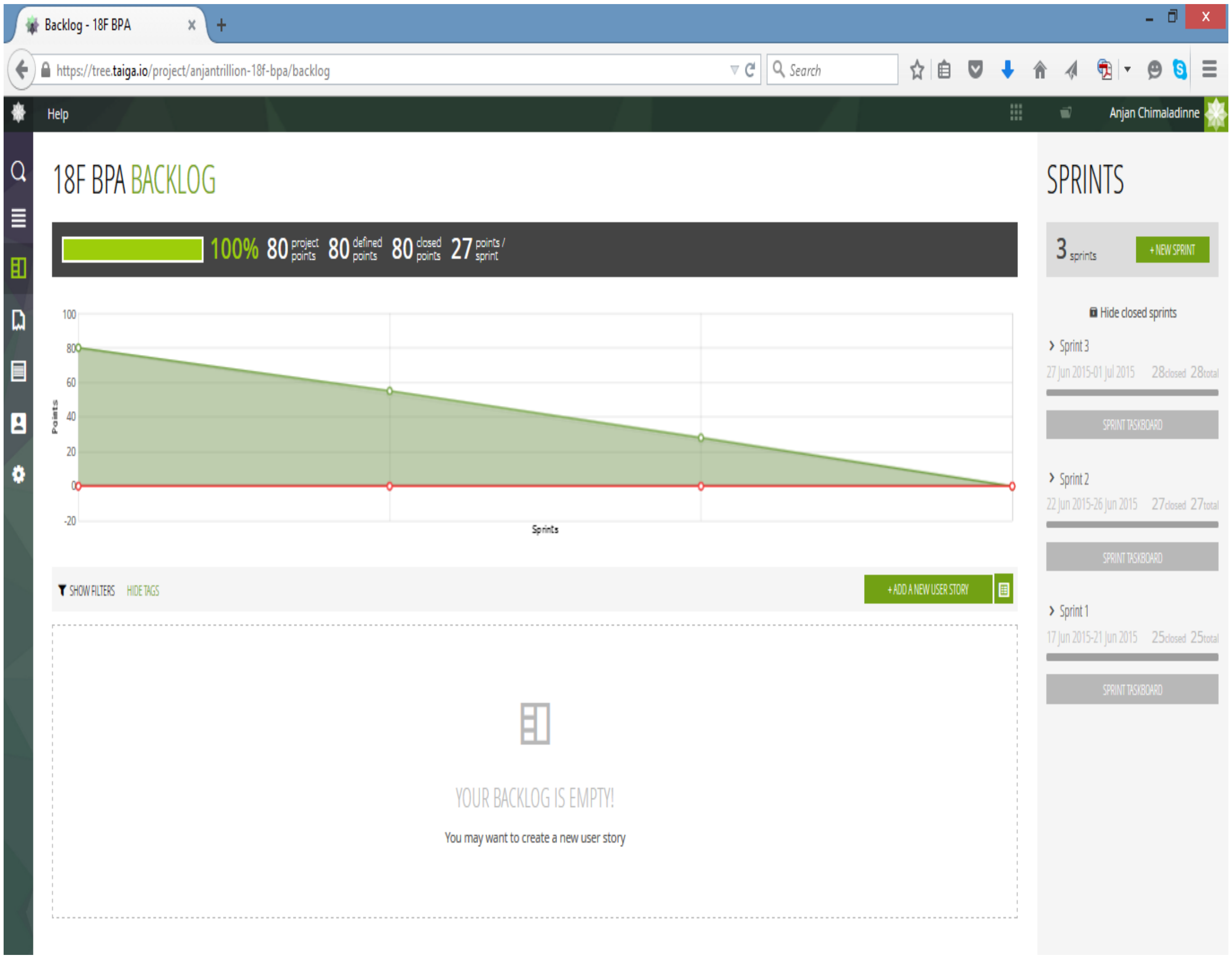
Trillion's Agile Software Development Approach for Design and Development

Based on Trillion's expertise in successfully implementing Agile and Scrum software development approach on mission critical applications both in government and commercial space (e.g., Department of Homeland Security's (DHS's) Enterprise Applications Development Integration and Sustainment (EADIS) and Corporation Service Company's (CSC's) Detection Console Platform (DCP)), we are incorporating Agile/Scrum approach to design and develop Agile Delivery Services (ADS I) prototype. Our release plan is as follows – (1) Sprint 1: 6/17-6/21, (2) Sprint 2: 6/22-6/26, and (3) Sprint 3: 6/27-7/1. We are leveraging Taiga, an open source Agile Application Lifecycle Management (ALM) platform, to track our Sprints, Backlog, Tasks, and issues – following screen shots are the artifacts.



18F BPA BACKLOG

100% 80 project points 80 defined points 80 closed points 27 points / sprint

YOUR BACKLOG IS EMPTY!

You may want to create a new user story

SPRINTS

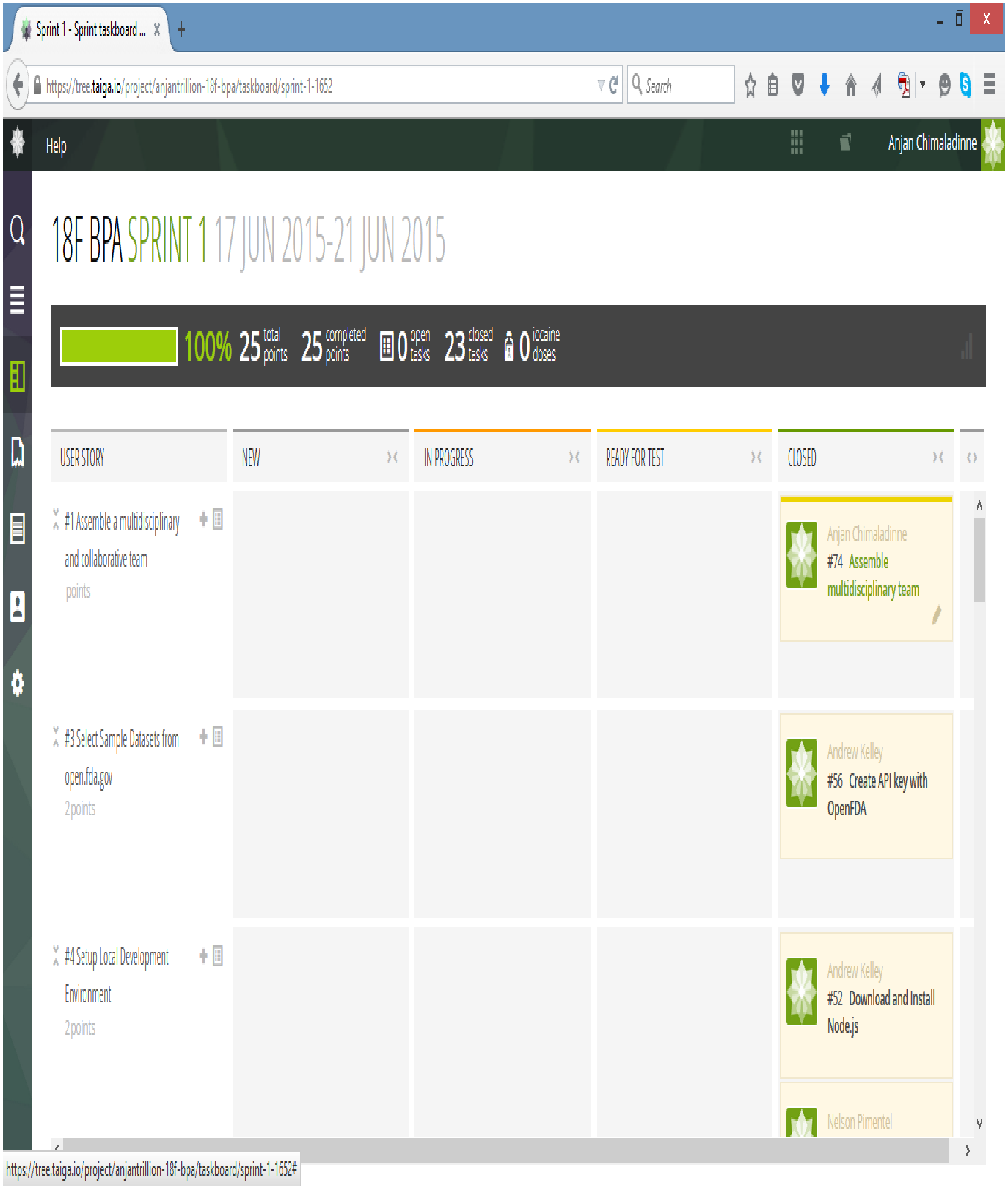
3 sprints

Sprint 3
27 Jun 2015-01 Jul 2015 28 closed 28 total

Sprint 2
22 Jun 2015-26 Jun 2015 27 closed 27 total

Sprint 1
17 Jun 2015-21 Jun 2015 25 closed 25 total

Figure 1 – Overall release plan



Sprint 1 - Sprint taskboard ...

https://tree.taiga.io/project/anjantrillion-18f-bpa/taskboard/sprint-1-1652

Help

Anjan Chimaladinne

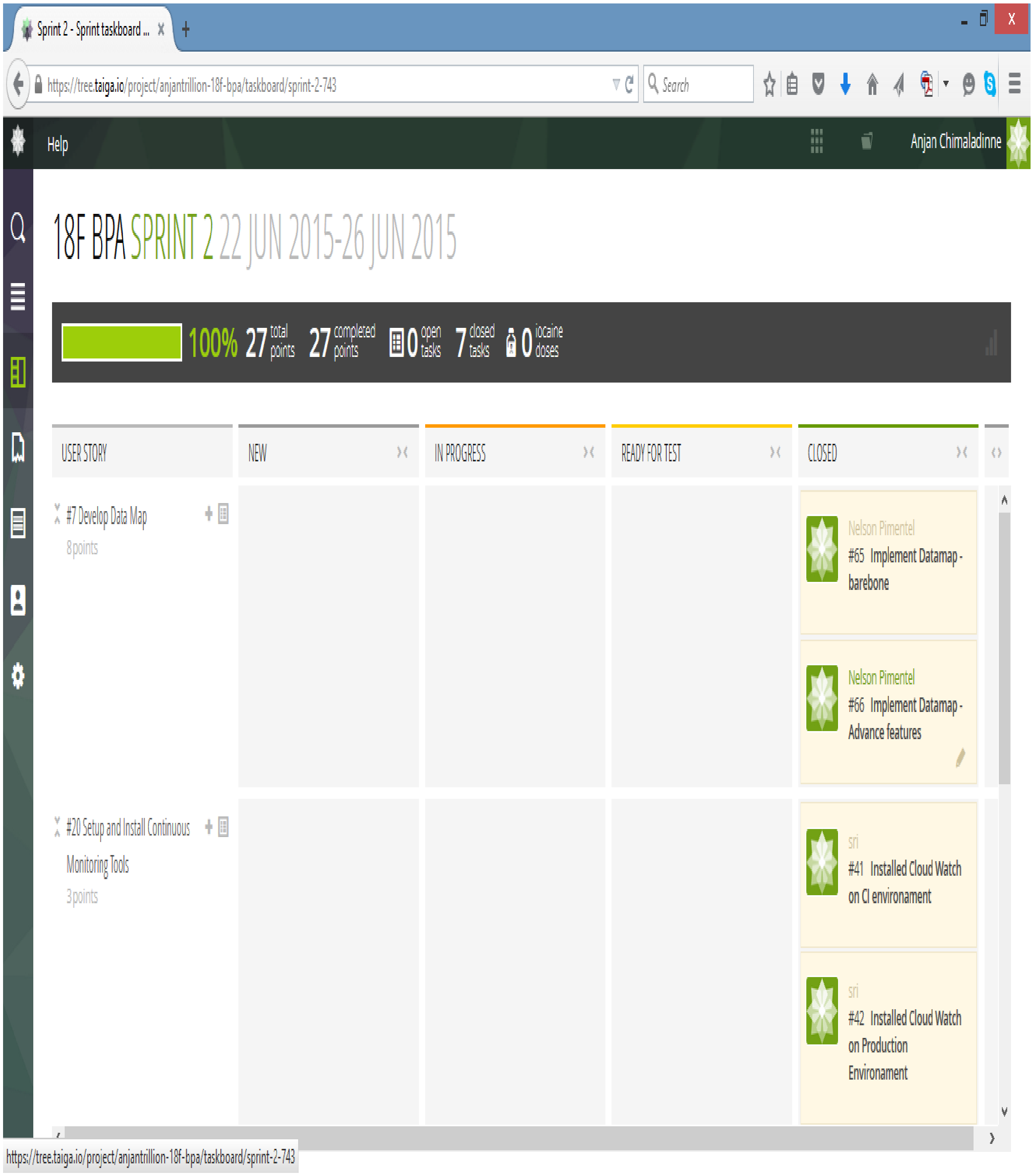
18F BPA SPRINT 1 17 JUN 2015-21 JUN 2015

100% 25 total points 25 completed points 0 open tasks 23 closed tasks 0 iocaine doses

USER STORY	NEW	IN PROGRESS	READY FOR TEST	CLOSED
#1 Assemble a multidisciplinary and collaborative team points				Anjan Chimaladinne #74 Assemble multidisciplinary team
#3 Select Sample Datasets from open.fda.gov 2points				Andrew Kelley #56 Create API key with OpenFDA
#4 Setup Local Development Environment 2points				Andrew Kelley #52 Download and Install Node.js Nelson Pimentel

https://tree.taiga.io/project/anjantrillion-18f-bpa/taskboard/sprint-1-1652#

Figure 2 – Sprint 1 Artifact


Sprint 2 - Sprint taskboard ...

https://tree.taiga.io/project/anjantrillion-18f-bpa/taskboard/sprint-2-743

Help

Anjan Chimaladinne

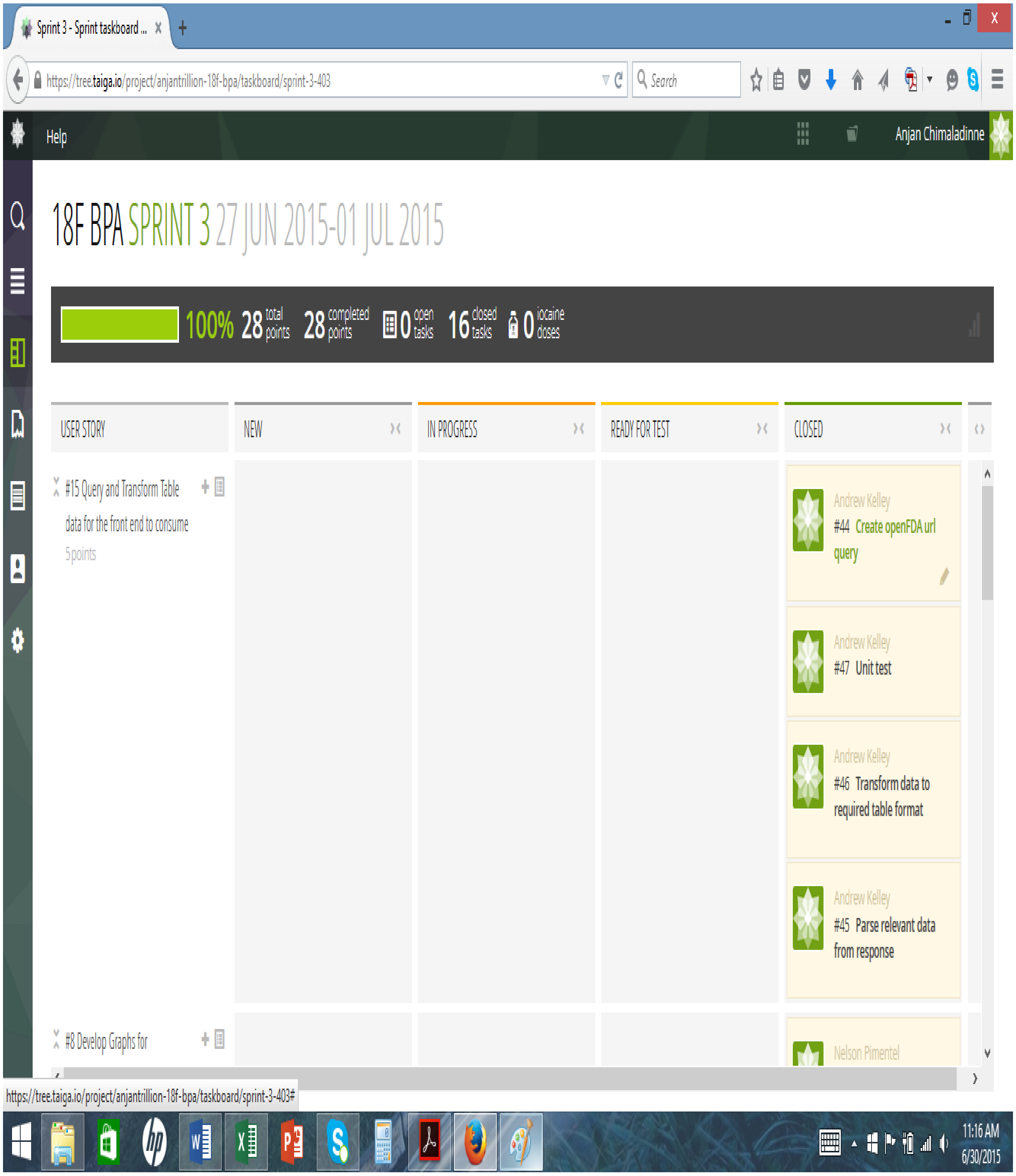
18F BPA SPRINT 2 22 JUN 2015-26 JUN 2015

100% 27 total points 27 completed points 0 open tasks 7 closed tasks 0 iocaine doses

USER STORY	NEW	IN PROGRESS	READY FOR TEST	CLOSED
#7 Develop Data Map 8points				Nelson Pimentel #65 Implement Datamap - barebone; Nelson Pimentel #66 Implement Datamap - Advance features
#20 Setup and Install Continuous Monitoring Tools 3points				sri #41 Installed Cloud Watch on CI environament; sri #42 Installed Cloud Watch on Production Environament

https://tree.taiga.io/project/anjantrillion-18f-bpa/taskboard/sprint-2-743

Figure 3 – Sprint 2 Artifact


Sprint 3 - Sprint taskboard ...

https://tree.taiga.io/project/anjantrillion-18f-bpa/taskboard/sprint-3-403

Help

Anjan Chimaladinne

18F BPA SPRINT 3 27 JUN 2015-01 JUL 2015

100% 28 total points 28 completed points 0 open tasks 16 closed tasks 0 iocaine doses

USER STORY	NEW	IN PROGRESS	READY FOR TEST	CLOSED
#15 Query and Transform Table data for the front end to consume 5 points				Andrew Kelley #44 Create openFDA url query; Andrew Kelley #47 Unit test; Andrew Kelley #46 Transform data to required table format; Andrew Kelley #45 Parse relevant data from response
#8 Develop Graphs for				Nelson Pimentel

https://tree.taiga.io/project/anjantrillion-18f-bpa/taskboard/sprint-3-403#

11:16 AM 6/30/2015

Figure 4 – Sprint 3 Artifact

Trillion's Technical Approach for the Design and Development

The diagram below illustrates high-level architecture for Trillion's 18F prototype. The Business Tier is based on Trillion's Intelligence Management Platform (TIMP). The Business Tier houses the core backend logic for the system and exposes its functionality through REpresentational State Transfer (REST) based webservices. TIMP consists on the Integration Tier component that has capabilities to invoke external services, databases, LDAP etc. The Presentation Tier provides a web based user interface that accesses TIMP using REST webservices. For the purposes of the 18F prototype, no data tier components have been used. Typically, depending on the

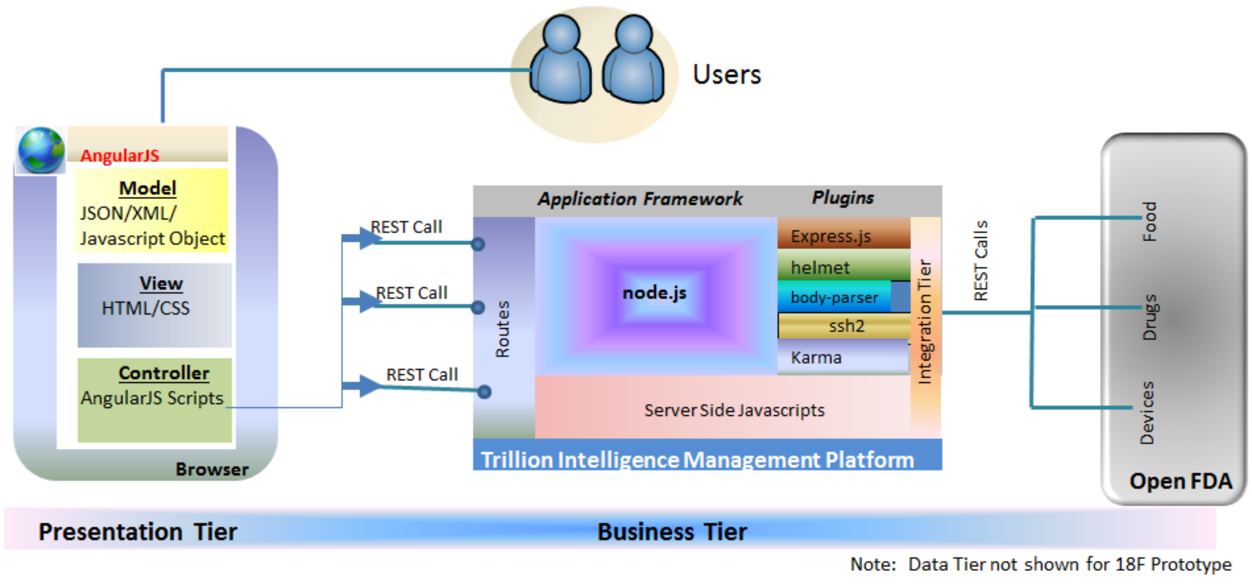


Figure 5 – High Level Architecture

requirements, TIMP provides easy integration with SQL and NoSQL based databases for a complete analytics solution.

Trillion's 18F prototype is implemented using lean, agile, open source technology stack. The Business Tier uses scaled down version of Trillion Intelligence Management Platform (TIMP) that is completely based on JavaScript technologies. Following is a list of Presentation tier and Business Tier technologies used:

Presentation Tier Technology	Comments	Business Tier Technology	Comments
Angular.js	Structural framework to build dynamic web pages	Node.js	Node.js is an open source, cross-platform runtime environment for server-side and networking applications. Node.js

Presentation Tier Technology	Comments	Business Tier Technology	Comments
			applications are written in JavaScript.
D3.js	D3 for Data-Driven Documents) is a JavaScript [1]library for producing dynamic, interactive data visualizations in web browsers	Express.JS	ExpressJS is a framework of Node.js that allows one to use several very useful and powerful features without having to reinvent the wheel, helps organize application's routing and use any templating solution with minimal effort.
Bootstrap	An html, css, JavaScript framework that you can use as basis for creating web sites or web applications	Forever	Allows a script to be run continuously.
Awesome Fonts	Font and CSS toolkit	Helmet	Helps lock down and secure our web applications.
		Body-Parser	Node.js body parsing middleware
		Compression	Helps compress data exchanged between different tiers.
		glob	File pattern matching package
		Request	HTTP request client
		Karma	Test driven development
		Jasmine	package that contains helper code for developing and running tests for node-based projects

Express.JS uses the concept of 'Routes'. Routing refers to determining how an application responds to a client request to a particular endpoint or URI. Each route can have one or more handler functions, which is/are executed when the route is matched. TIMP exposes endpoints to request data for Open FDA's Device, Food and Drug related data. The handler functions invoke appropriate webservices exposed by Open FDA, process the data and send the response to requestor.

[1]

The Presentation Tier utilizes the Model-View-Controller pattern based on the Angular.JS framework. Since there were no Authentication/Authorization requirements, Trillion's 18F prototype has disabled this logic but these components can be easily enabled as and when required. Figure 6 below illustrates the development/deployment diagram for Trillion's 18F prototype.

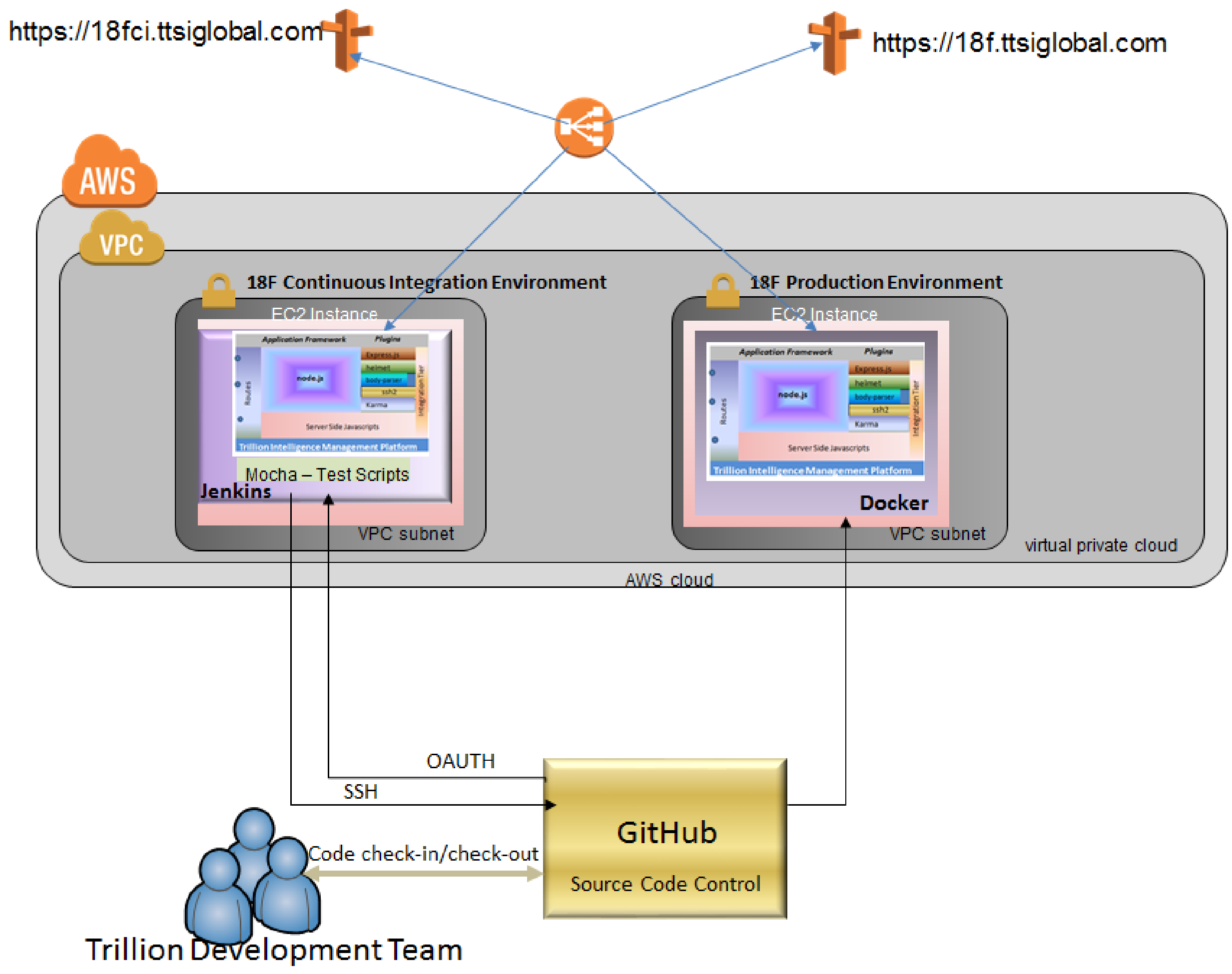


Figure 6 – Development and Deployment of Prototype

GitHub is used as the Source code repository. Two Amazon Webservice EC2 instances, one serving as the continuous integration and test server and the other serving as the Production server, are deployed in separate subnets to firewall Production and test environments. The continuous integration server, using Jenkins, checks out the latest code on a continuous basis, builds it and deploys the code. Mocha test framework is utilized for running automated test scripts.

The Production Server utilizes Docker container. Docker allows an application to be packaged with all of its dependencies into a standardized unit for software development. Docker containers wrap up a piece of software in a complete file system that contains everything it needs to run: code, runtime, system tools, and system libraries – anything you can install on a server. This guarantees that it will always run the same, regardless of the environment it is running in. The designated stable version of the code from GitHub is used for in the Production server.