

Team 6 – Predicting Potential Patient Issue – Iteration 1 Report

Joseph Doonis, Jonas Fornehed, Jacob Hill,
Timothy Kelley, Amanda McGuire, Robert McKay

2021-12-06

Summary of what was completed by the team during the last iteration

- What stories were planned? Completed? Are still in progress?

The team completed most of the stories assigned for iteration 1. Some of the spikes, namely ones involving research, will continue into future iterations. The story for training a machine learning model will also continue into the next iteration and possibly further. For the next sprint planning session, the team will split this story during backlog grooming. The stories completed this iteration focused on designing a mockup for the user interface, implementing backend services to facilitate user accounts, and initial training of the model for machine learning. Story details listed below:

Mockup source: <https://www.figma.com/file/Sx43hNW5BnJZrBfuQrMpNj/Predicting-Patient-issues-App-Mockup?node-id=0%3A1>

Planned (45 story points)

- **Medical professional log in:** As a medical professional, I need to log in to my account with my username and password so that I can access patient information in the application.
 - o Jacob Hill
- **Create data diagram:** As a developer, I want to make a diagram for how the data will flow through the frontend, API, and database so that I can reference this during development.
 - o Timothy Kelley
- **Create a mockup home screen:** As a developer, I need to create a mockup for the home screen of our application so that the customer can get a good idea of our concept and redirect us if need be.
 - o Amanda McGuire
- **Create a mockup notification center:** As a developer, I need to create a mockup for the notification center of our application so that the customer can get a good idea of our concept and redirect us if need be.
 - o Amanda McGuire
- **Create a mockup patient profile:** As a developer, I want to create a mockup of the patient profile UI so that I have a basis on what the final product will look like for myself and the stakeholders.
 - o Amanda McGuire

- **Create a mockup associate profile:** As a developer, I want to create a mockup of the associate profile UI so that I have a basis on what the final product will look like for myself and the stakeholders.
 - o Amanda McGuire
- **Create mockup login screen:** As a developer, I need to create a mockup for the login screen of our application so that the customer can get a good idea of our concept and redirect us if need be.
 - o Amanda McGuire
- **Delete an entry from the user table:** As a developer, I want to delete an entry from the user table via python APIs so that I can remove a user from the database.
 - o Robert McKay, Jacob Hill
- **Read data from the user table:** As a developer, I want to read data from the user table with python APIs so that I can retrieve information from the table.
 - o Robert McKay, Jacob Hill
- **Connect to the backend database with python APIs:** As a developer, I want to connect to a database on the server with a python APIs so that I can create CRUDs for tables in the database.
 - o Timothy Kelley
- **Update an entry in the user table:** As a developer, I want to be able to update an entry in the user table using python API's so that end users can change their name/password.
 - o Robert McKay, Jacob Hill
- **Create an entry in the user table:** As a developer, I want to be able to create an entry in the user table with python APIs so that end users can have accounts.
 - o Robert McKay, Jacob Hill
- **Create database table for users:** As a developer, I want to create a database table that will store user credentials so that they can log in securely.
 - o Joseph Doonis
- **Create a database for persistent storage of user data:** As a developer, I want to create postgres database on the server so that the front end can store user information.
 - o Joseph Doonis
- **Install & Configure NetExtender VPN:** As a software developer, I need to install and configure NetExtender VPN so that I can access the remote TN Tech server off-campus.
 - o Everyone
- **Train Python Machine Learning Model:** As a software developer, I need to train a python machine learning model that can accurately (>90%) predict if a patient is going to code/crash and make it accessible to the python webserver.
 - o Jonas Fornehed, Joseph Doonis, Jacob Hill
- **Acquire TN Tech Server:** As a software developer, I need to acquire a TN Tech server with at least 100 GB of data so that I can store project files, datasets, and development code for the whole team.
 - o Robert McKay

- **Download & Build eICU Dataset – PostgreSQL:** As a software developer, I need to download and build the eICU dataset databases on PostgreSQL so that I can begin looking through the data.
 - o Timothy Kelley
- **Learn more about PostgreSQL:** As a developer, I want to learn more about PostgreSQL so I can use the test databases more efficiently.
 - o Everyone
- **Learn about python machine learning:** As a developer, I want to learn how to use python for machine learning so I can help with the creation of the machine learning model.
 - o Everyone
- **Learn about data encryption:** As a developer, I want to learn how to encrypt patient data so I can make sure patient data is secure.
 - o Everyone
- **Learn about HIPAA compliance:** As a developer, I want to learn more about HIPAA compliance so the software stays HIPAA compliant.
 - o Everyone
- **Add models of database schema to API:** As a developer, I want to utilize model objects representing database tuples from each table so I can train the machine learning model.
 - o Timothy Kelley
- **Web Token Authentication:** As a developer, I want to manage and enforce API security through the use of tokens, so only those who are authorized can access data.
 - o Timothy Kelley, Jacob Hill, Robert McKay

Completed (30 story points)

- **Medical professional log in:** As a medical professional, I need to log in to my account with my username and password so that I can access patient information in the application.
 - o Jacob Hill
- **Create data diagram:** As a developer, I want to make a diagram for how the data will flow through the frontend, API, and database so that I can reference this during development.
 - o Timothy Kelley
- **Create mockup home screen:** As a developer, I need to create a mockup for the home screen of our application so that the customer can get a good idea of our concept and redirect us if need be.
 - o Amanda McGuire
- **Create mockup notification center:** As a developer, I need to create a mockup for the notification center of our application so that the customer can get a good idea of our concept and redirect us if need be.
 - o Amanda McGuire
- **Create mockup login screen:** As a developer, I need to create a mockup for the login screen of our application so that the customer can get a good idea of our concept and redirect us if need be.

- Amanda McGuire
- **Create a mockup patient profile:** As a developer, I want to create a mockup of the patient profile UI so that I have a basis on what the final product will look like for myself and the stakeholders.
 - Amanda McGuire
- **Create a mockup associate profile:** As a developer, I want to create a mockup of the associate profile UI so that I have a basis on what the final product will look like for myself and the stakeholders.
 - Amanda McGuire
- **Delete an entry from the user table:** As a developer, I want to delete an entry from the user table via python APIs so that I can remove a user from the database.
 - Robert McKay, Jacob Hill
- **Read data from the user table:** As a developer, I want to read data from the user table with python APIs so that I can retrieve information from the table.
 - Robert McKay, Jacob Hill
- **Connect to the backend database with python APIs:** As a developer, I want to connect to a database on the server with a python APIs so that I can create CRUDs for tables in the database.
 - Timothy Kelley
- **Update an entry in the user table:** As a developer, I want to be able to update an entry in the user table using python API's so that end users can change their name/password.
 - Robert McKay, Jacob Hill
- **Create an entry in the user table:** As a developer, I want to be able to create an entry in the user table with python APIs so that end users can have accounts.
 - Robert McKay, Jacob Hill
- **Create database table for users:** As a developer, I want to create a database table that will store user credentials so that they can log in securely.
 - Joseph Doonis
- **Create a database for persistent storage of user data:** As a developer, I want to create postgres database on the server so that the front end can store user information.
 - Joseph Doonis
- **Install & Configure NetExtender VPN:** As a software developer, I need to install and configure NetExtender VPN so that I can access the remote TN Tech server off-campus.
 - Everyone
- **Acquire TN Tech Server:** As a software developer, I need to acquire a TN Tech server with at least 100 GB of data so that I can store project files, datasets, and development code for the whole team.
 - Robert McKay
- **Download & Build eICU Dataset – PostgreSQL:** As a software developer, I need to download and build the eICU dataset databases on PostgreSQL so that I can begin looking through the data.
 - Timothy Kelley

- **Configure Python 3:** As a software developer, I need to install python version 3 and pip package manager on the server so that I can download and install the python requirements and run the fast-api backend API service.
 - o Jacob Hill
- **Select all roles:** As a developer, I want to be able to select all rows from the roles table in the userinfo database via fastapi so that the frontend can display all current roles to the user.
 - o Robert McKay
- **Delete a role:** As a developer, I want to be able to delete a role from the roles table in the userinfo database via fastapi so that the frontend can remove a role.
 - o Robert McKay
- **Add new role:** As a developer, I want to be able to insert a new role to the roles relation in the userinfo database via fastapi so that the frontend can add roles to the app.
 - o Robert McKay
- **Login Authentication API Function:** As a developer, I want to authenticate a user's login through a FastAPI function so authenticated users can access the web app.
 - o Timothy Kelley, Robert McKay, Jacob Hill
- **Create fast API:** As a developer, I want to implement a service using fast api so I can connect the database backend with the UI.
 - o Robert McKay
- **Add models of database schema to API:** As a developer, I want to utilize model objects representing database tuples from each table so I can train the machine learning model.
 - o Timothy Kelley

Still in progress (15 story points)

- **Learn more about PostgreSQL:** As a developer, I want to learn more about PostgreSQL so I can use the test databases more efficiently.
 - o Everyone
- **Learn about python machine learning:** As a developer, I want to learn how to use python for machine learning so I can help with the creation of the machine learning model.
 - o Everyone
- **Learn about data encryption:** As a developer, I want to learn how to encrypt patient data so I can make sure patient data is secure.
 - o Everyone
- **Learn about HIPAA compliance:** As a developer, I want to learn more about HIPAA compliance so the software stays HIPAA compliant.
 - o Everyone
- **Train Python Machine Learning Model:** As a software developer, I need to train a python machine learning model that can accurately (>90%) predict if a patient is going to code/crash and make it accessible to the python webserver.
 - o Jonas Fornehed, Joseph Doonis, Jacob Hill

- **New stories and story points added since beginning of iteration**

Stories added (17 story points)

- **Configure Python 3:** As a software developer, I need to install python version 3 and pip package manager on the server so that I can download and install the python requirements and run the fast-api backend API service.
 - o Jacob Hill
- **Select all roles:** As a developer, I want to be able to select all rows from the roles table in the userinfo database via fastapi so that the frontend can display all current roles to the user.
 - o Robert McKay
- **Delete a role:** As a developer, I want to be able to delete a role from the roles table in the userinfo database via fastapi so that the frontend can remove a role.
 - o Robert McKay
- **Add new role:** As a developer, I want to be able to insert a new role to the roles relation in the userinfo database via fastapi so that the frontend can add roles to the app.
 - o Robert McKay
- **Login Authentication API Function:** As a developer, I want to authenticate a user's login through a FastAPI function so authenticated users can access the web app.
 - o Timothy Kelley, Robert McKay, Jacob Hill
- **Create fast API:** As a developer, I want to implement a service using fast api so I can connect the database backend with the UI.
 - o Robert McKay
- **Add models of database schema to API:** As a developer, I want to utilize model objects representing database tuples from each table so I can train the machine learning model.
 - o Timothy Kelley

What stories are in the iteration backlog for the next iteration? How has this changed for what was originally planned? Include the number of points to be attempted.

- **Iteration backlog for next iteration:**

The stories planned for the next iteration will focus on developing the machine learning model, implementing the frontend features from the mockup, and providing any necessary backend services to facilitate the proceeding aspects of the project. During the backlog planning for iteration 1, the remaining stories were not assigned to any iteration, so the original plan did not necessarily change. The team has added some stories for implementation of the frontend and, after initial development of the machine learning model, identified some specific stories to add regarding model training and data processing. The currently planned stories for iteration 2, listed below, will most

likely change during the next sprint planning, but provide a general idea of the team's direction for the upcoming sprint.

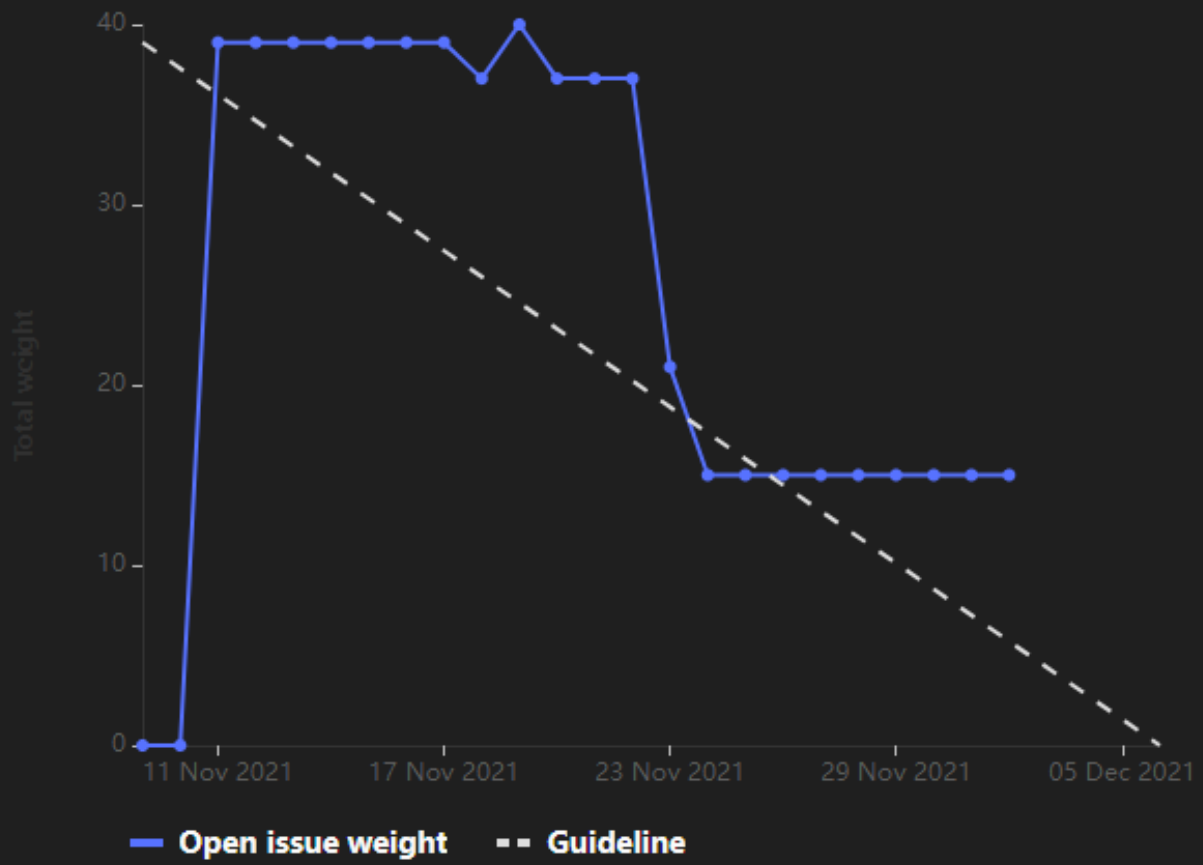
Planned (40 story points)

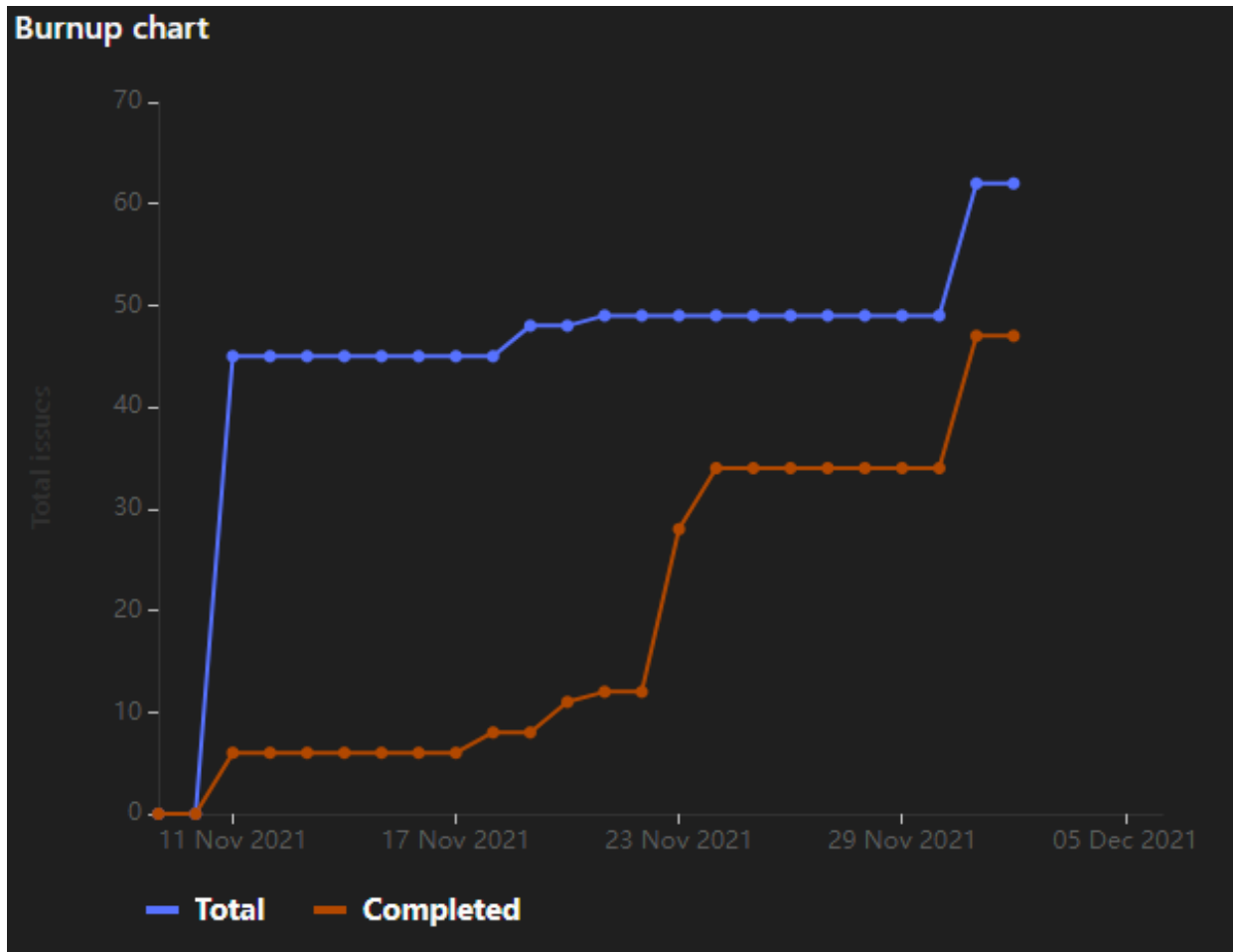
- **Enter patient data:** As a medical provider, I want to be able to enter patient data into the UI so the system can predict patient events.
- **Configure python webserver:** As a software developer, I want to configure a python webserver for the deployment of the project.
- **Learn more about PostgreSQL:** As a developer, I want to learn more about PostgreSQL so I can use the test databases more efficiently.
- **Learn about python machine learning:** As a developer, I want to learn how to use python for machine learning so I can help with the creation of the machine learning model.
- **Learn about data encryption:** As a developer, I want to learn how to encrypt patient data so I can make sure patient data is secure.
- **Learn about HIPAA compliance:** As a developer, I want to learn more about HIPAA compliance so the software stays HIPAA compliant.
- **Train Python Machine Learning Model:** As a software developer, I need to train a python machine learning model that can accurately (>90%) predict if a patient is going to code/crash and make it accessible to the python webserver.
- **Encrypt patient data:** As a developer, I want to learn how to encrypt patient data so I can make sure patient data is secure.
- **API route for machine learning:** As a developer, I want an api route to the machine learning model that predicts patient issue so that the frontend can interact with the model.
- **Preprocess data for machine learning:** As a developer, I want to preprocess data from the eICU dataset so that I can effectively train a machine learning model to predict patient events.
- **Research recurrent neural networks:** As a developer, I want to learn more about recurrent neural networks so I can implement one in tensorflow.
- **Research LSMT ML model:** As a developer, I want to learn how to create an LSMT ML model in tensorflow so I can create an accurate model for predicting critical patient events.
- **Medical staff login:** As a medical provider, I want to be able to log in to the application so that I can access the features of the app.
- **Reading from database in chunks:** As a developer, I want to learn how to get data from the database in smaller chunks so I can more efficiently train our model.
- **Create a homepage for the app:** As a user of the app, I want the application to have a home screen so that I can view access the features of the app.
- **Create database for patient information:** As a developer, I want a database on the server for patient information so that I can store information from the frontend.

Burndown / Burnup Chart

Note: Burndown/Burnup chart is showing story points (issue weight) -- not # issues.

Burndown chart





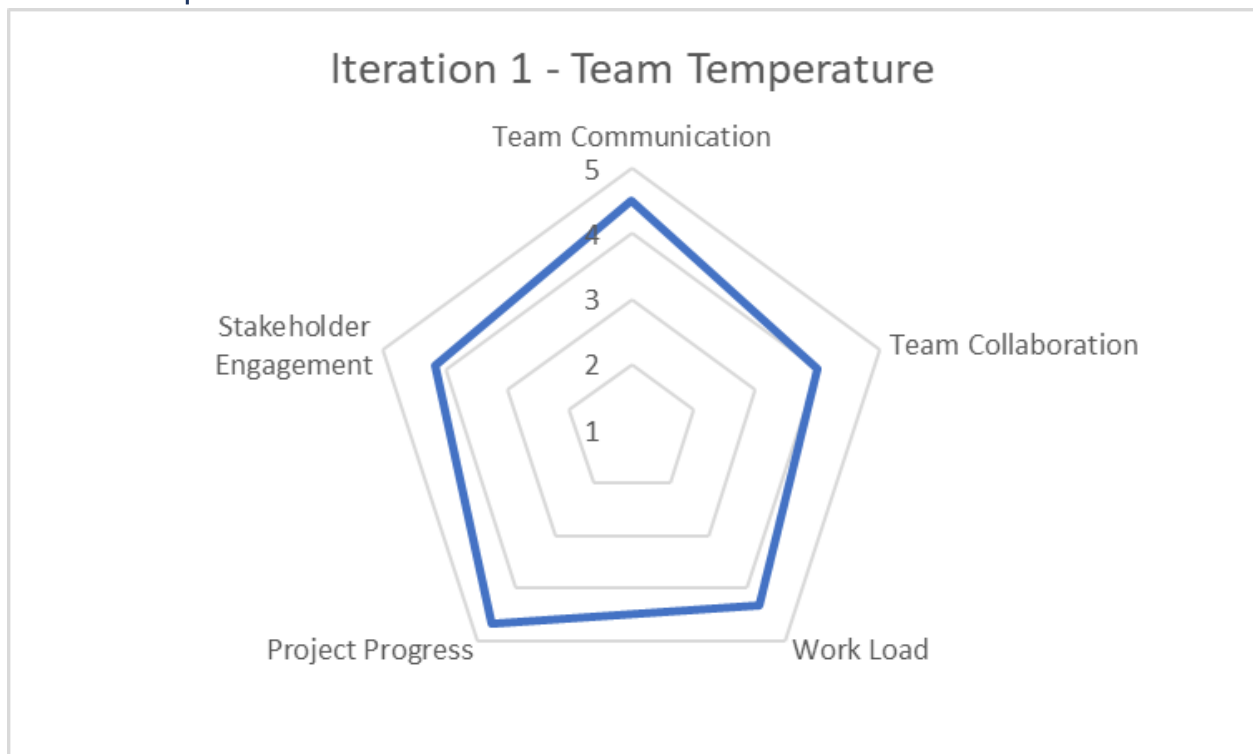
The burndown and burnup charts show our progress over the entirety of iteration 1. In particular, we were able to make great progress during the end of week 1 into week 2 of this iteration (11-17 to 11-24). This was due to the fact that the whole team was on board with what needed to be done and the work was delegated appropriately.

Retrospective

- What has gone well?
 - Reasonable and evenly distributed workload.
 - Completed nearly all user stories.
 - Customer is satisfied with progress.
 - Team communication is acceptable.
- What could be improved?
 - Improve team collaboration since every person in the group placed team collaboration for team temperature at a 4.

- What questions do you have about the project or process?
 - How do we perform machine learning properly and efficiently for our specific product?
 - How will doctors, nurses, and associates access the web application? How will domains work in this case?
- What action items (with responsible party) need to be addressed?
 - The team must research machine learning and how to integrate it properly with the system.
 - Formulate questions for Megan and Brandon about machine learning and stay connected with them over break.

Team Temperature



Results:

- Team Communication: **4.5**
- Team Collaboration: **4.0**
- Work Load: **4.33**
- Project Progress: **4.67**
- Stakeholder Engagement: **4.17**

Overall, the spider chart shows that we, as a group, feel that there is excellent communication and overall project progress. The workload, team collaboration, and stakeholder engagement are very good but there is area for improvement.

Showcase:

<https://www.youtube.com/watch?v=zNN6KBHtBEO>