Harvard Extension School
CSCIE-99: Final Project

Biomedical Plate, Assay, and Results Management System

MILESTONE 1

WE99: West-East Team

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Alexander Zaman

Tim Stefanski

Alan Orcharton

WE99 Team Vision

The team focus is providing outstanding tools to assist in analyzing the dose response characteristics potential drugs.

We will provide beautiful interactive visualization tools that will assist the scientist in:

- Creating and managing experimental plate sets for dose response experiments
- Performing quality control checks on plate results and plate controls
- Performing Interactive analysis of dose response results.

The team will store the experimental results and the analysis of the results so that the historic experimental analysis can be reviewed or reproduced at any time.

Scientists will be able to save the results for further analysis or publish their analysis, making it available to all other users.

Business Opportunity

- High throughput screening tests millions of potential drugs.
- Commercial software is expensive
- Enable Scientists to be organized and efficient when screening potential drugs.
- Dynamic analysis tools help reduce the number of experiments.
- Eliminate compounds earlier in the discovery cycle.

Presentation Outline

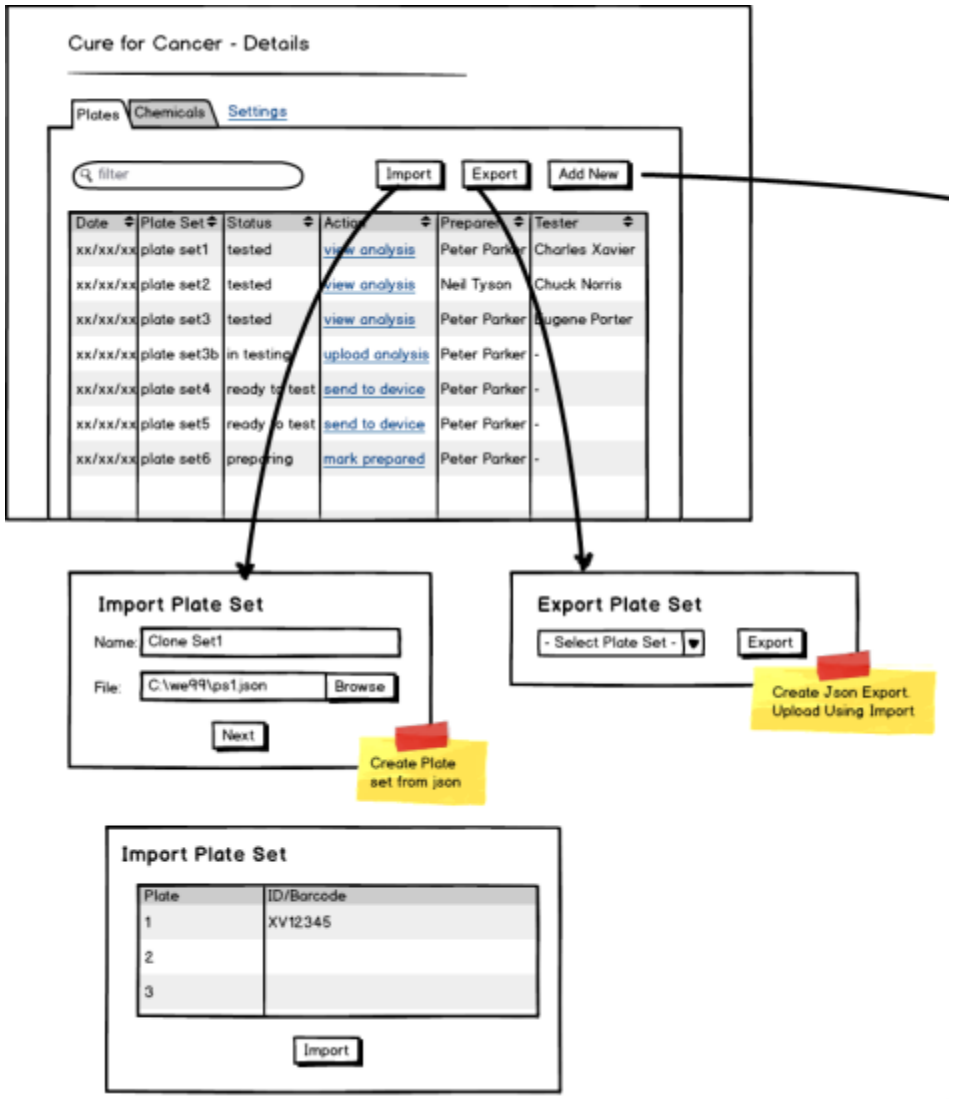
Overview of Presentation

- Plate Editing and Creation – Alex
- Results Analysis – Sean
- Architecture – Mark
- Front End / Risks – Tim
- Project Planning/Estimates - Alan

What “we99” are Delivering – Plate Map Editor

Plate Manager / Import – Export

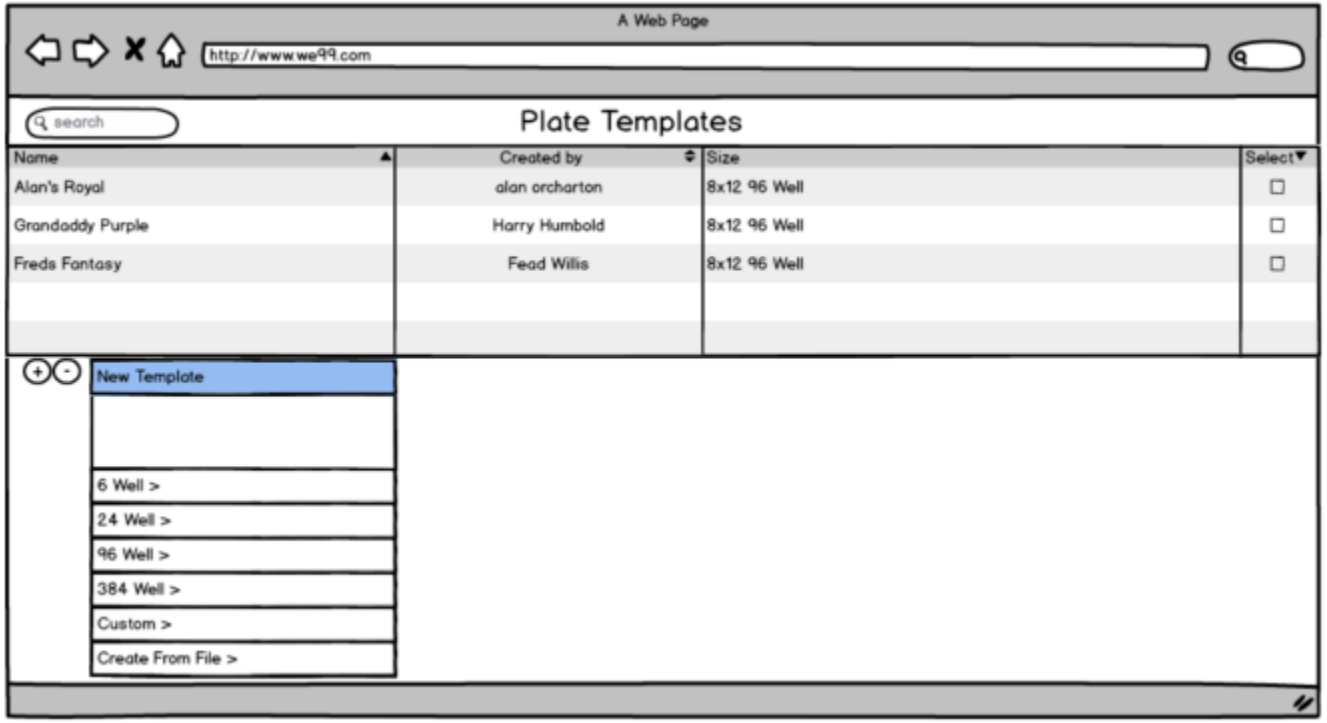
- Import to take data from json file.
- Export to put details of the plate into a json file
- Click actions to update status:
  - Mark prepared
  - Send to device
  - Upload analysis
  - View analysis



What “we99” are Delivering – Plate Map Editor

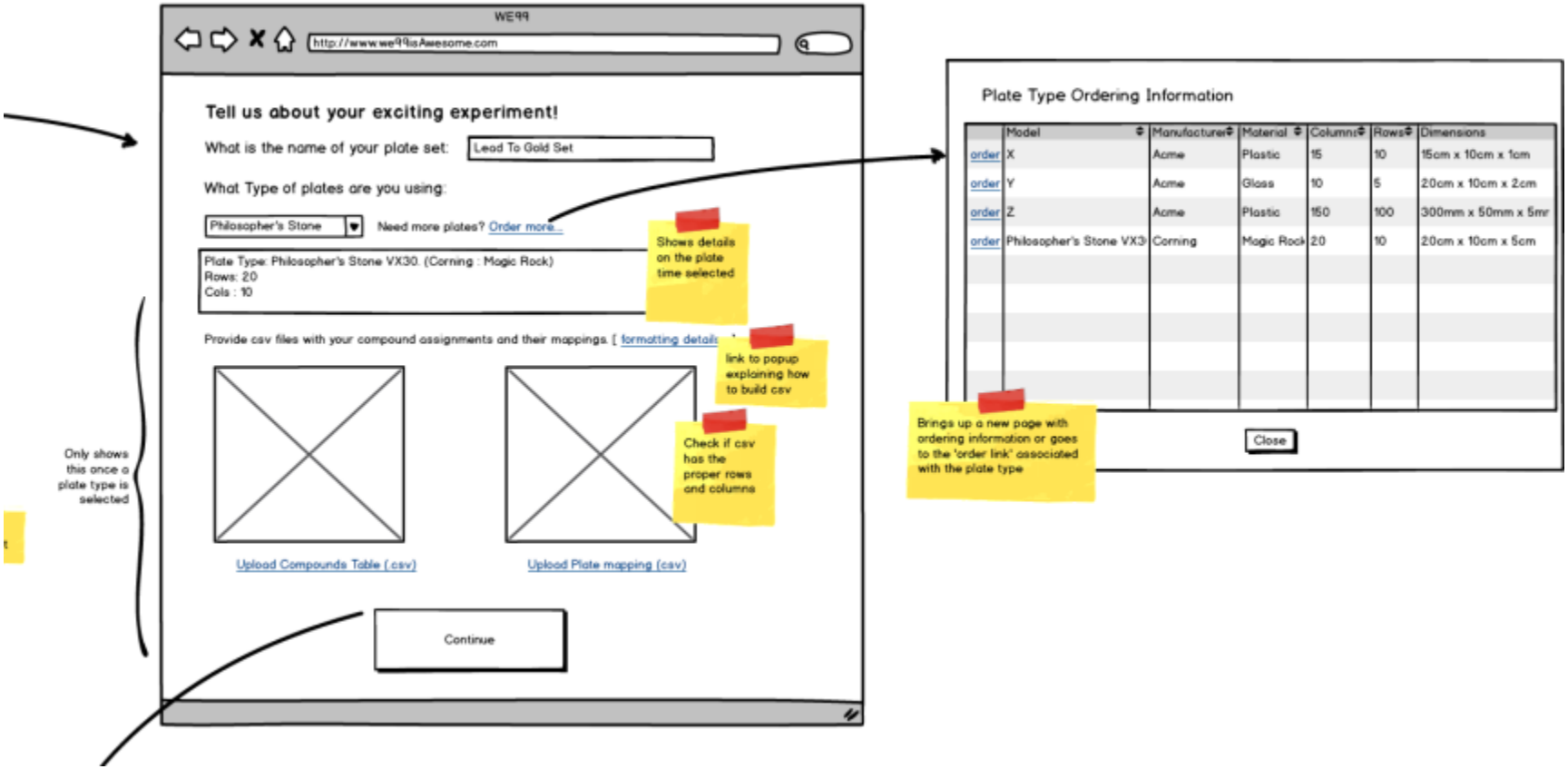
Plate Templates

- Plate are created from plate templates



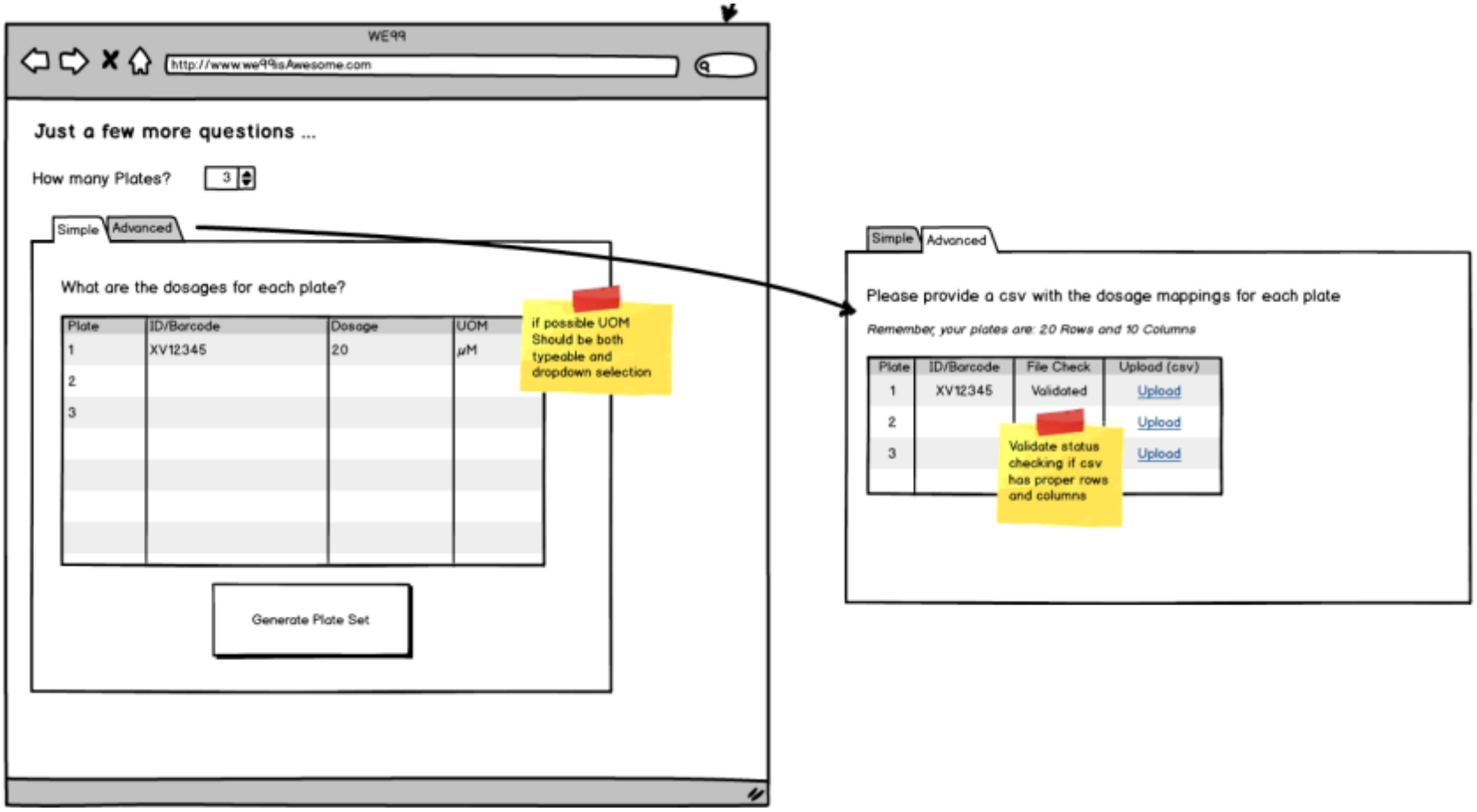
What “we99” are Delivering – Plate Map Editor

Add Plate Wizard – Part 1: Wells and Compounds



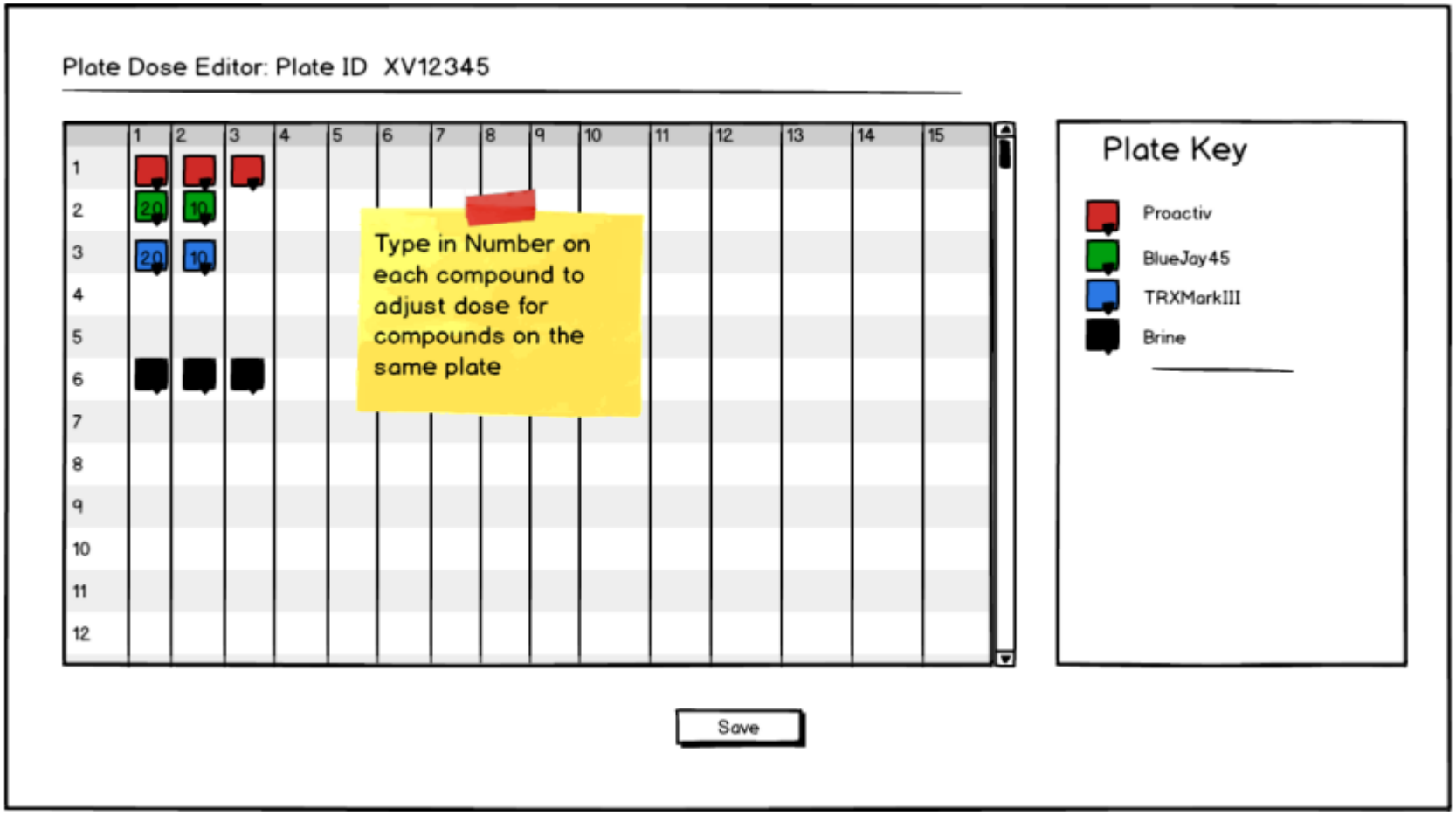
What “we99” are Delivering – Plate Map Editor

Add Plate Wizard – Part 2: Dosage

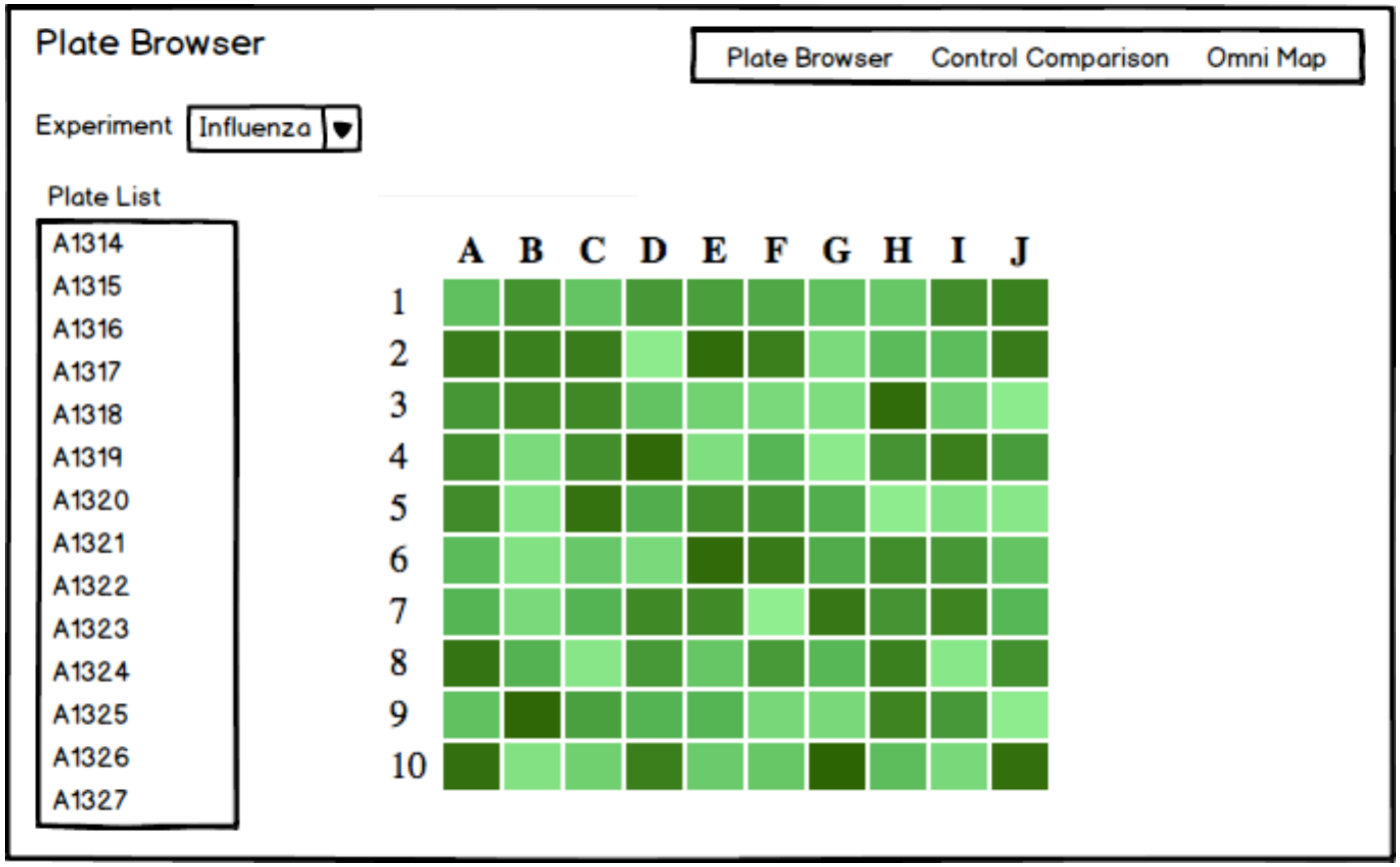


What “we99” are Delivering – Plate Map Editor

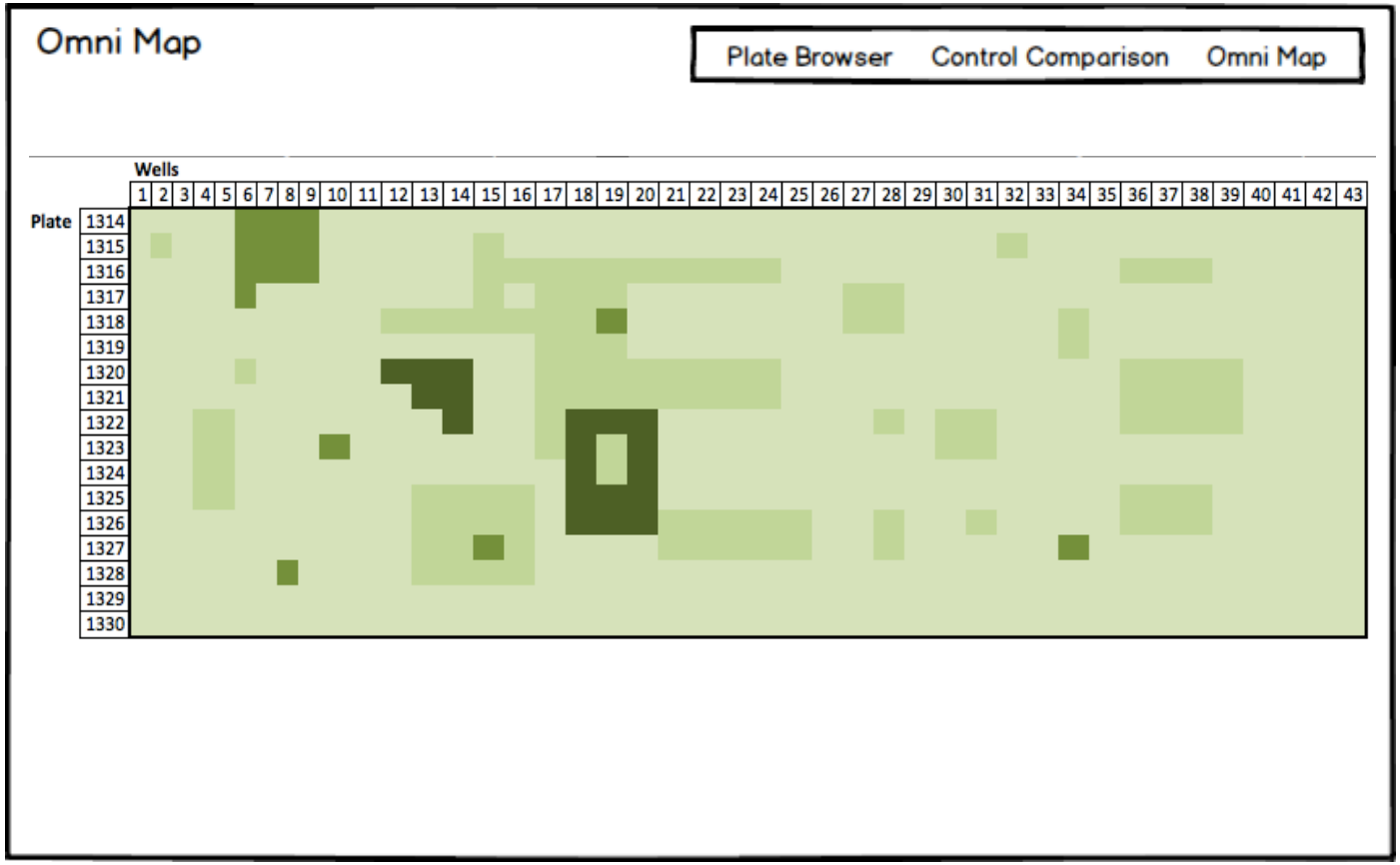
Add Plate Wizard – Plate Preview



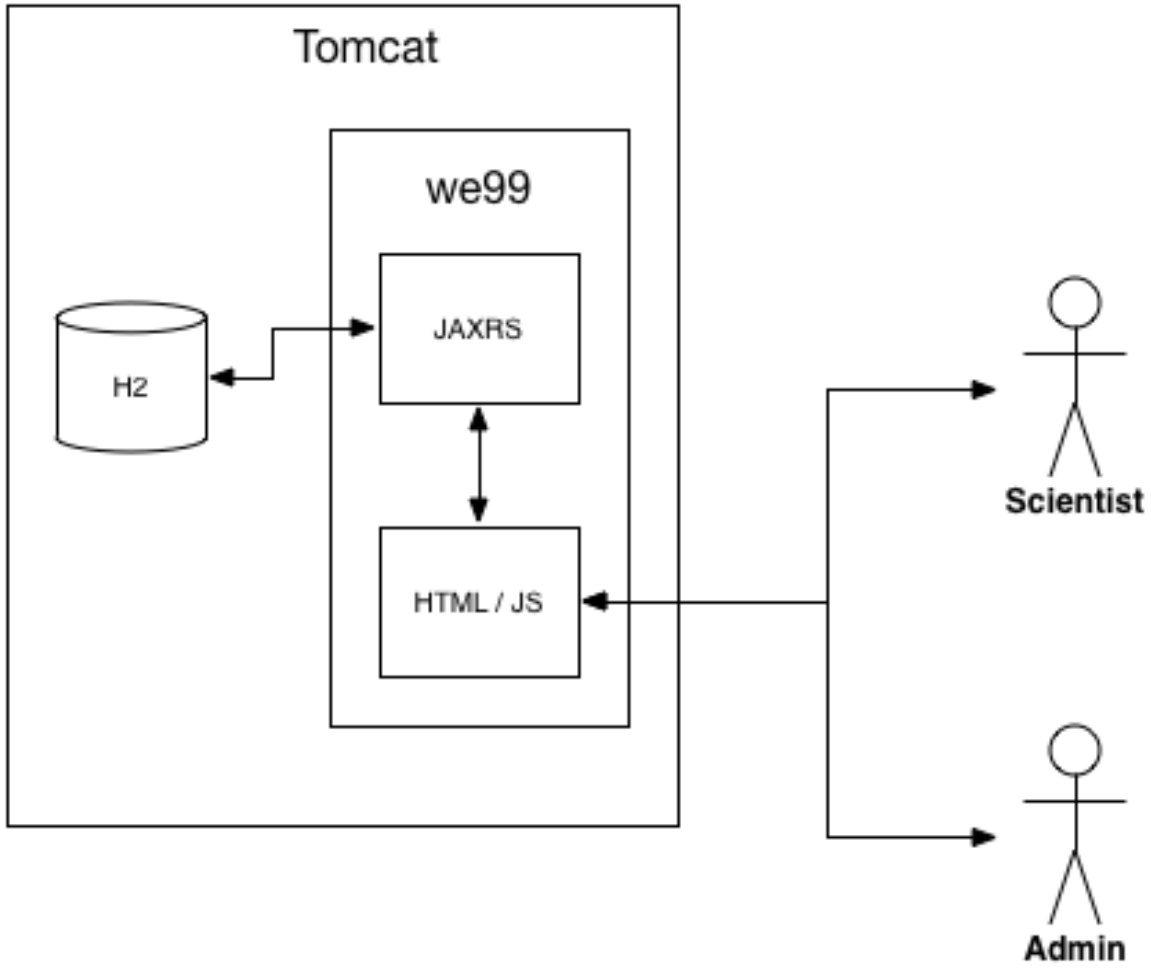
What “we99” are Delivering – Results Analysis



What we99” are Delivering – Results Analysis



System Architecture



System Architecture

Model

The domain model uses the standard JPA annotations in order to be able to create a declarative persistence layer for the application

Controller

The controller portion of the application is implemented via REST services. The service classes are implemented using the JAXRS standard specification

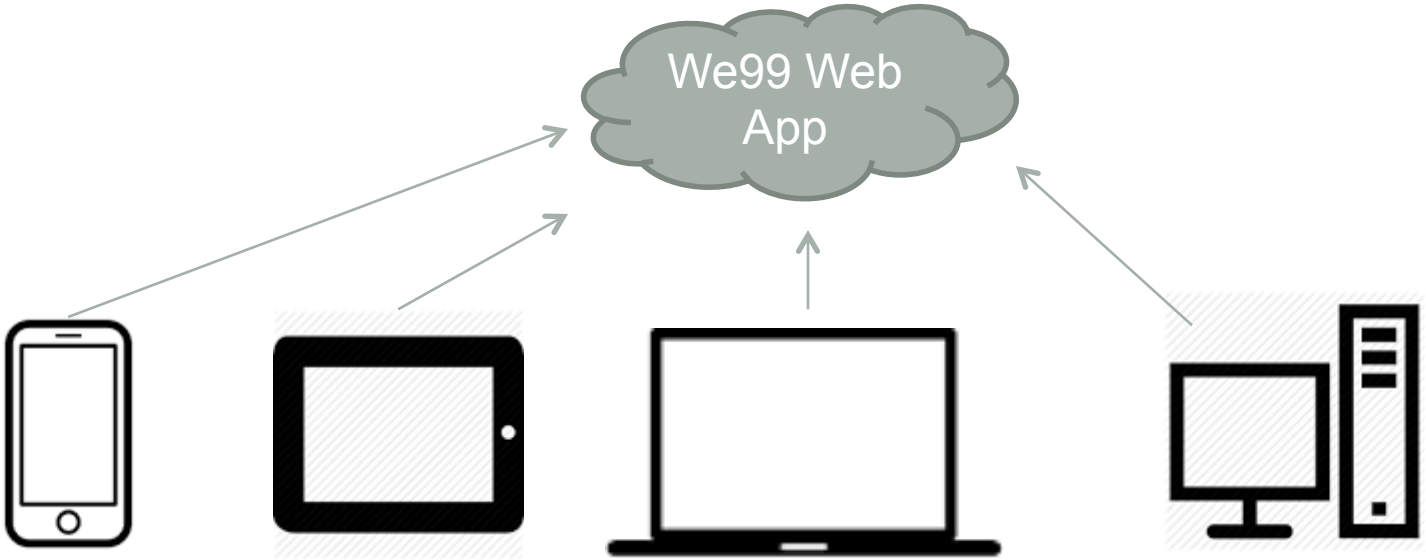
View

The view component of the application is an application based on Angular JS.

Front End – Web Thin-Client

The front-end of the West-East project is designed to be a web application that is accessible via a browser

This setup enables our application to be reachable by a wide variety of different devices and form factors, allowing a high degree of flexibility for our end users



Front End – Client Server Model

Benefits

- Multithreaded, Multi-user support

- Modern User Interface and Technologies – more code executed in Browser, reduces server load

- Architectural pattern separate development of graphical user interface from the development of business logic or back end logic. The frontend uses REST services to interact with the backend. It does not need to know how the backend processes data or stores it.

Front End - Components

HTML5
The major technology markup language of the Internet used for structuring and presenting content. HTML5 is the latest revision of the standard.

Bootstrap
A popular HTML, CSS, and JS framework for developing responsive, mobile first projects on the web

AngularJS
Popular Javascript framework for dynamic web applications developed by Google

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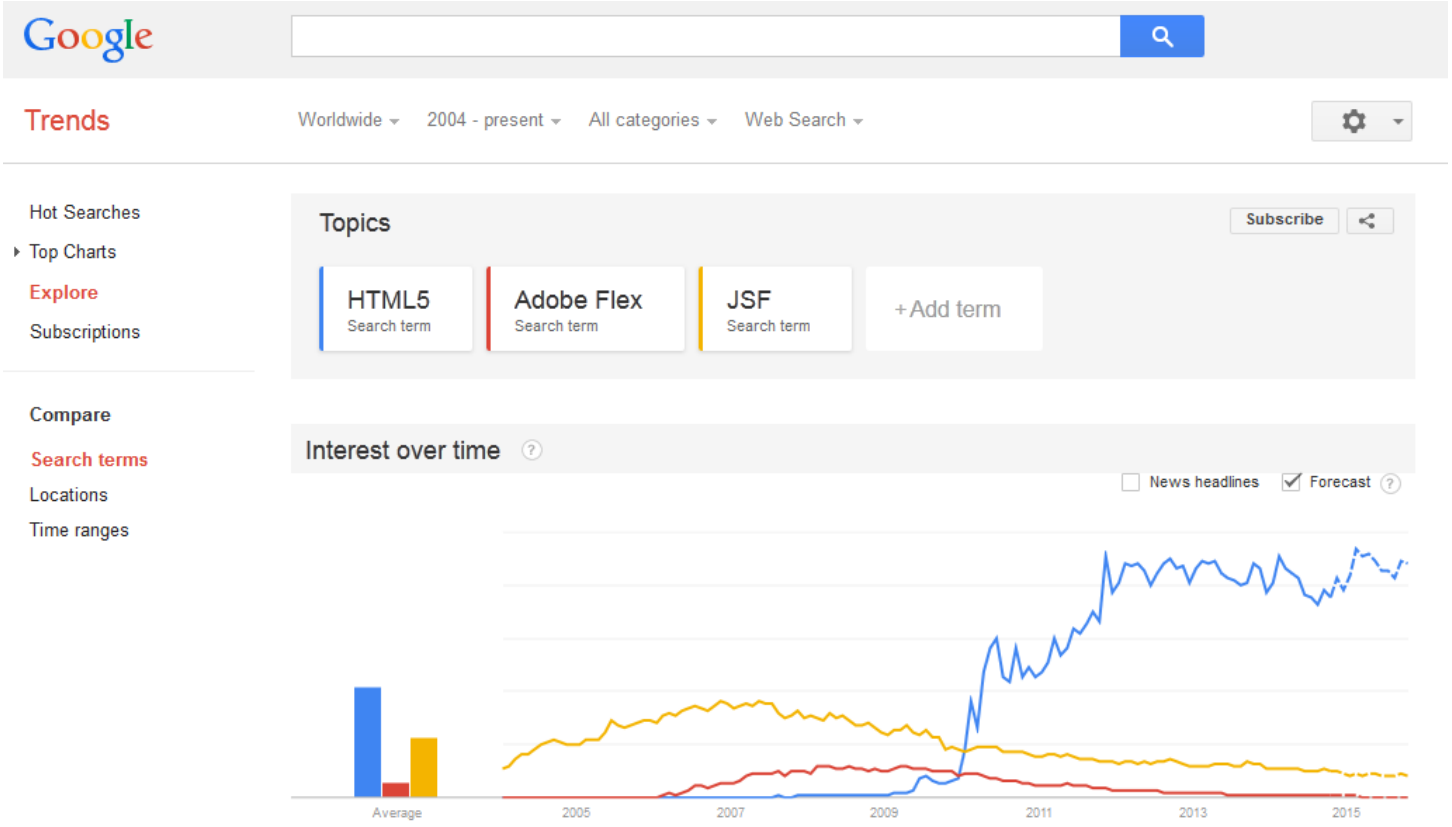
Front End – Components (con't)

JQuery
A fast, small, and feature-rich JavaScript library. It simplifies Javascript tasks like HTML document traversal and manipulation, event handling, animation, and Ajax. It also helps provide a common API for cross-browser compatibility

D3
A javascript library for displaying beautiful and interactive data graphics.

Front End – Rationale

We chose our frontend stack with an eye towards the future. HTML5 is becoming the de facto web front-end standard, in contrast to older technologies like Adobe Flex and JSF.



Front End – Build Tools

Grunt
Task tool for automating front-end jobs, such as minification, concatentation, controller unit tests, and other jobs

Bower
Dependency management tool developed by Twitter

Yeoman
Automatic code generation tool for rapid prototyping and development

Project Risks

Risks

- Integration with other teams
  - Design meetings with other teams planned
- Stories take longer that estimated
  - Keep a burn-up chart and prioritize stories
- Getting of Good Test Data
  - Professor and TA may be able to get more

- Testing Strategy
  - Test Driven Design

Project Planning – Team / Tools

Division of Labor

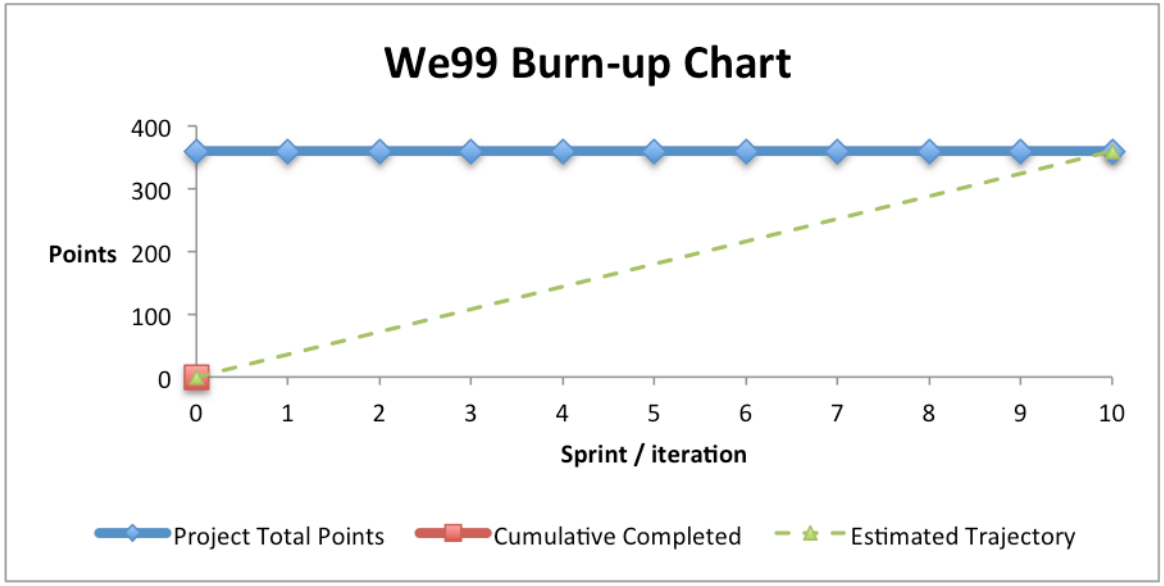
- 3 People specializing in Front End work
- 2 People specializing in Back End work

Collaborative Tools

- Slack (messaging)
- Git Hub Repository
- JIRA

Project Planning

- 10 Iterations
- 360 Story Points (Project Estimate 720 Hours)
- Burn-up Calculated weekly



Key Milestones

- Milestone 2 Deliverables
  - Screen Process Flow
  - Domain Model
  - Web Service Interfaces
  - Plate Map Editor
  - Web Services for Plate Editor
  - Web Services for QC Results
  - Heat Maps
  - QC Plates / Experiments
- Milestone 3 Deliverables
  - Interactive Analysis
  - Interactive Dose Response Analysis
  - Save or Publish