

Engineering on Display Project: Specs and Requirements

Document version: 04/27/2017 v3.0

1.0.0. Project Agreement and Statement of Work

THIS PROJECT AGREEMENT AND STATEMENT OF WORK (this “Agreement”) is entered into by and between the undersigned Buyer and Service Provider as of the Effective Date. The Buyer and Service Provider are sometimes referred to collectively herein as the “Parties” and individually as a “Party”. All capitalized terms not defined in this Agreement have the meanings given to such terms in the Terms of Service Agreement (“Terms of Service”) available, unless the context requires otherwise.

1.1.0. BACKGROUND AND INITIAL OBLIGATIONS.

1.1.1. The “Buyer” is:

Dr. Kenrick Mock
University of Alaska, Anchorage, College of Engineering
2900 Spirit Dr.
Anchorage, AK. 99508
kjmock@alaska.edu

1.1.2. The “Service Providers” are:

Andrew Smart ads00019@students.stir.ac.uk
Martin Boyle mboyle15@alaska.edu
Terrance Mount trmount@alaska.edu

1.1.3. The Project is:

Engineering on display.
A display for monitors in the EIB building.
Delivery Date: 05/06/2017
Service Compensation: \$0.00 USD

1.2.0. Project Description:

A display for monitors in the EIB building, showing reading from sensors within the building and information or advertisements posted by members of staff.

1.2.1. Key Assumptions:

1. UAA Facilities is responsible for setting up access to the Siemens data to be used in the application. If data for the EIB is not provided, then data from another building will be provided.
2. Dr. Mock will provide a SQL Server database for storing application data.
3. Dr. Mock will provide a web server for application hosting.
4. UAA Facilities will provide the three touchscreen displays currently mounted in the EIB building to run the capstone software.
5. Advertising flyers and announcements will be provided and updated by the building manager.

1.2.2. Scope of Services

1. The program will display a slideshow of advertisements as provided by members of staff.
2. The program will show graphs detailing the energy data received.
3. Allow access for information, advertisements and data, to be updated by members of staff.
4. Disallow entry to the system by any whose purpose is not to update data or maintain program.
5. Provide metrics of usage.

1.3.0. Milestone Deliverables

1. Requirements Document
2. Design Document
3. Prototype of Public User Graphical User Interface.
4. Siemens Data to Database
5. Administrator Graphical User Interface
6. Public User Graphical User Interface
7. Passive Slideshow / Classmate Tests
8. Final deliverable
9. Final Documentation
10. Poster / Presentation

1.4.0. Specs and Requirements Agreement

By signing below, the buyer and service provider(s) listed above agree to the conditions outlined and verify that the requirements detailed below satisfy the functionality desired by the buying party as well as the statement of work promised by the service providers.

Dr. Kenrick Mock

Date

Andrew Smart

Date

Martin Boyle

Date

Terrance Mount

Date

2.0.0. Project Requirements

2.0.1. Project Overview

The Engineering on Display (EoD) project purpose is to display Siemens sensor data to visitors to the Engineering and Industry Building (EIB) at the University of Alaska, Anchorage (UAA). The software for the project is being built as a senior capstone project for the three service providers. The software will consist of three parts:

1. A data handler to convert the Siemens data into a database
2. A database for storing all the Siemens data and user information
3. A web application to display the data and other important information

Final functionality will be tested by the developers and fellow classmates. Documents for requirements, design, user manual and final write up will be included in the final deliverable.

2.0.2. Web Application Overview

The web application (web app) primary purpose is to be the front end for the project. It will have three main functions:

1. A public graphical user interface,
2. A passive public slideshow of advertisements, and
3. An administrator graphical user interface.

The web app will run on three touchscreen computers placed on the first, second and third floors of the EIB. Descriptions of these functions will follow in the next section.

2.1.0. Functional Requirements

2.1.1. Web Application Feature 1: Public Graphical User Interface

This feature is how the public visiting the EIB will view sensor data and read about the Engineer on Display project. This feature is a touch based web application. Below is a list of specific sub features.

1. Designed as primary interface for the three touchscreens. All buttons enlarged to aid with interaction on a touchscreen.
2. Single page application: the public interface will all be displayed on a single page. All necessary calls to the database will be done with Asynchronous Java and XML (AJAX) calls.
3. Title banner with UAA Logo and Name (Figures 2-5). This banner will provide a consistent visual throughout the website.
4. Color scheme: using white background to reduce clutter and brighten up display. The touch panels are not very bright so a lighter background will help with visibility.
5. Descriptive heading with pictures: inform viewer on what this display is all about. This heading will contain a title with descriptive text below it. (Figures 2-5). This heading will be customizable in the Power User section.
6. Navigation menu: the menu will have four buttons corresponding to the four sensor data from Siemens. When a user presses the button for Electrical Usage, Water Usage, Natural Gas Usage

or Outside Temperature the statistics data section of the page will change. Each menu button will have a small picture for the type of data displayed.

7. Navigation menu: active button indication. When a menu button is pressed it will turn a darker color and change shape to indicate it is the active button for the data section.
8. Data Section: this section will have three parts. First a heading with a small picture corresponding with the sensor. Second will be a quick statistics section with textual statistics. Third is a graph of the sensor data.
9. Quick Statistics: this will display today's average and the percentage up or down for the week, month and year. Units will be displayed according to the sensor. The words for "Up", "Down" or "Same" will be displayed to aid with understanding statistics.
10. Graph of Sensor Data: Displays the sensor data with three possible time scales. The color scheme will match the sensor data. Color will be determined by the assigned color scheme of the sensor.
11. Graph of Sensor Data: scroll buttons on each side. When first viewed the graph will display the most recent data on the right hand side and back fill with as many data points as needed for timescale. To scroll back and forth through the time scale the user can use the large arrow buttons on each side of the graph. If a button can not be used because it is at the end of the data range, it will be grayed out.
12. Graph of Sensor Data: Time Range buttons: There will be three buttons below the graph to change the time scale. When switching between different time sensors, the app will display the same scale and date of the previous sensor. Example: switching from electrical usage to water usage the time scale and date range will be the same so the user can compare the two.
13. Graph of Sensor Data: Day Scale button: this button will change the graph to a fill line graph to show the average daily amount for the sensor data for each data point. It will start with the current day and date back seven days but the user can change that range with the scroll buttons. The color will be determined by the sensor color.
14. Graph of Sensor Data: Month Scale Button: this button will change the graph to a fill line graph to show the average monthly amount for the sensor data for each data point. It will start with the current month and date back twelve months but the user can change that range with the scroll buttons.
15. Graph of Sensor Data: Year Scale Button: this button will change the graph to a bar graph to show the average yearly amount for the sensor data for each data point. It will start with the current year and date back ten year or how many year data is available.
16. Data Section: Electrical Usage: by selecting this sensor data the color scheme will be yellow with a yellow lightning bolt in the title. The data units will be in kilowatts.
17. Data Section: Water Usage: by selecting this sensor data the color scheme will be blue with a blue water drop in the title. The data units will be in gallons.
18. Data Section: Natural Gas Usage: by selecting this sensor data the color scheme will be red with a red flame in the title. The data units will be in kilo British Thermal Units.
19. Data Section: Outside Temperature: by selecting this sensor data the color scheme will be red with a red thermometer in the title. The data units will be in Fahrenheit.

Fig 2. Graphical User Interface. User type: Public
Electrical Usage / Month.

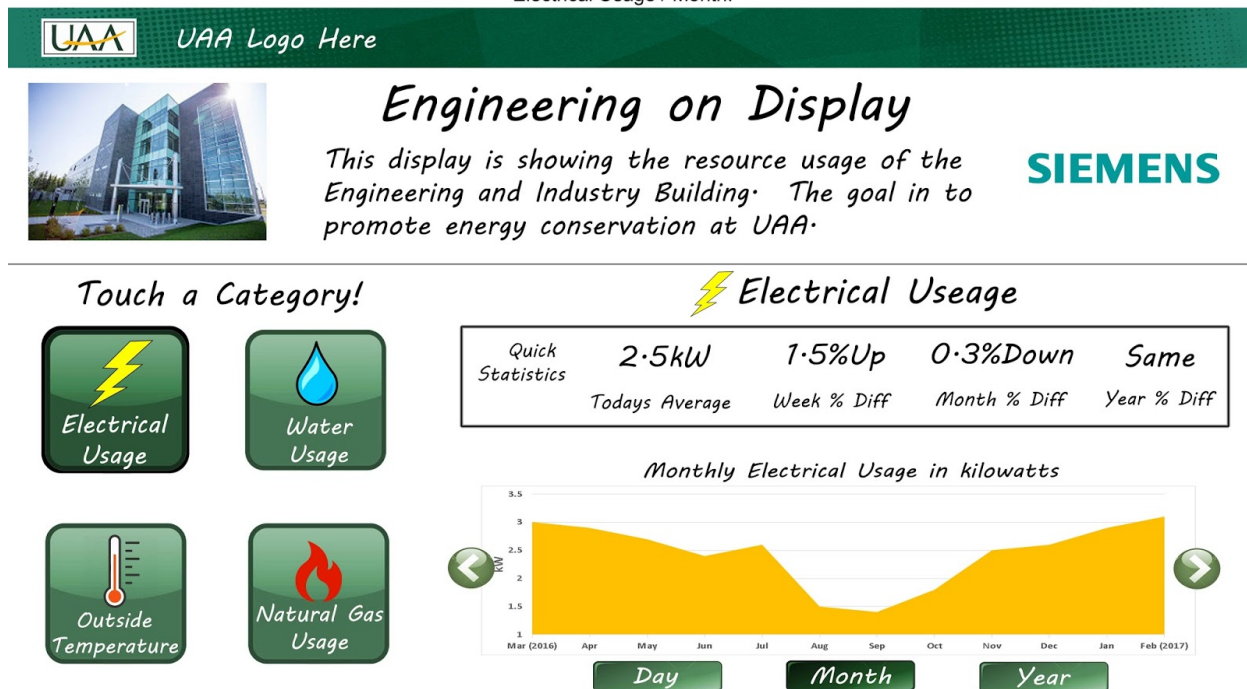


Fig 3. Graphical User Interface. User type: Public
Water Usage / Day Graph.

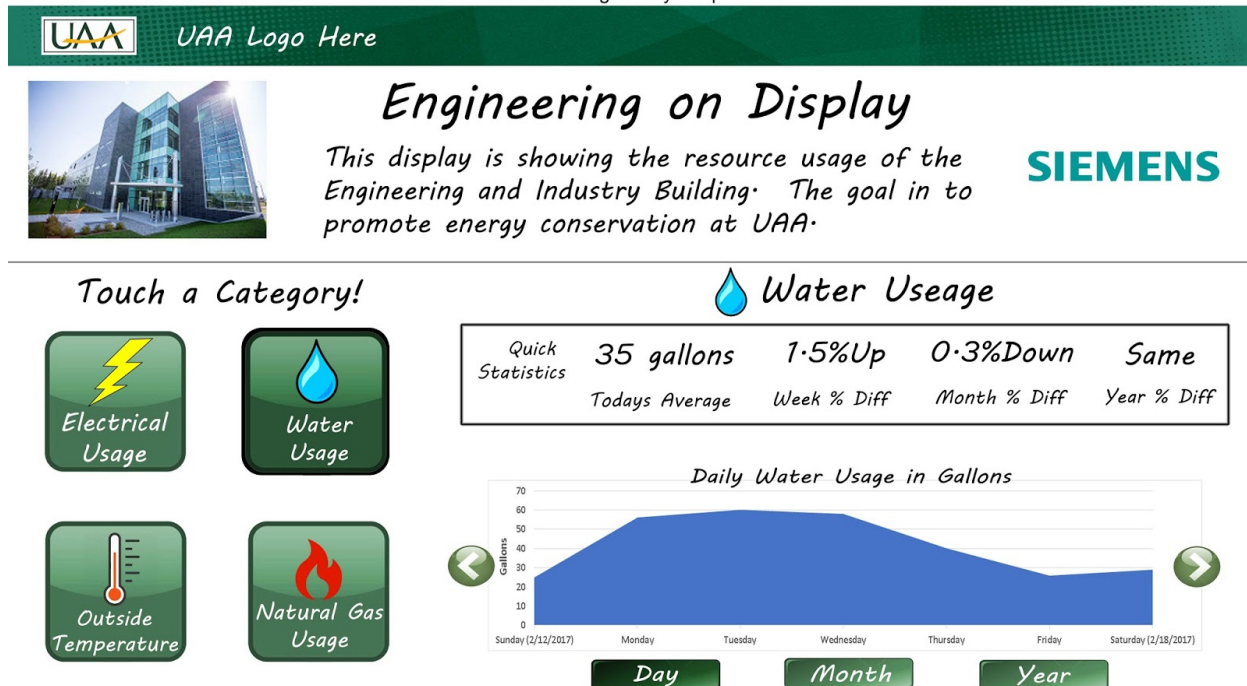


Fig 4. Graphical User Interface. User type: Public
Natural Gas Usage / Year Graph.

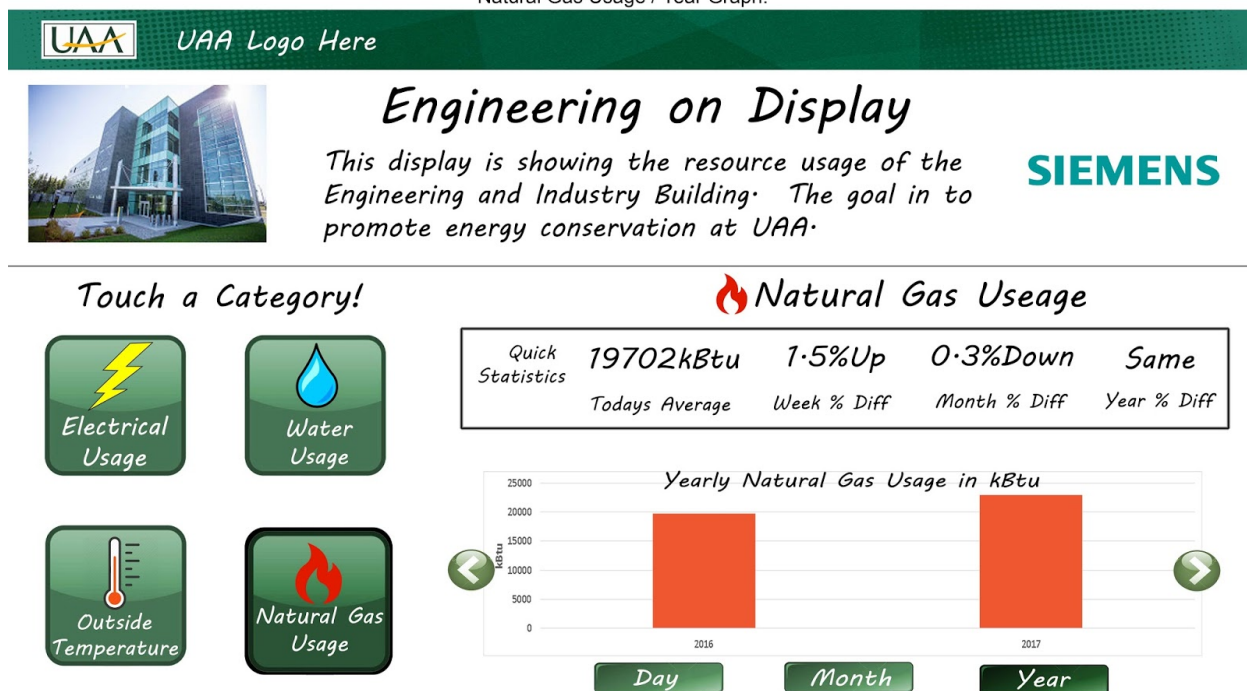
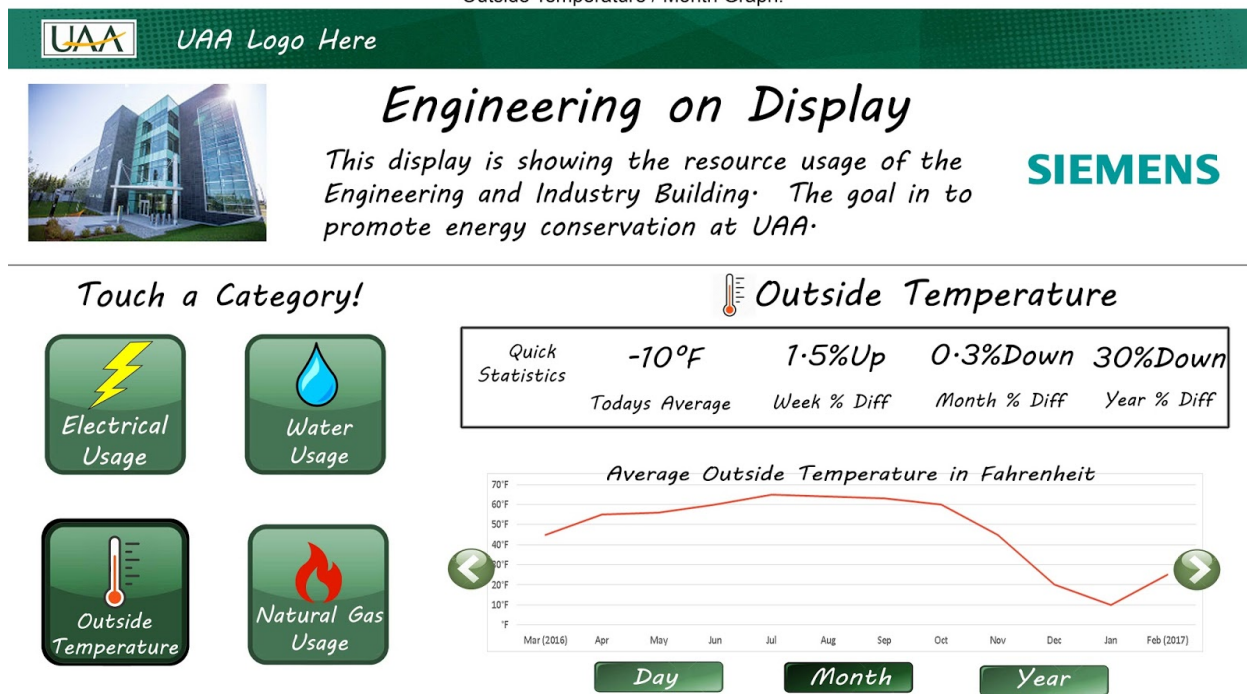


Fig 5. Graphical User Interface. User type: Public
Outside Temperature / Month Graph.

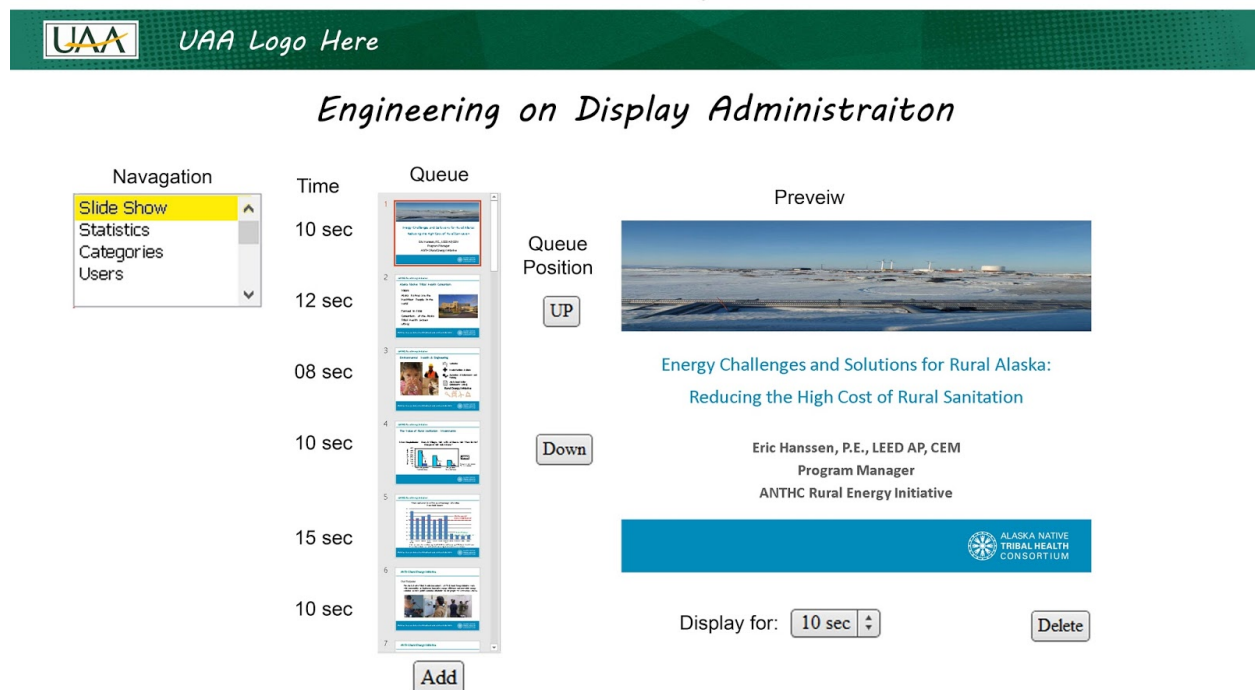


2.1.2. Web Application Feature 2: Power User Graphical User Interface

This feature is to allow an administrator access to the listed sub features below. It is designed to run on the administrator's web browser and not on the touch screen displays. Below is a list of specific sub features.

1. Allows power users to access the webapp. Used for editing and upkeep.
2. Power user will access page through URL which will deal with authentication.
3. Single page. Features navigation bar to select from four displays to be described (figure 6).
4. Slide show allows for the editing of the passive slideshow.
5. Provides list of current images in slideshow.
6. Functionality provided is the ability to add, remove, preview or reorder images. Also to decide how long to display an individual image.
7. Statistics provides metrics for the usage of the EoD site
8. Metrics will be displayed in a table.
9. Metrics will include number of total uses, number of uses of each monitor, length of uses, regularity of viewing of specific pages.
10. Users will provide functionality to add or remove power users access to webapp.
11. Creation of user will require a username and password.
12. Categories will provide options to alter the inputs, to allow additional readings types to be added.

Fig 6. Graphical User Interface. User type: PowerUser
SlideShow / Mouse Keyboard



2.1.3. Web Application Feature 3: Passive Slide Show of Announcements

This feature displays a slideshow submitted by the power user. Below is a list of specific sub features.

1. This feature will allow the power user (building admin/CoEng Staff) to add and remove image files for a slideshow that plays when the display becomes inactive.
2. When the EoD page becomes inactive after 15 minutes the page will switch to a passive slideshow that cycles through the list of uploaded image files.
3. The image files will be in common image formats such as .jpg, .png, etc. and must be approved announcements/flyers for the College of Engineering.
4. Each image can have a value between 5 and 30 seconds for the display time and their positions in the order of display can be changed. The slideshow will loop continuously until the display is interacted with.
5. While in slide display mode the only allowed interaction within the slide display area will be to swipe left or right to change slides. This will reset the slide timer to 0 on whichever slide is navigated to.
6. There will be a button at the bottom of the display that when pressed allows an interacting user to exit the slide playback and return to the EoD page.

2.2.0. Non-Functional requirements

2.2.1. Stakeholder: Power User

This stakeholder is for the administrator of the software. He or she will be able to add/delete other power users, look at metrics, change the categories, and change the slide show. Intend for Dr. Mock and facilities manager.

2.2.2. Stakeholder: Public User

This stakeholder is the primary intended audience for the web app, to use the public GUI and view the passive announcements. The only assumption that can be made is a physical ability to operate the public GUI.

2.2.3. Software Requirements

The project will be designed for this software to be running on the three touch screens in the EIB or on the servers IT Services. No guarantees on proper functionality if these requirements are not met.

1. Web browser: Microsoft Edge, Google Chrome v50+
2. Client Side Scripting Language: JavaScript version 2016
3. Server Side Web Framework: ASP.NET Core
4. Database server: MS SQL Server 2016
5. Server Operating system: Windows Server 2016

2.2.4. Hardware Requirements

The public graphical user interface and the passive slide show are designed to run on the following hardware. The power user interface is a simple webapp that will run a current web browser.

1. Touchscreen Computer: Dell Inspiron 3043

2. Size: 1600x900 pixels / 19.5" diagonal
3. CPU: Intel(R) Pentium(R) N3540 @ 2.16 GHz
4. Ram: 4.00 GB

2.2.5. Crash / Error Handling

How errors are handled in the three features of the software.

1. In the event the web browser or the computer crashes. The software will be restarted. No saving of states, or recovery needed.
2. If database is not available the website will continue to show advertising with a small text prompt saying the server is unavailable. An email message will be sent to the designated maintenance person for resolution.

2.4.0. Assumptions

What assumptions are needed to complete the project.

1. Database and interface development will be modeled off the preexisting data until current data for the EIB has been obtained from Siemens.
2. Implementation will start once a Windows Server is provided by Dr. Mock.
3. Final testing and deployment of software will require access to the three touchscreen displays at the EIB.

2.5.0. Changes to Project

Any changes to the look of the public graphical user interface have to be final after approving the prototype of public interface. All pictures, text, fonts, font weights, placement and any other changes are final with the approval of the prototype.