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| --- | --- | --- | --- | --- |
|  |  |  | Requirements | |
|  |  |  |  |  |
|  |  |  | Project Name: | Biochemical Plate, Assay, and Result Management system |
|  |  |  |
|  |  |  |
|  | Date: | 23rd Feb 2015 |
| CSCIE-99  Project | Customer: | Peter Henstock |
|  |  |  |  |
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# Document Administration

## Document Change History

| Date | Author | Version | Description of Change |
| --- | --- | --- | --- |
| 23rd February 2015 | Alan Orcharton | 1.0 | Initial Document |
|  |  |  |  |
|  |  |  |  |

## Document Content Owners

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## Document Approvers

| Name | Role | Signature / Electronic approval | Sign-off Date |
| --- | --- | --- | --- |
| Peter Henstock | Customer |  |  |
|  |  |  |  |
|  |  |  |  |

# Assumptions and Constraints

## Assumptions

## Constraints

* Software Solution must be free.

# Scope

## In Scope

## Out of Scope

# Proposed Functionality

## Overview

We propose a web-based software solution to facilitate the creation of Biochemical plate specifications, the management of experiments (assays), and the analysis of results.

We have broken the requirements into sections to facilitate the review and analysis of the functional requirements as follows:

**Security**

Requirements associated with logging into the system and defining user roles within the system.

**Plate Management**

The definition, creation, and storage of biochemical plates and plate sets to be used in experiments

**Experiment Management**

The definition, creation, and storage of experiments conducted.

**Results Analysis**

Functionality associated with loading, analyzing, reviewing, and storing experiment results.

**Special Features**

Proposals for advanced features to enhance the product

# Business (Functional) Requirements

## Security Functional Requirements

### Security Overview

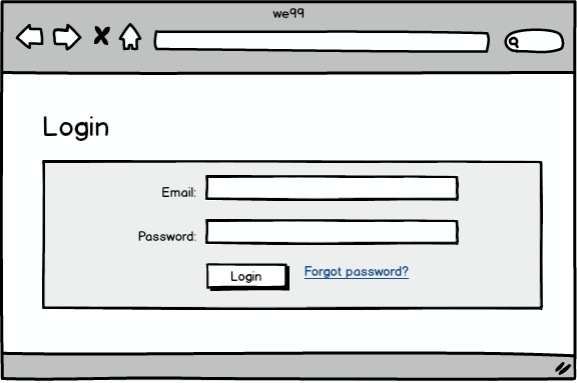
We propose that all users of the system must have

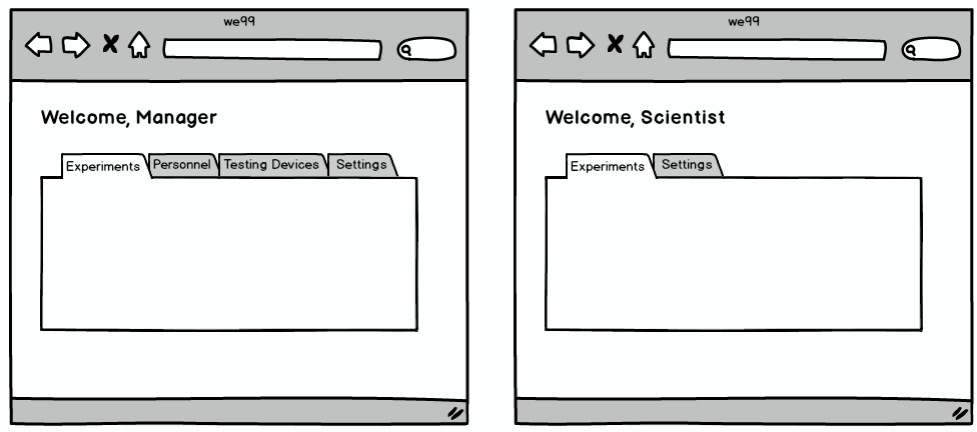
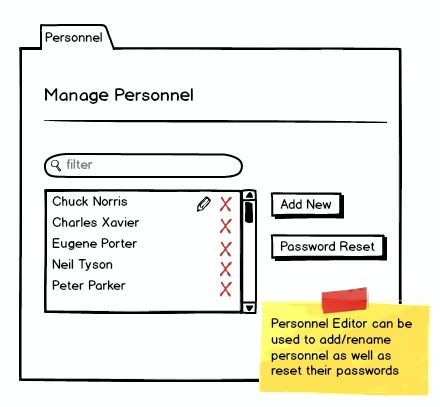
* An account – to logon to the system
* A User role – Administrator or Scientist

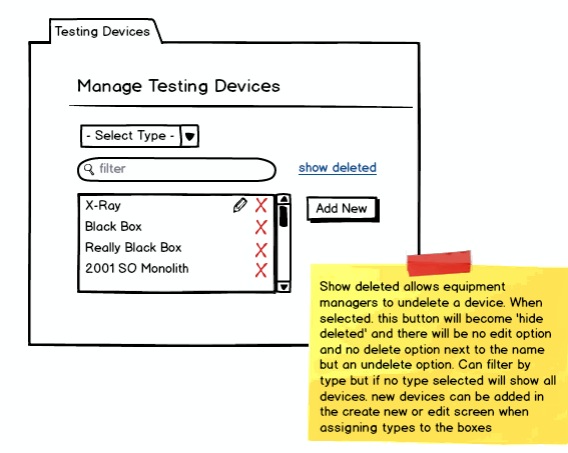
A user with the Administrator role has access to create and remove user accounts.

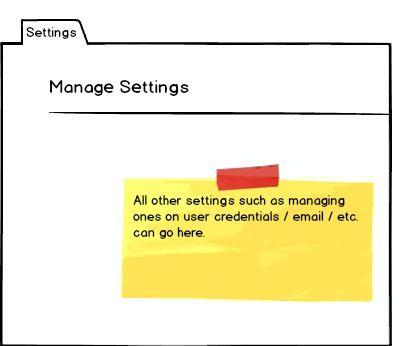
We also propose the ability to create “Teams” for an experiment. A team lead with and administrator role would have the ability to create a team of scientists. See Experiment Management section.

### Sample Screens / Story Board









### Open Issues / Questions Security Section

| # | Description | NOtes |
| --- | --- | --- |
| 1 | Can we use Testing devices to manage import export formats of files associated with the device |  |
| 2 | Roles – Are there any other roles besides Manager/Administrator and Scientist that we should add |  |
| 3 | Organization Units – Is there a need to allow organizational groupings to manage accounts in large corporate enviorments |  |

## 

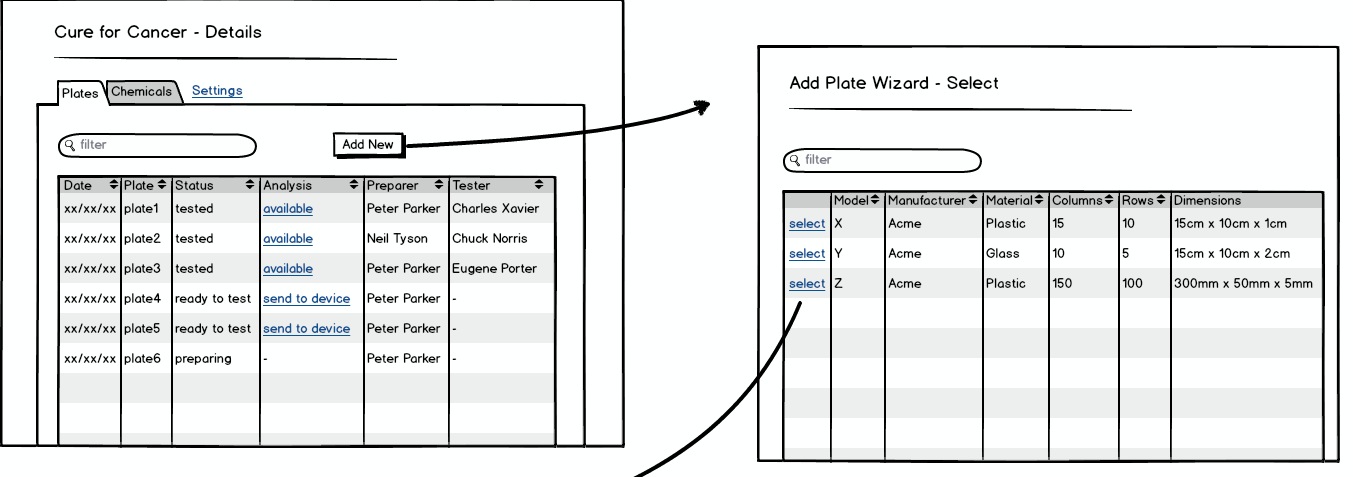
## Plate Management Requirements

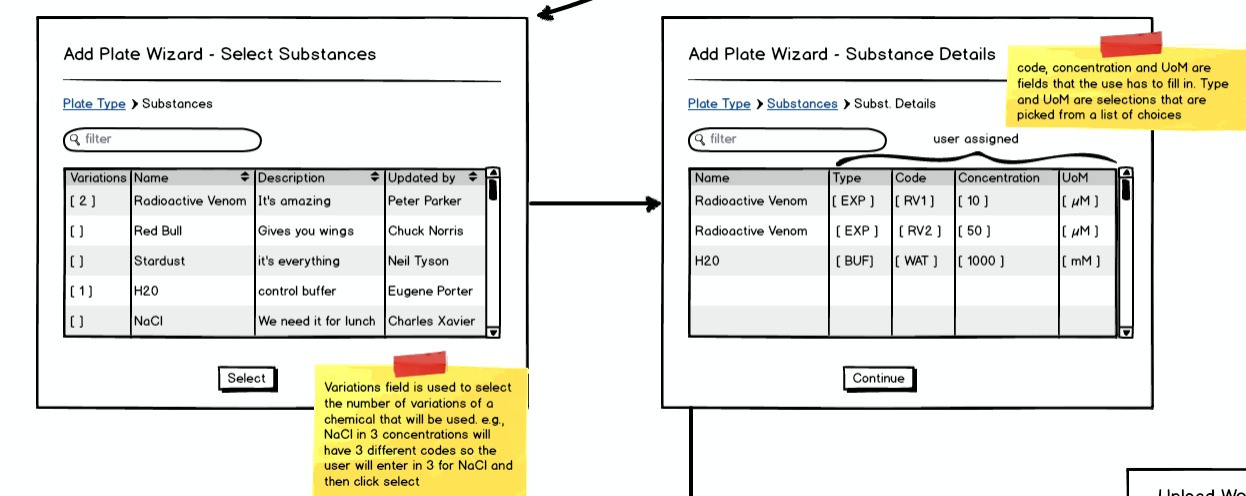
### Plate Management Overview

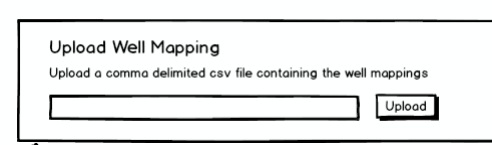
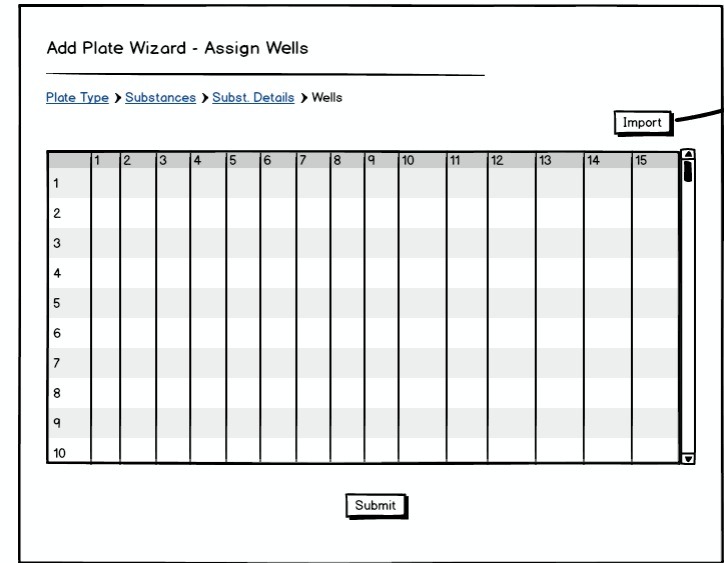
Plate Management covers creating specification of the contents of microtitre plates to be used in experiments. Users can create plates of any dimension and can specify the compound and the concentration of each compound to be added to each well.

Plate specifications can be cloned, altered and modified for new experiments. Plate specifications can be exported for use sending to robotic labs to fill the plates to be used in the experiment.

### Sample Screens / Story Board







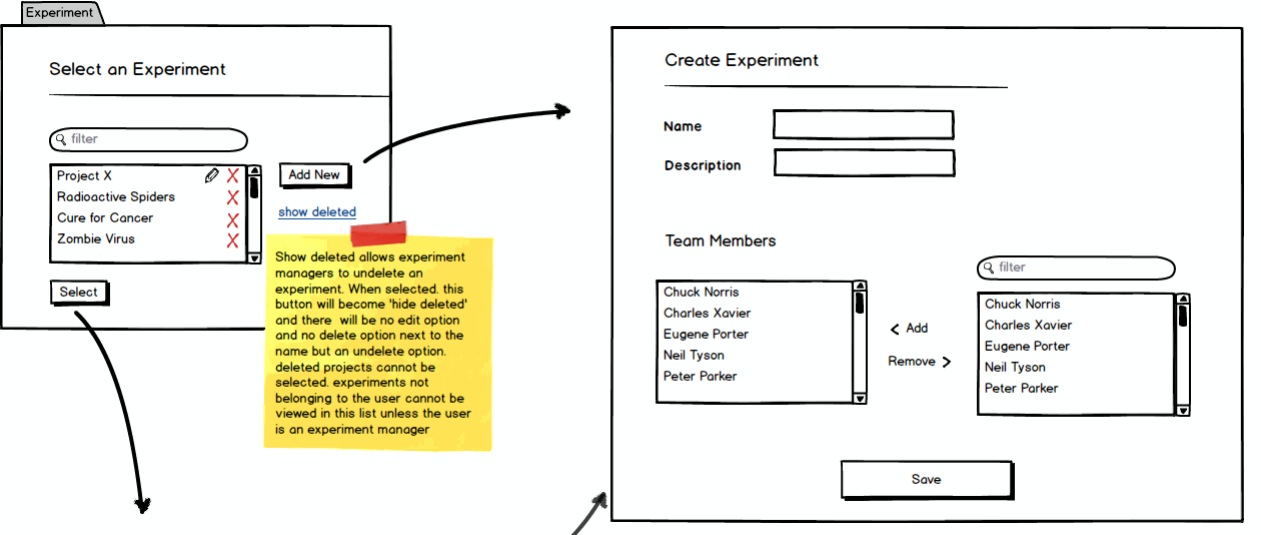
### Open Issues / Questions Plate Management

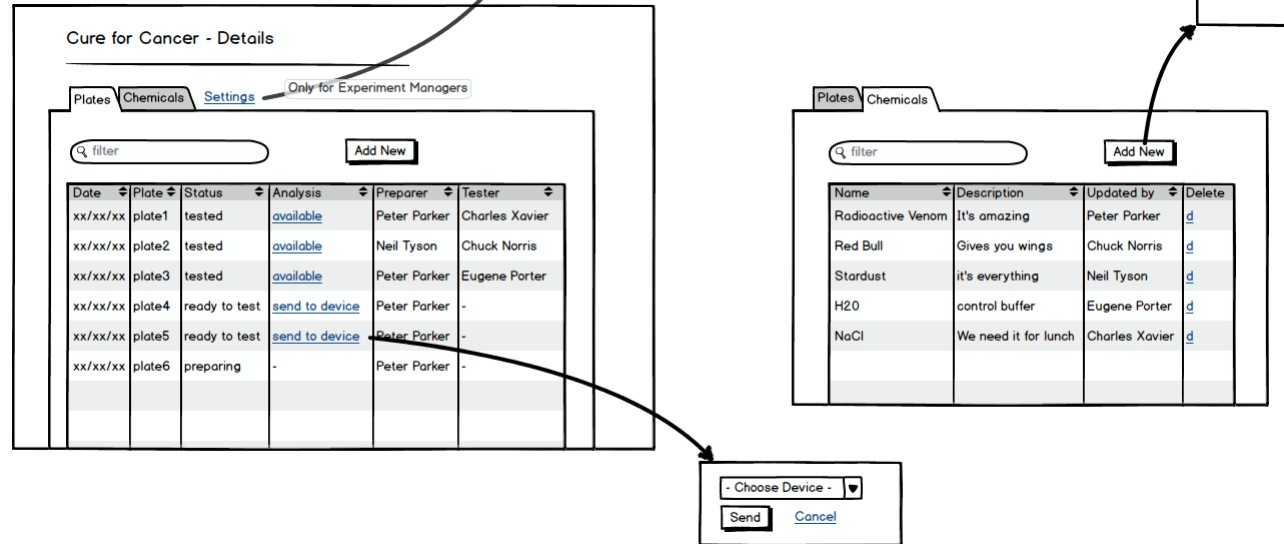
| # | Description | NOtes |
| --- | --- | --- |
| 1 | Is there a need for Plate Templates? Adding placeholders for compounds, controls and empty. Perhaps including an index for dosage. Merge the Compound list with the template to create a plate.  Is cloning the plate a reasonable alternative to the template concept |  |
| 2 | For dose response analysis. Applying doses or concentrations of compounds. Is there a shorthand e.g. 20uM 5-fold ? |  |
| 3 | Ability to create plates of any dimension. |  |
| 4 | Exporting plate specs. Is there a standard format? Do we need to handle with different parsers tied to equipment type? |  |

## Experiment Management Requirements

### Overview

### Sample Screens / Story Board





### Open Issues / Questions Experiment Management

| # | Description | NOtes |
| --- | --- | --- |
| 1 | Adding Compounds. Is there a need to do this in a bulk import? |  |
| 2 |  |  |

## Results Analysis Requirements

### Overview

### Sample Screens / Story Boards

### Open Issues / Questions Results Analysis

| # | Description | NOtes |
| --- | --- | --- |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

## Special Feature Proposals

### Overview

We have includes a few special features that we were considering implementing as part of the system.

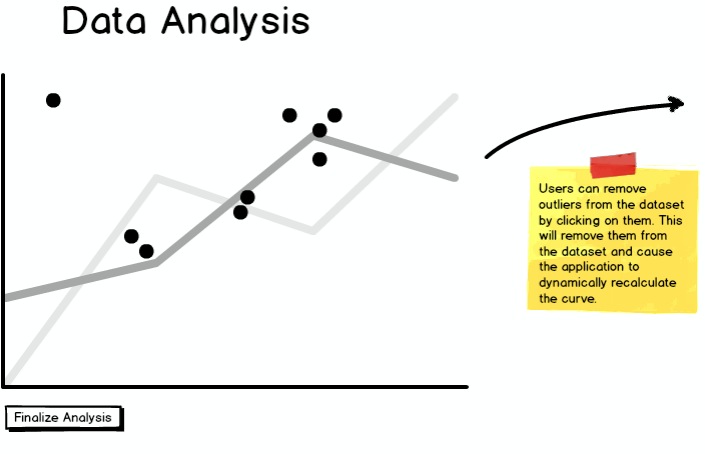
### Interactive Visualization

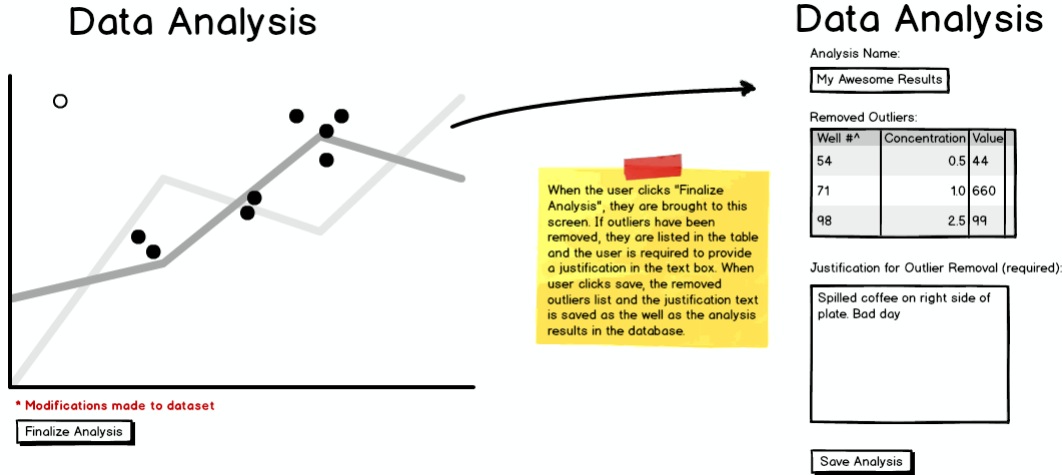
Allow the user to remove plot points from an Experiment's results. They will see the raw data from the processing in a scatter plot where we fit a curve to the data. The user can select points in the UI and remove them which will cause the graph to render the curve line again.

We will track which points were removed and enable users to provide comments as to why they were removed.

When removing points, you can offer a preview view. This would generate a new regression on the fly when certain points are selected to be removed. This can either be saved which would create the change and audit trail or the scientist could cancel changes.

#### Sample Screens / Story Boards



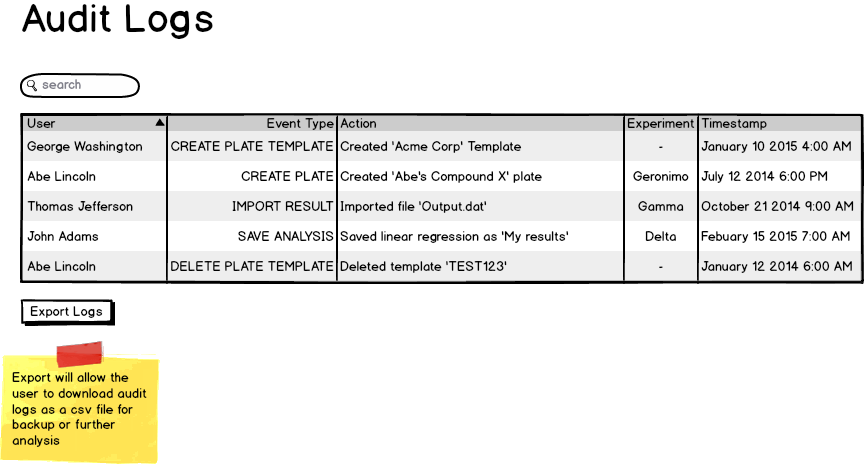


### Audit Trail

We could track whenever a Plate / Well / Dose / Experiment changes. This would allow users to know when something in the system has changed and may be necessary for internal reporting or perhaps regulatory agency requirements.

Assuming that we have some type of relational database, we should hook into the changes at the transaction level so the audit trail is captured in the same atomic operation as the data is changed. Note: there's a good library from Hibernate for this called Envers.

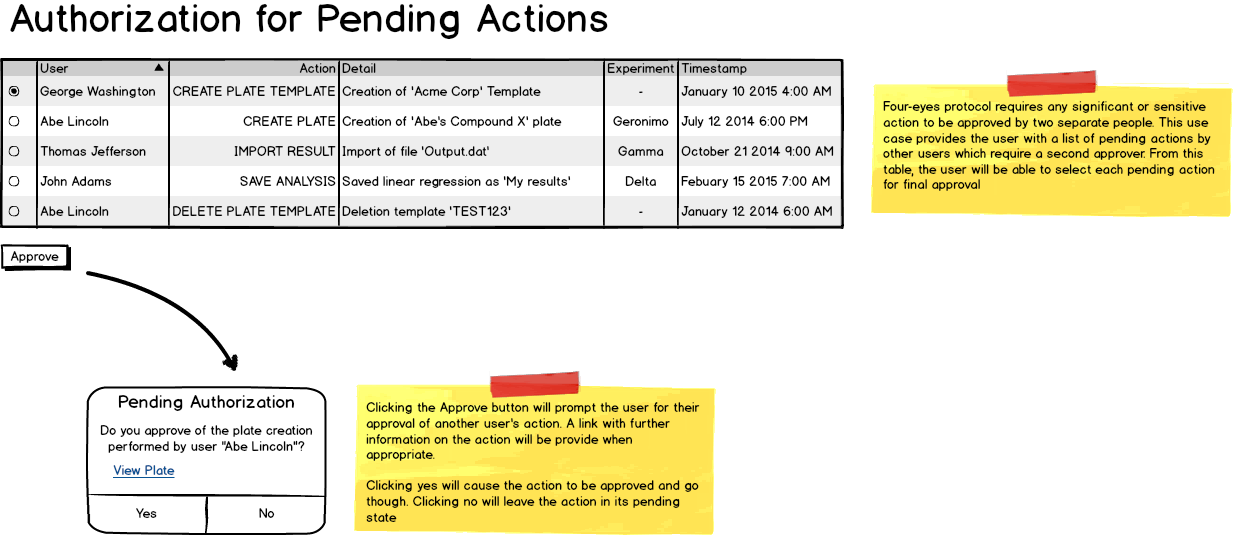
#### Sample Screens / Story Boards



### Four Eyes Protocol

Changes to experiment results or perhaps the plate configuration before an experiment should require a second person to review or approve the change. This would assume that we have an authentication model in place so we know which users own an Experiment and thus which users would be eligible to approve the change,

#### Sample Screens / Story Boards



### Flexible Plate Template Editor

Plate templates can be saved and loaded so that they can be shared. The save file is a clear format (e.g., csv) that could be edited directly with a text editor/excel. Alternatively the webapp interface can have a table that lets you design the plate.

### Plate Sharing

In some cases a plate may need to be shared across multiple Experiments. This may be a cost or resource issue. In order to support this, we need to associate wells to an experiment and not assume that a plate belongs to a single Experiment.

### Support Machine / Equipment File parsers

If we are storing data regarding the equipment used for an experiment we could possibly have the ability to customize output file formats for the type of equipment. This could also apply to parsing the results files from different machine types.

### Open Issues / Questions Special Features

| # | Description | NOtes |
| --- | --- | --- |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |