insert your content here.

12 Performance Requirements

12.1 Speed and Latency Requirements

Insert your content here.

12.2 Safety-Critical Requirements

Insert your content here.

12.3 Precision or Accuracy Requirements

Insert your content here.

12.4 Robustness or Fault-Tolerance Requirements

Insert your content here.

12.5 Capacity Requirements

Insert your content here.

12.6 Scalability or Extensibility Requirements

Insert your content here.

12.7 Longevity Requirements

Insert your content here.

13 Operational and Environmental Requirements

13.1 Expected Physical Environment

Insert your content here.

13.2 Wider Environment Requirements

Insert your content here.

13.3 Requirements for Interfacing with Adjacent Systems

Insert your content here.

13.4 Productization Requirements

Insert your content here.

13.5 Release Requirements

Insert your content here.

14 Maintainability and Support Requirements

14.1 Maintenance Requirements

Insert your content here.

14.2 Supportability Requirements

Insert your content here.

14.3 Adaptability Requirements

Insert your content here.

15 Security Requirements

15.1 Access Requirements

Insert your content here.

15.2 Integrity Requirements

Insert your content here.

15.3 Privacy Requirements

Insert your content here.

15.4 Audit Requirements

Insert your content here.

15.5 Immunity Requirements

Insert your content here.

16 Cultural Requirements

16.1 Cultural Requirements

Insert your content here.

17 Compliance Requirements

17.1 Legal Requirements

Insert your content here.

17.2 Standards Compliance Requirements

Insert your content here.

18 Open Issues

Insert your content here.

19 Off-the-Shelf Solutions

19.1 Ready-Made Products

Insert your content here.

19.2 Reusable Components

Insert your content here.

19.3 Products That Can Be Copied

Insert your content here.

20 New Problems

20.1 Effects on the Current Environment

Insert your content here.

20.2 Effects on the Installed Systems

Insert your content here.

20.3 Potential User Problems

Insert your content here.

20.4 Limitations in the Anticipated Implementation Environment That May Inhibit the New Product

Insert your content here.

20.5 Follow-Up Problems

Insert your content here.

21 Tasks

21.1 Project Planning

Insert your content here.

21.2 Planning of the Development Phases

Insert your content here.

22 Migration to the New Product

22.1 Requirements for Migration to the New Product

Insert your content here.

22.2 Data That Has to be Modified or Translated for the New System

Insert your content here.

23 Costs

Insert your content here.

24 User Documentation and Training

24.1 User Documentation Requirements

User documentation will cover both the front-end and back-end features and functionalities.

24.1.1 Back-End

The backend user documentation will include all the API end points that are created.
It will show the base URL for the end points along with descriptions of each along with its required parameters and its types. These parameters will be those in the path, query and body. The response from the API call will include what the expected body will be along with any error handling. With this being a small project, a rate limit section may be included to ensure that it does not exceed the number of API calls. Versioning and support resources will be added for any additional references missing.
This document is intended to be passed on to the research lead or to any other group who would like to understand how the back-end processes work along. It will also be written such that someone else may use it to extend the current functionalities or to troubleshoot any errors that may arise in the future after this project has been passed on.

24.1.2 Front-End

The front end documentation serves less as for developers but for the end user. This documentation will include how to add new attributes to the data set, how to request data plots and any major functionality features.
This document is intended to be a help/tutorial for the end users who will be using the site for its functionalities.

24.2 Training Requirements

No training is required to use the end product.

25 Waiting Room

Insert your content here.

26 Ideas for Solution

Insert your content here.

Appendix — Reflection

The information in this section will be used to evaluate the team members on the graduate attribute of Lifelong Learning. Please answer the following questions:

1. What knowledge and skills will the team collectively need to acquire to successfully complete this capstone project? Examples of possible knowledge to acquire include domain specific knowledge from the domain of your application, or software engineering knowledge, mechatronics knowledge or computer science knowledge. Skills may be related to technology, or writing, or presentation, or team management, etc. You should look to identify at least one item for each team member.

2. For each of the knowledge areas and skills identified in the previous question, what are at least two approaches to acquiring the knowledge or mastering the skill? Of the identified approaches, which will each team member pursue, and why did they make this choice?