

# Software Requirements Specification

for

## **Saya Life - Cal State LA Senior Design Project Dashboard**

Version 1.2 approved

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# Revision History

Name	Date	Reason For Changes	Version
Daniel C.	12/07/23	Edited sections 1.1, 1.2, 1.4, 2, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, and 2.8.	1.0
Gabriel G.	12/07/23	Edited 1.3, 5.3, 5.1, 6	1.0
Isaac M.	12/07/23	Edited section 4,5,6	1.0
Jimmy N.	12/07/23	Reformatted T.O.C	1.0
Jimmy N.	12/07/23	Edited section 4.0	1.0
Daniel C.	12/07/23	Revised the entire document. Some information was misplaced or was not appropriate for this SRS doc. Added details where necessary.	1.1
Daniel C.	12/08/23	Minor edits throughout the document.	1.2

# 1. Introduction

This Software Requirements Specifications (SRS) document explains what our senior design project, Dashboard, is. Readers of this document will find the functional and non-functional requirements for Dashboard.

Information such as general overviews, application functionalities, requirements, and ethical considerations will all be found in this document.

Anyone who intends to use and implement Dashboard should read this SRS document.

## 1.1 Purpose

The purpose of this SRS document is to lay out the requirements for the development of Dashboard. The most important information in this document are the functional and non-functional requirements, but other general information about Dashboard will be found in this document.

The current version of Dashboard is version 0.01.

## 1.2 Intended Audience and Reading Suggestions

This document is mainly directed to the developers and quality assurance testers of Dashboard. Anyone who wishes to learn more about this software is welcome to read this document.

General users and readers will find Sections 1, 2, and 3 useful for understanding what Dashboard is.

Developers and designers should refer to Sections 4 and 5 to fully understand the requirements of Dashboard.

Section 6 applies to all readers of this document. It covers legal and ethical considerations that Dashboard adheres to.

## 1.3 Product Scope

Dashboard is intended to be integrated into the Saya.Life website. Insurance companies that are registered with Saya.Life will have access to Dashboard, which can evaluate how valuable a client is.

The evaluation will be shown in a dynamic report that includes specific information about the client. This will allow insurance companies to make better informed decisions about each client they have or could potentially accept.

## 1.4 Definitions, Acronyms, and Abbreviations

In this section, readers will find all definitions, acronyms, and abbreviations relevant to this document.

### Definitions:

**Client:** Refers to an insurance company's client.

**Dashboard:** The official name of our project.

**Developers:** Refers to the ten developers of Dashboard.

**Model:** Machine learning algorithm.

**Saya Life:** The Sponsor of this project, Dashboard. This company specializes in water management systems. Is also referred to as “Saya.Life”, “Saya.life”, “Saya”, or “SAYA.life”.

**The application, system, or product:** Refers to Dashboard.

**User or user:** You, the user of Dashboard. In many cases this refers to insurance companies registered under Saya Life.

#### Acronyms:

**SRS:** Software Requirements Specifications document

**UI:** User Interface

## 1.5 References

- Jupyter Documentation (<https://docs.jupyter.org/en/latest/>)
- Saya Life Website (<https://saya.life>)
- Scikit-Learn Documentation (<https://scikit-learn.org/stable/index.html>)
- Tableau User Guide ([https://help.tableau.com/current/pro/desktop/en-us/gettingstarted\\_overview.htm](https://help.tableau.com/current/pro/desktop/en-us/gettingstarted_overview.htm))

## 2. Overall Description

Users of Dashboard will be able to generate a dynamic report of the desired client. Users will be able to insert data, such as the number of people in a building, how old the building is, and its size. All of this data will be processed to tell insurance companies how valuable a customer is with customized graphs that display information about the client.

### 2.1 System Analysis

The goal of Dashboard is to evaluate a client based on water and building metrics, and to display the evaluation as a dynamic report that shows insurance companies the evaluation score and data about the client.

The first major hurdle is gathering the appropriate data and metrics to feed a machine learning model.

The second major hurdle is creating a formula that we can use to create a functional scale for evaluation.

The third major hurdle is choosing, testing, and adjusting an appropriate machine learning model.

The fourth major hurdle is to create an API that extracts the Saya data, stores the new input data, feeds the data to the machine learning model, and finally sends the evaluation and graph information to the Dashboard webpage.

The fifth major hurdle is designing a dashboard that not only displays the evaluation of a client, but also tells a story about the client. An insurance company should be able to *see* why a client got the evaluation displayed.

Planned Solutions:

Although Saya Life has provided client data, it is up to the development team to gather additional public data that we can use to train our model. We will choose the public data carefully (to the best of our abilities) to avoid biases.

We will research how we can approach the creation of the formula. We will test our approach with the data we are able to gather.

We will conduct research on the different types of algorithms that could help us develop Dashboard.

We will use Python to create an API for Dashboard and thoroughly test it to ensure that all of its functionalities work.

Lastly, we will plan well, test, and validate all of the software we write to make sure all components of Dashboard works.

## 2.2 Product Perspective

Dashboard is directly tied to Saya Life's website. It will be integrated as a part of the website that only admins and insurance companies registered under Saya Life can access. Although our development team does not have access to the Saya Life website, we imagine that Saya will insert the Dashboard within an insurance company's homepage, but they may also have a dedicated page for it.

We will design our own dashboard and dynamic reporting system with the themes Saya uses in their website, but it is up to Saya Life to decide if they will keep the design or change it.

## 2.3 Product Functions

Our product will provide the following functions:

- Multiple building-related inputs
- A button to start the data processing
- Displaying the final evaluation
- Displaying graphs about the client

## 2.4 User Classes and Characteristics

**Insurance Companies:** This class of users will have access to most of the features Saya Life has to offer. They will not be able to access or change their own data, nor others' data. They will be able to generate reports for their clients.

**Developers and testers:** The developers and testers will have access to the Dashboard API, source code, and any development tools used to create and update Dashboard. They do not have access to the Saya Life website and any of its code, database(s), or tools.

**Saya Life:** Saya Life will have full access to Dashboard and holds all rights to change Dashboard according to the website and company's needs.

## 2.5 Operating Environment

This software will be available on any operating system that can run popular internet browsers such as Chrome, Edge, Safari, and Firefox.

Users will need a desktop or a mobile device that can access the internet. A desktop is recommended.

## 2.6 Design and Implementation Constraints

- Time limitations
  - Developers have other projects and situations that need attention and may affect their availability for this project.
  - All developers have different schedules, and this makes it challenging to have meetings in which everyone provides updates and ensure everyone is on the same page.
- Limited Knowledge
  - Our development team has a basic understanding of designing dashboards and implementing machine learning algorithms.
  - We will have to spend time researching and learning these aspects of the project
- Hardware limitations
  - Limited hardware may affect a developer's productivity, especially for generating multiple dynamic graphs at the same time.
- Software limitations
  - Outdated operating systems or browsers may not allow developers to access all tools used for Dashboard.

## 2.7 User Documentation

No user documentation (manuals, online guides, tutorials, etc.) is planned to be delivered along with Dashboard. However, in the case that Saya Life decides user documentation is needed, it will be listed here.

## 2.8 Assumptions and Dependencies

Dashboard will utilize Excel to keep records of our data. Jupyter, Google Colab, the Anaconda library, and Python 3 will be used to develop machine learning models. Tableau will be used to design and implement the visual appearance of Dashboard. Our development will use GitHub to easily hold and access Dashboard.

## 2.9 Apportioning of Requirements

As of right now, there are no features that we plan to delay for future versions of Dashboard.

# 3. External Interface Requirements

This section will contain brief overviews about how Dashboard should be used and about some of its functionalities.

### 3.1 User Interfaces

Our development team does not have access to the Saya Life website code nor can we register an account with Saya. We are assuming that Dashboard will be integrated within a registered user's homepage.

- Dashboard Input
  - Building Information Input Fields
  - Report Generation Button
- Dashboard Output
  - A section that displays the client evaluation score
  - Multiple graphs for different metrics in relation to time
    - Example: A graph that displays the number of leaks for each month

Users must be registered under the Saya Life website to access Dashboard.

### 3.2 Hardware Interfaces

Users will need a desktop or mobile device that has access to the internet to sign into the Saya Life website.

### 3.3 Software Interfaces

Users must have access to updated web browsers that can access the Saya Life website. These include, but are not limited to: Chrome, Safari, Edge, and Firefox. Common desktop operating systems that can run these web browsers are Windows 10/11 and macOS Sonoma.

### 3.4 Communications Interfaces

Communications within the Saya Life website are controlled and determined by Saya Life. Our team has no say in the communications of the Saya Life website.

Dashboard on its own will use its own API to perform its functions. It is up to Saya Life to decide how they will implement communications and security measures.

The Saya Life website is secure and abides by industry standards.

## 4. Requirements Specification

This section contains necessary information for developers, designers, and testers of Dashboard. All software requirements are listed and described in detail in this section. Each requirement should be read and understood before any Dashboard development is made.

### 4.1 Functional Requirements

1. The system shall allow users to provide building information.
  - 1.1. Input fields
    - 1.1.1. The number of people field is required; must be a whole number.
    - 1.1.2. The age of the building field is required; must be a whole number.
    - 1.1.3. The size of the building field is required; must be a whole number and will be processed as square feet.



- 1.1.4. The number of rooms field is optional; must be a whole number.
    - 1.1.5. History of leaks is required; there must be a drop list that provides the options “Rare”, “Normal”, and “Common”.
      - 1.1.5.1. This may be changed to a file input that abides by a specific format.
    - 1.1.6. The model field is optional; there must be a drop list that provides the option for every machine learning model in use.
      - 1.1.6.1. This is more users that have good understanding of machine learning models
      - 1.1.6.2. Users that don’t understand machine learning can still use this field to get different evaluations from different models.
    - 1.1.7. Other input fields are still being determined.
  - 1.2. Output
    - 1.2.1. If a required input was left empty, an appropriate message should be displayed to tell the user what is wrong. No other functionality should be called.
    - 1.2.2. For inputs that do not pass input validation, a message should be displayed to tell the user each specific issue. No other functionality should be called.
    - 1.2.3. If all inputs pass input validation, a success message should be displayed and the model should begin evaluation. The message should be removed once the evaluation score and graphs are ready to be displayed.
  - 1.3. A button to begin the evaluation process.
2. The system shall use trained machine learning models to evaluate the desired client.
    - 2.1. Input
      - 2.1.1. All data from Saya Life
      - 2.1.2. All building data from the user
    - 2.2. Output
      - 2.2.1. A number on a scale from 1 - 10 along with that number’s meaning and description.
      - 2.2.2. The data necessary to generate graphs about leak information, building performance, water usage, etc.
  3. The system shall have a general Dashboard API
    - 3.1. Controller functions
      - 3.1.1. Dashboard API will serve as the central control center for Dashboard
      - 3.1.2. It should have functions that get Saya Life data
      - 3.1.3. It should have functions that receive and store building data
      - 3.1.4. It should have functions that call a specific model and provide the necessary data to the model.
      - 3.1.5. There should be functions that send the result data back to the dashboard web page.
  4. The system shall display the model evaluation and relevant graphs
    - 4.1. Output
      - 4.1.1. The evaluation score, score title, and score description
      - 4.1.2. Around 5 - 10 graphs that give insight into the evaluation score and client status
        - 4.1.2.1. The specific graphs are still being decided and tested
      - 4.1.3. The user should not be overloaded with information that does not give insight to the evaluation.
  5. The system shall continue to run if an error occurs.

- 5.1. If possible, the error should be displayed in its own textbox and draw the attention of the user or developer.
6. The system shall allow the user to generate back-to-back reports
  - 6.1. Input data remains the same, but should not be deleted by the system. The user decides what data they want to change in the input fields.
  - 6.2. New data must pass input validation. Refer to functional requirements 1.1 .
7. The system may provide the option to minimize or close the evaluation segment of the page.

## 4.2 External Interface Requirements

Dashboard shall be able to access the Excel client records. These records should be in .csv format.

These records contain:

- Meter number
- Flow
  - In feet
- Total flow
  - In feet
- Flow rate
  - In feet
  - In relation to seconds
- Meter Local Time
- Unit
  - Gallons
- Previous flow

Other Excel records are still being populated and formatted.

## 4.3 Logical Database Requirements

As of right now, we are not using a database. We are using Excel to hold client records.

Our Excel data contains the following data:

- Saya Life Data
  - Water flow duration
  - Water volume
  - Water flow rate
  - Type of water
  - Month
  - Meter Number
- Building Data
  - Age
  - Number of rooms
  - Type of building
  - Number of residents
  - History of leaks
- Hardware Data

- Type of pipe
- Length of pipe
- Age of pipe
- Misc Data
  - Type of leak
  - Location of pipe

Saya Life data, hardware data, and other miscellaneous data will be provided by Saya Life. We don't know if they use a database or not.

Users of Dashboard will have their own building data that they can refer to and insert in the input fields. As of now, Dashboard will not store this data. It will only use it temporarily to generate an evaluation.

## 4.4 Design Constraints

The development team is new to working with dashboard designs, machine learning algorithms, and feature engineering. Each of these aspects will require time to be researched and learned.

Because of this constraint, we may not implement the best algorithm, or we may not choose the best dashboard designs that exist. We want all feedback possible from Saya Life to implement each functionality in a way that suits Saya Life.

In terms of the Dashboard integration into the Saya Life website, we want to create a good template for Saya Life, but developers should not spend too much time worrying about how Dashboard will look in the Saya Life website. Saya Life has made it clear that their own development team will implement Dashboard in their own way.

# 5. Other Nonfunctional Requirements

## 5.1 Performance Requirements

Dashboard is currently being tested with 3-6 months of data. Larger data (1-2 years) should be handled without issue. Because we currently do not have large sets of data, it is possible that the output of information will take longer than usual.

We don't recommend feeding the Dashboard with data that contains information for more than three years, unless it's for testing purposes.

## 5.2 Safety Requirements

The Dashboard development team will be careful not to use biased data, such as data that is tied to a specific zip code.

We don't want clients to be unfairly penalized by biased data.

## 5.3 Security Requirements

Dashboard does not handle any passwords or personal information, except for the client data that is provided by Saya Life. Dashboard will display parts of this data in its evaluation outputs, but with the assumption that only insurance companies will be able to generate and see those reports.

The Dashboard development team cannot ensure the security of Dashboard data because we do not have access to the Saya Life website. However, Saya Life does abide by industry security standards.

## 5.4 Software Quality Attributes

The Dashboard development team strives to prioritize and deliver the following quality attributes:

- Ease of use
  - Dashboard will be designed to be easy to use and understand with the use of good color contrasts and a simple UI.
- Maintainability
  - We are designing Dashboard with the long term in mind.
  - Code should be clean, organized, and follow a clear structure.
  - Code should be easily adjustable to allow for meaningful changes.
- Correctness
  - Dashboard should display accurate results.
  - Insurance companies have big decisions to make. Our product should reflect that.
  - Our model and frontend page will be tested thoroughly.
- Efficiency
  - Dashboard will be designed to retrieve, process, and output data as quickly as possible.

## 5.5 Business Rules

Dashboard developers shall always prioritize the needs of Saya Life.

Dashboard developers shall make changes that abide by the requirements found in this document.

Changes that break the functionality of Dashboard shall be fixed as soon as possible.

Developers and stakeholders shall treat each other with respect.

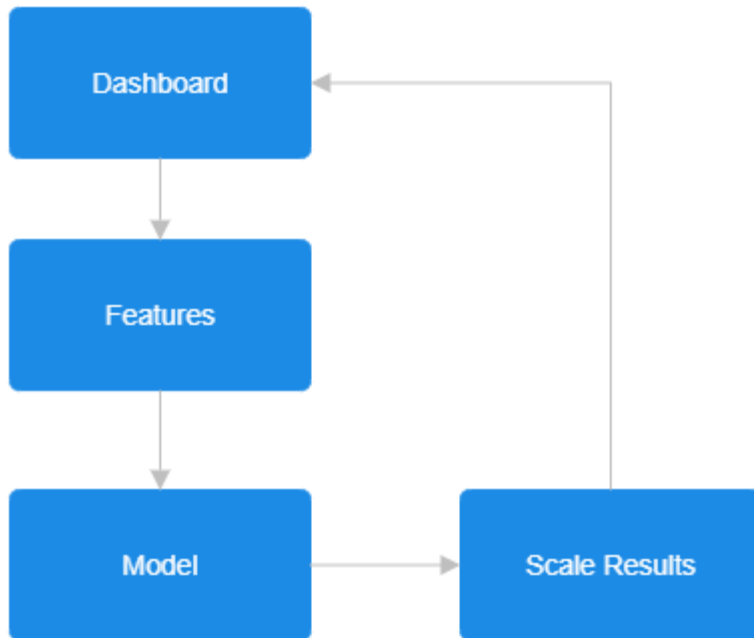
# 6. Legal and Ethical Considerations

Dashboard uses client data. This data is directly provided by Saya Life, and it is a small set of one client dataset. The data is over a year old. This demonstrates data security and responsibility from Saya's end, and Dashboard developers will use this data responsibly by not sharing or using it outside of the project.

We are aware that public data may contain biases in the form of zip codes, income, building prices, and many more. We consider usage of this type of data to be unethical. Therefore, the development team will do its best to thoroughly investigate each public dataset we want to use.

## Appendix A: Analysis Models

### Sample Model breakdown



## Appendix B: To Be Determined List

To be determined!