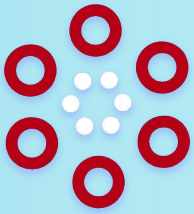

PatientAdvocate

Access all of your medical information from anywhere.

CS 411W Fall 2019

Red Team

December 2nd, 2019

Amber Martinez * Alex Baker * Alex Kostyn * Daniel Kent * Erinn Loren * Joshua Smith * Steven Vardaro

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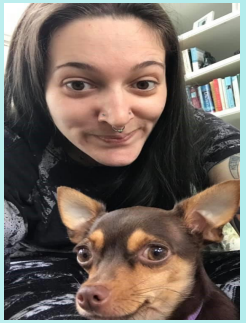
Our Team

Amber Martinez
Project Lead

Alex Kostyn
Cloud Security Engineer

Alex Baker
Solutions Architect



Erinn Loren
Data Engineer

Steven Vardaro
Algorithms Developer

Daniel Kent
UI/UX Developer

Josh Smith
Database Engineer

Problem Statement

Health care patients do not have a central mobile environment to promptly access, organize, and share their medical information with various providers.

Problem Characteristics

Record Completeness

Patients' records are scattered throughout different electronic health record (EHR) systems.

Patient Convenience

Patients do not have a way to access medical records outside of their provider office.

Emergency Care

Patients do not have a way to update their daily regimen for their physicians.

Solution Characteristics

Record Completeness

Log into existing patient portals and gather available medical record information.

Patient Convenience

Allow access to self and dependent records.

Emergency Care

Detail patient daily regimen to share with providers.

Customer

Anyone that uses a mobile smartphone and needs to access all of their medical records from one place. The Patient Advocate application would greatly benefit those in need of medical care outside the scope of their primary care provider's network, those with chronic conditions, and those who take care of dependents and the elderly.

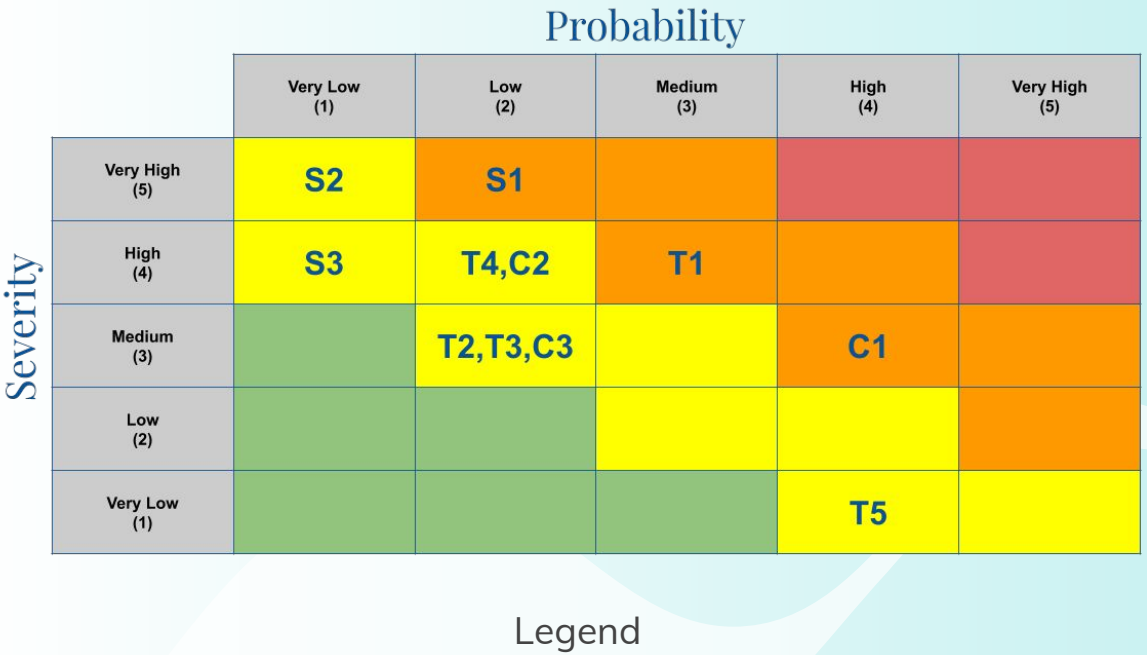
Will

- Allow end users to log into their existing patient portals.
- Allow access to dependent records
- Gather available record information from existing patient portals.
- Allow users to specify their daily regimen to share with providers.
- Observe HIPAA laws.

Will Not

- Allow patients to change physician provided medical records.
- Allow unauthorized access to patient records.
- Modify providers' existing EHR systems.

Risk Matrix



Legend

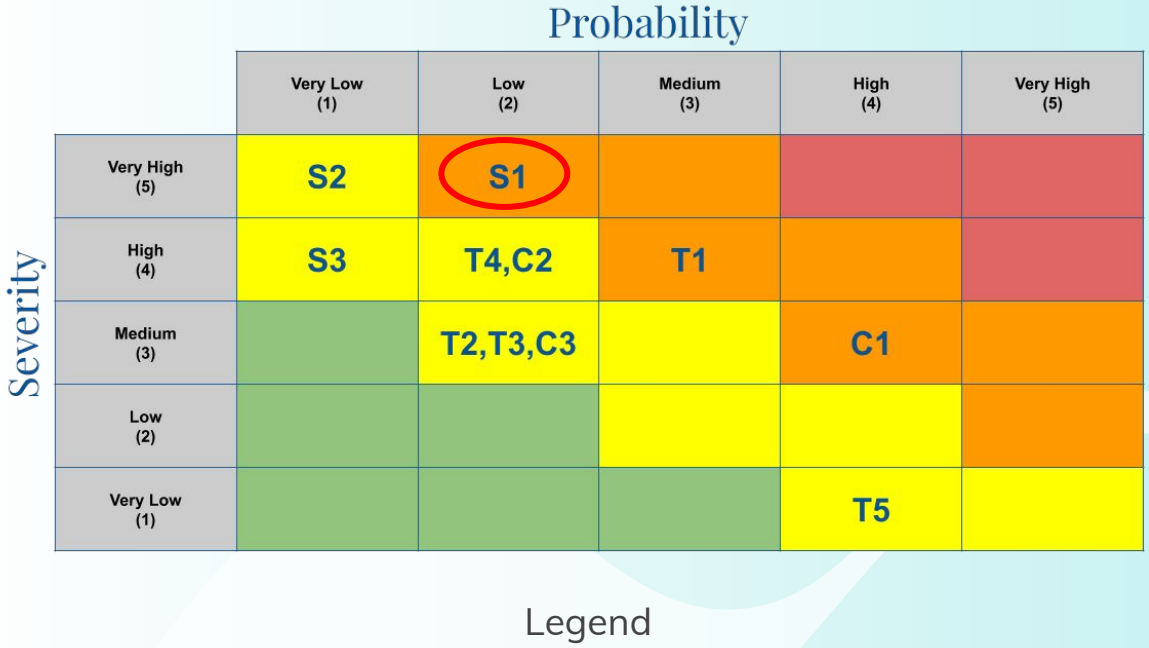
T - Technical Risk C - Customer Risk S - Security Risk

S1 - Meet all HIPAA security requirements.
S2 - Application or cloud breach.
S3 - User losses their password.

T1 - Dependant on record formats that we receive.
T2 - Patient unable to access the internet.
T3 - We have difficulties establishing a link with various patient portals.
T4 - Data loss within the network.
T5 - Local data version conflict with server version.

C1 - Patients input incorrect data into their profile.
C2 - Patient's medical record completeness is self-dependent.
C3 - Patient has difficulties establishing multiple dependent profiles.

Security Risk - S1



Legend

T - Technical Risk C - Customer Risk S - Security Risk

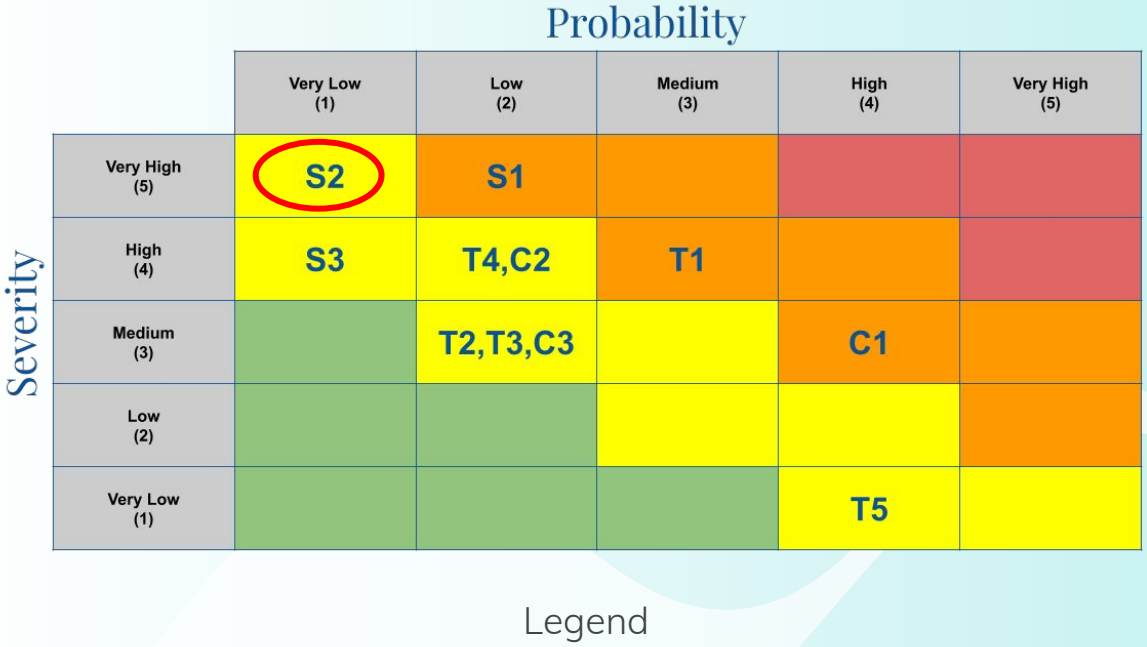
Risk

Meet all HIPAA security requirements.

Risk Mitigation

Communication between the client and server are encrypted using HIPPA approved methods.

Security Risk - S2



Legend

T - Technical Risk C - Customer Risk S - Security Risk

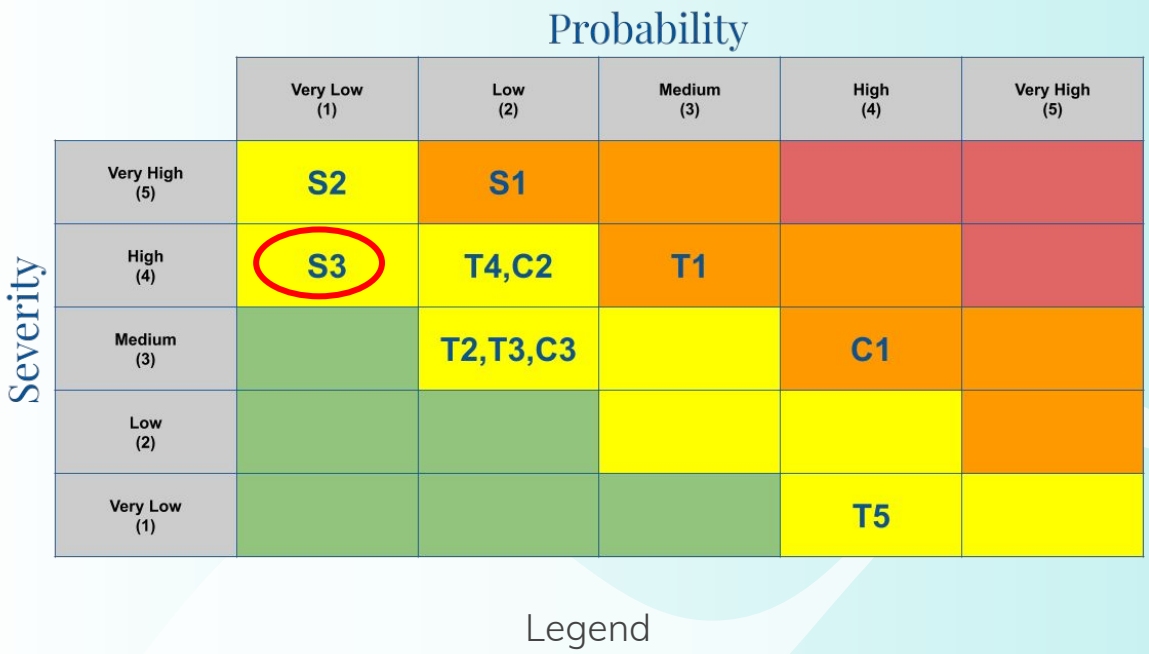
Risk

Application or cloud breach.

Risk Mitigation

Encryption and Decryption are done on the device only. This protects users in the event of a system compromise.

Security Risk - S3



Legend

T - Technical Risk C - Customer Risk S - Security Risk

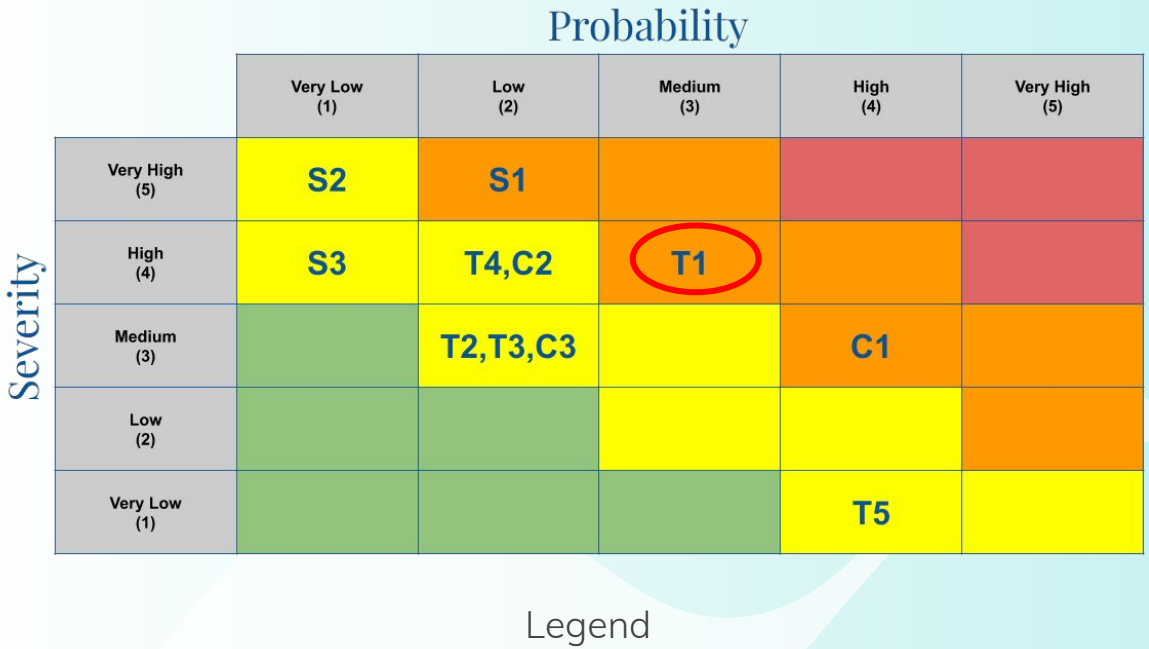
Risk

User loses their password.

Risk Mitigation

Introduce account recovery codes at the creation of the account which can be used to recover information stored in the account. Additionally a validation process is put in place to recover account passwords. For instance, recovery codes or secret passphrases.

Technical Risk - T1



Risk

Dependant on record formats that we receive.

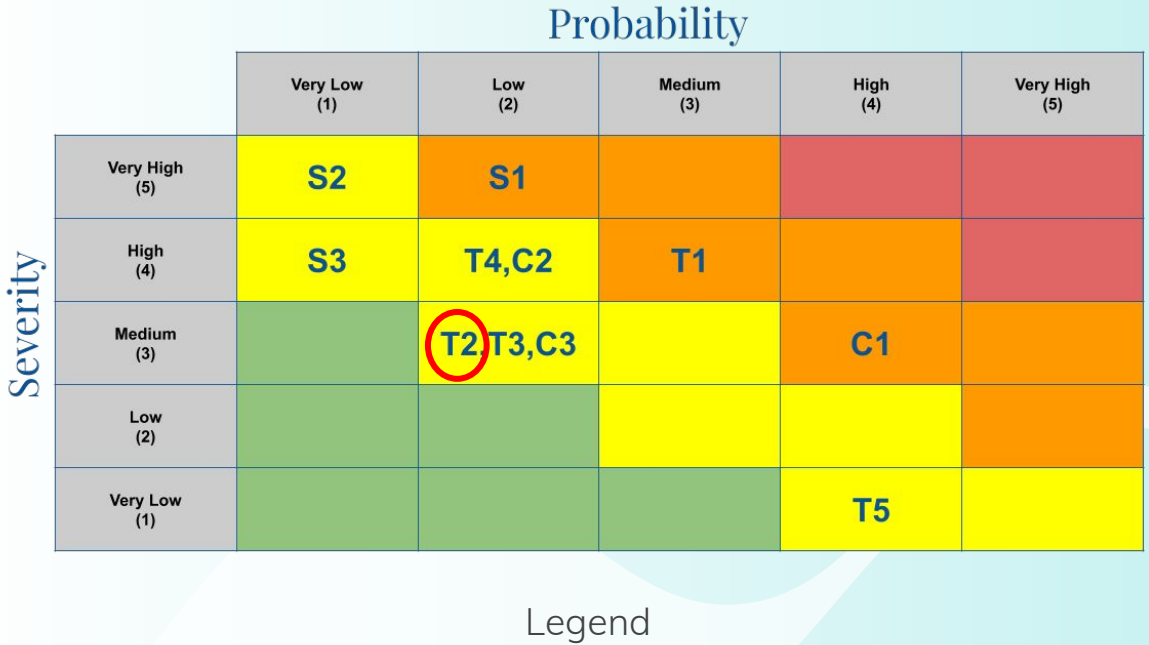
Risk Mitigation

Transcribe records to a format that is acceptable.

Legend

T - Technical Risk C - Customer Risk S - Security Risk

Technical Risk - T2



Legend

T - Technical Risk C - Customer Risk S - Security Risk

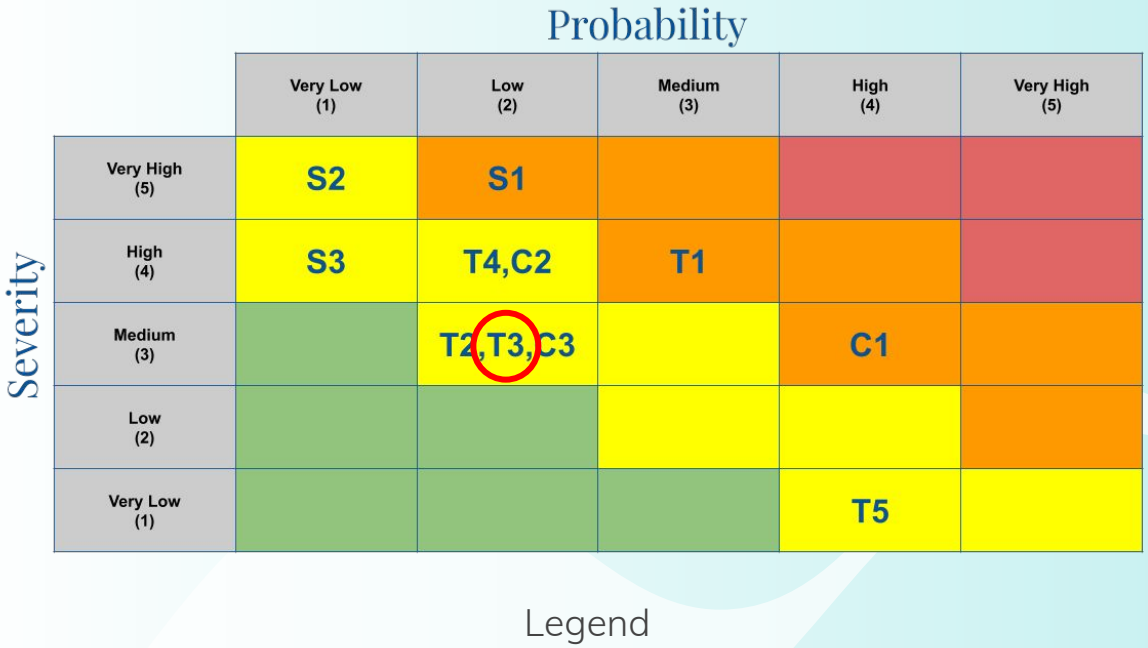
Risk

Patient unable to access the internet.

Risk Mitigation

An encrypted local copy of the record will be kept on the local device for a limited time.

Technical Risk - T3



Risk

We have difficulties establishing a link with various patient portals.

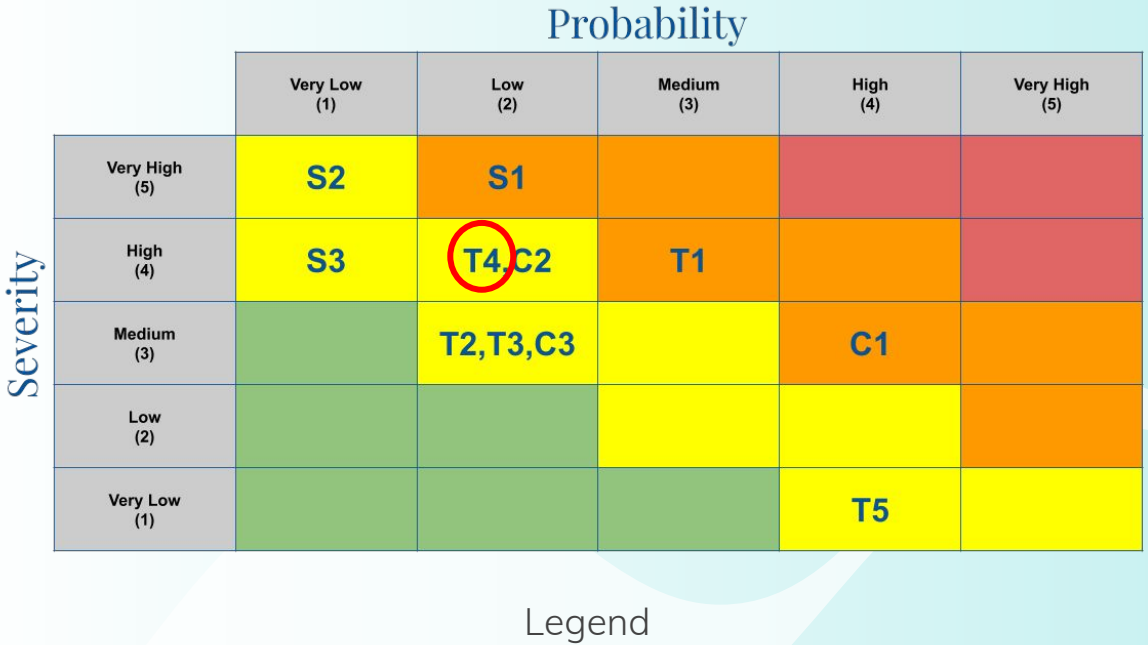
Risk Mitigation

Work with patient portal administrators to remedy link issues.

Legend

T - Technical Risk C - Customer Risk S - Security Risk

Technical Risk - T4



Risk

Data loss within the network.

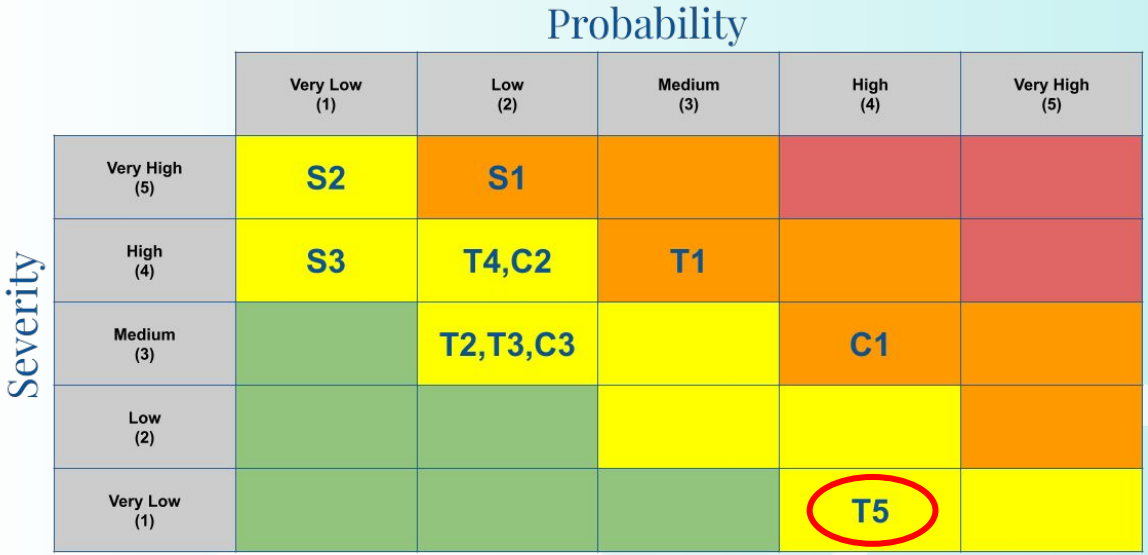
Risk Mitigation

Data is replicated in the data center, and disaster recovery plans created.

Legend

T - Technical Risk C - Customer Risk S - Security Risk

Technical Risk - T5



Legend

T - Technical Risk C - Customer Risk S - Security Risk

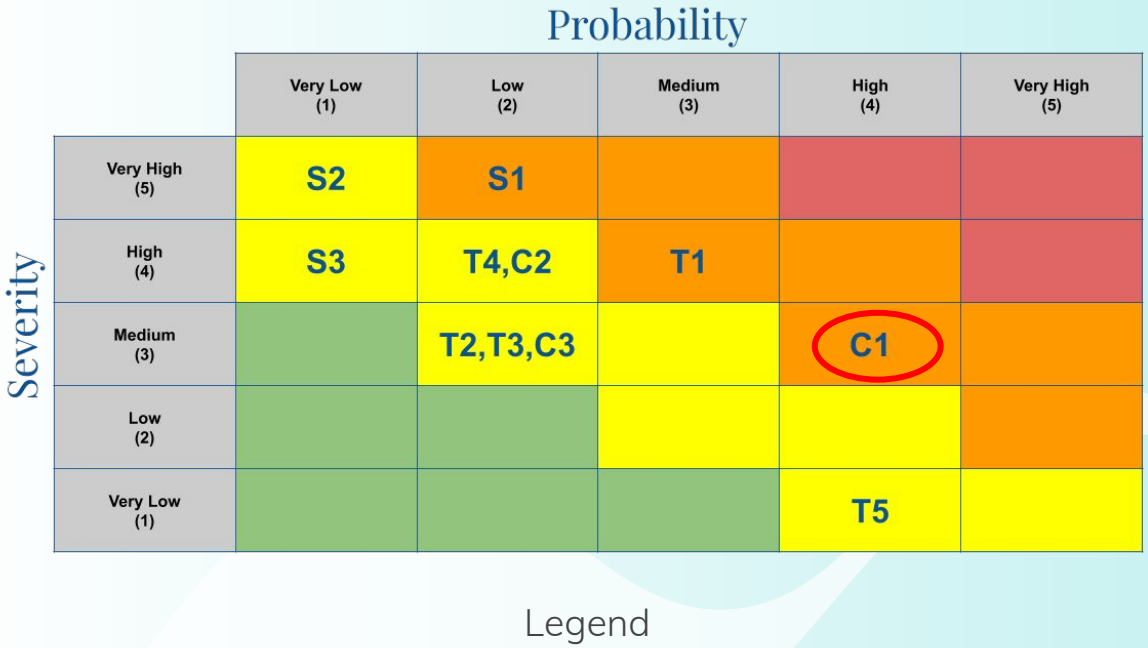
Risk

Local data version conflict with server version.

Risk Mitigation

Prompt user to either save changes or force upload.

Customer Risk - C1



Legend

T - Technical Risk C - Customer Risk S - Security Risk

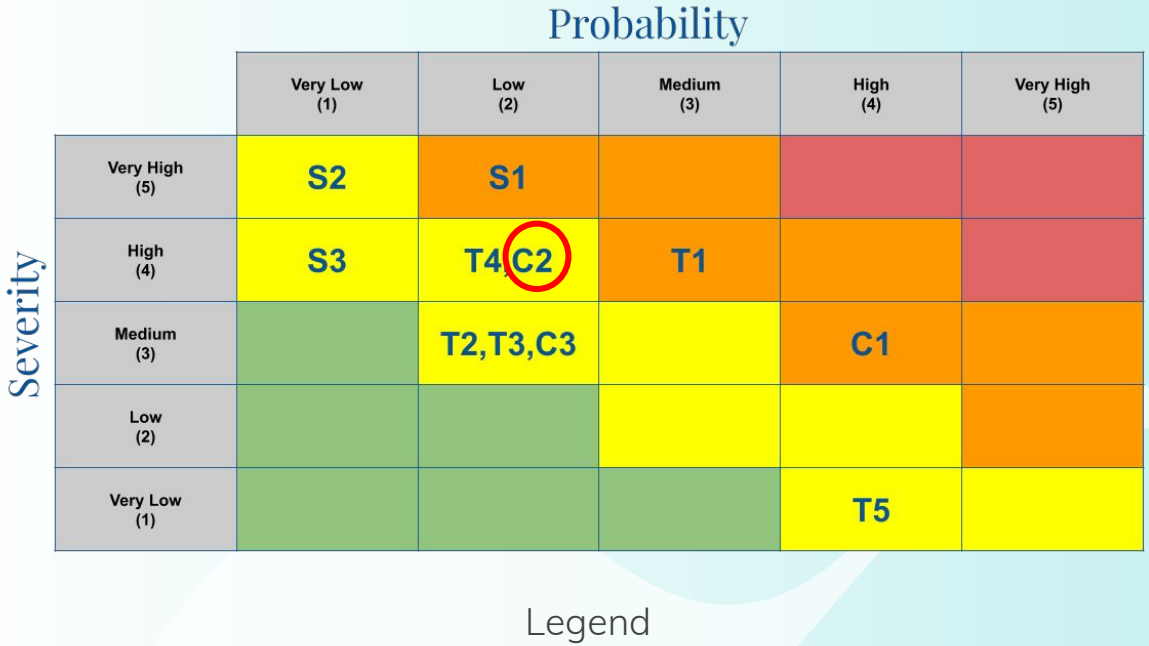
Risk

Patients input incorrect data into their profile.

Risk Mitigation

Allow patients to edit profile settings and implement a type of “auto-complete” feature.

Customer Risk - C2



Risk

Patient's medical record completeness is self-dependent.

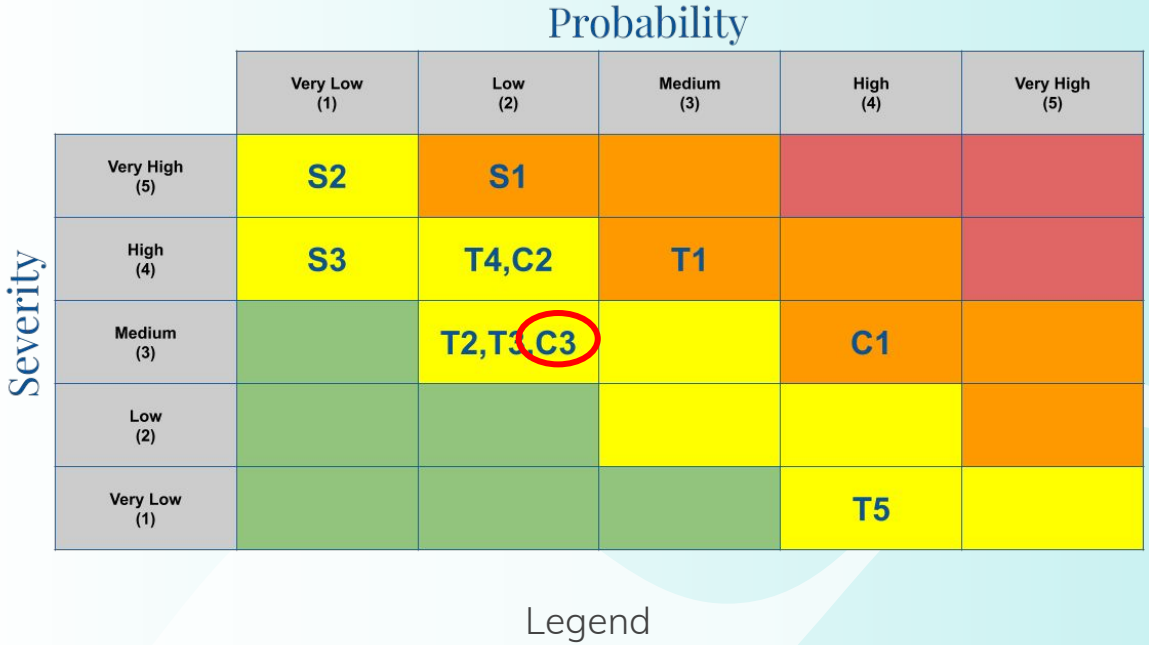
Risk Mitigation

Encourage portal linkage.

Legend

T - Technical Risk C - Customer Risk S - Security Risk

Customer Risk - C3



Risk

Patient has difficulties establishing multiple dependent profiles.

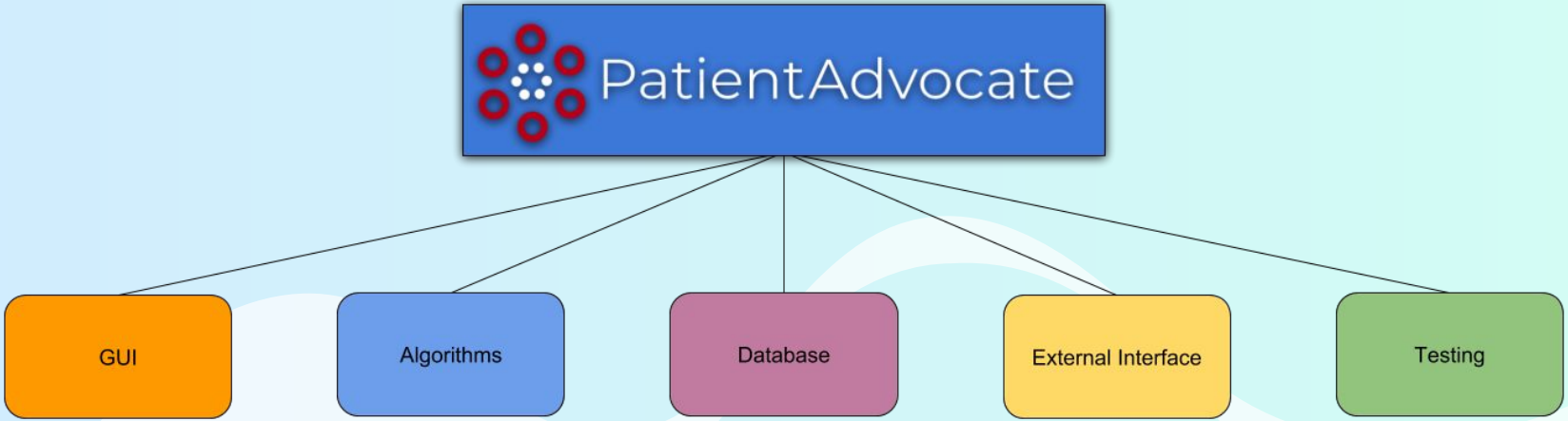
Risk Mitigation

Provide a walkthrough that details how to set up additional profiles within the Patient Advocate app.

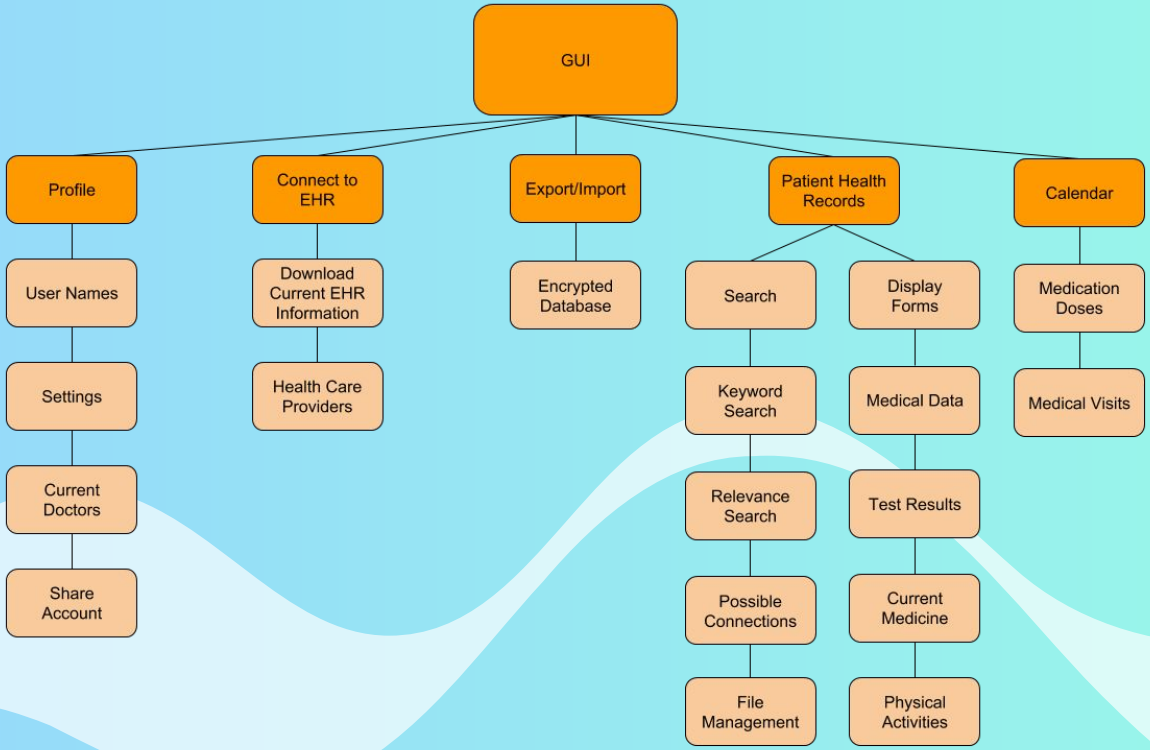
Legend

T - Technical Risk C - Customer Risk S - Security Risk

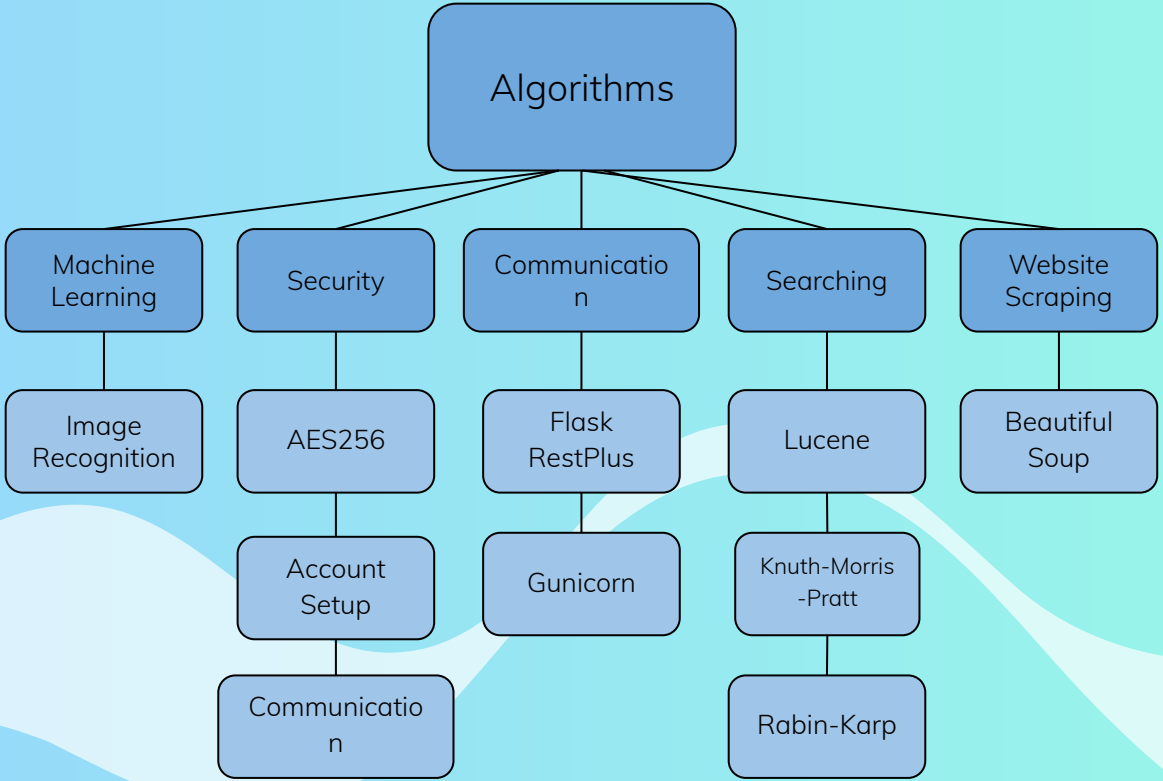
Work Breakdown Structure



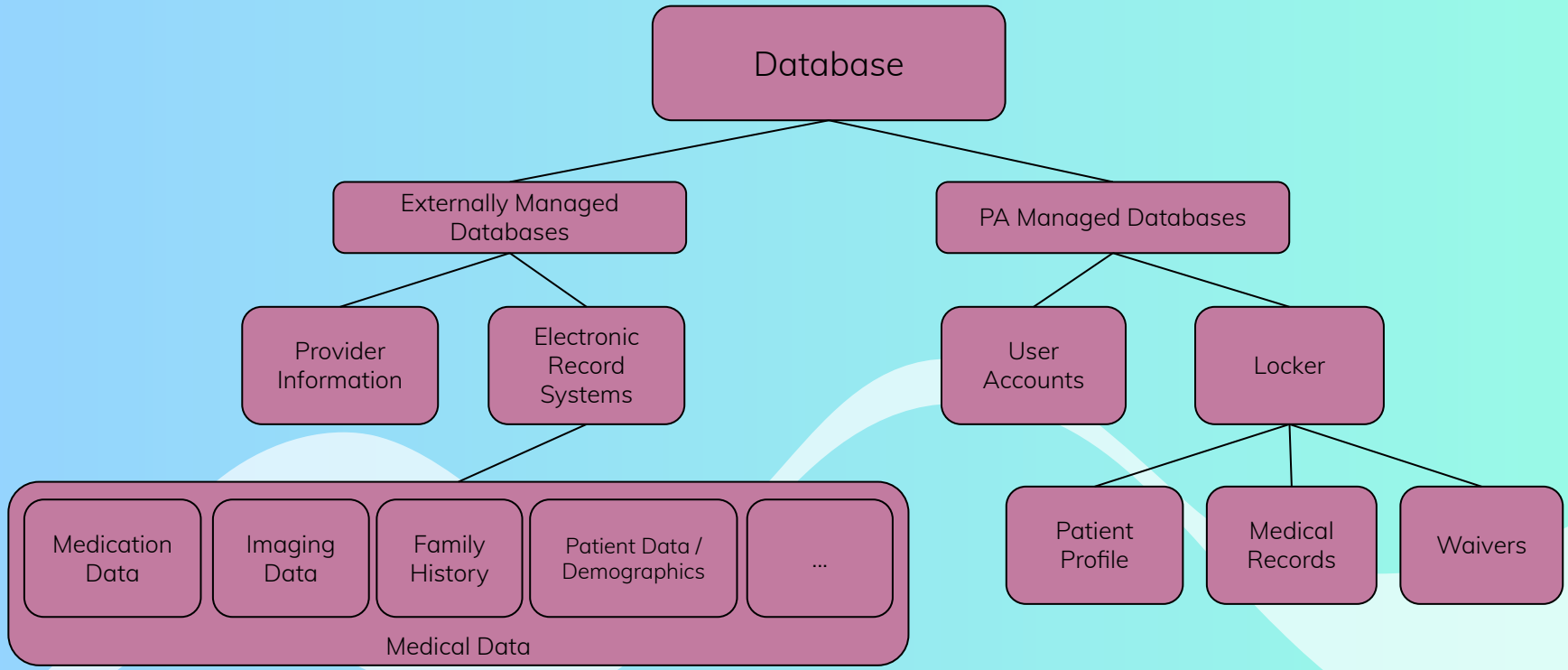
Work Breakdown Structure - User Interface



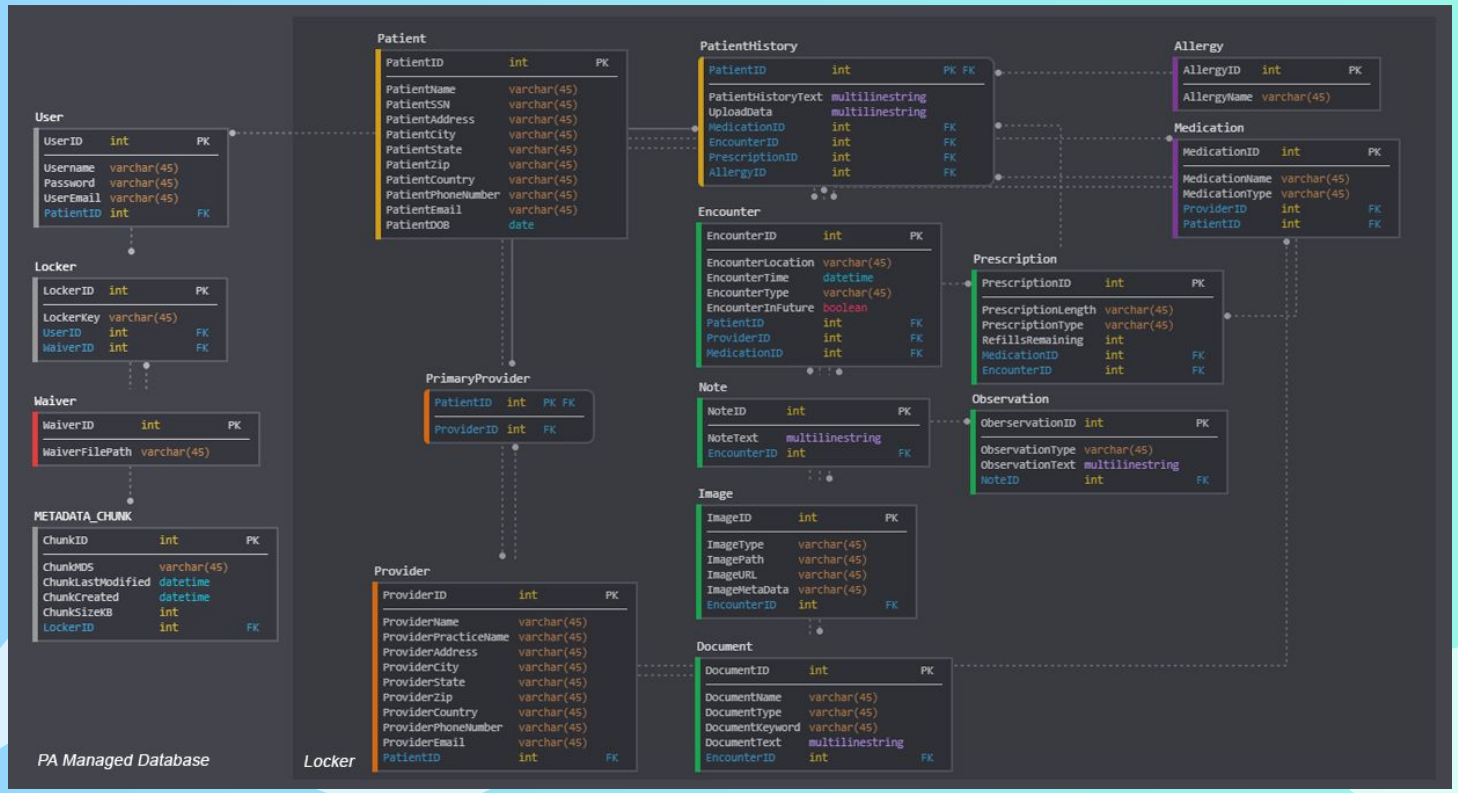
Work Breakdown Structure - Algorithms



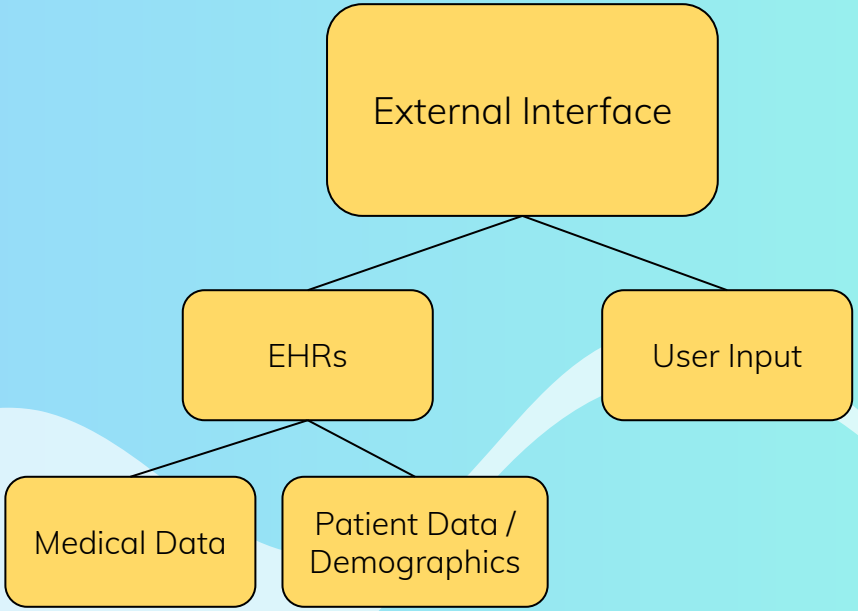
Work Breakdown Structure - Database



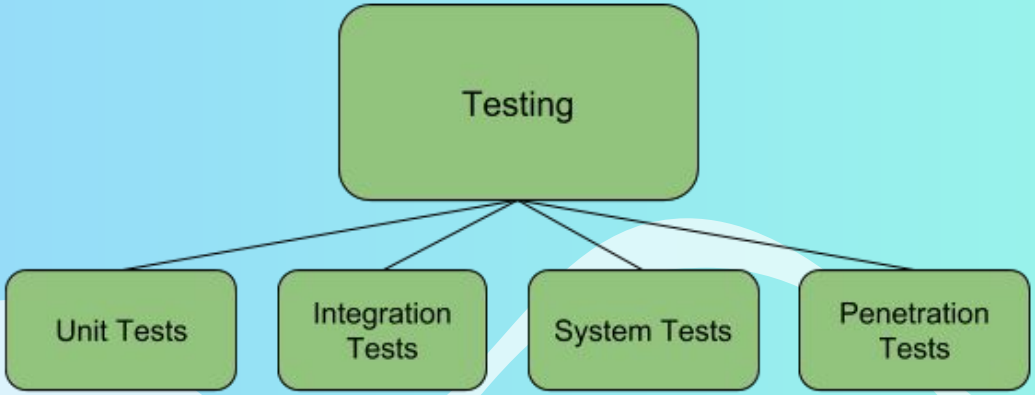
Database Schema - PA Managed Databases



Work Breakdown Structure - External Interface



Work Breakdown Structure - Testing



Goals & Objectives

Security

	Features	Real World Product	Prototype	Description
1	Locker	✓	✓	Encrypted. Contains the database with the patient profile, medical records, personal logs, images, and release of information waiver
2	Authentication	✓	✓	Matching of current user to the database and current session.
3	Client/Server Communication	✓	✓	Transmission of modified chunks between user device and server.

Goals & Objectives

GUI

	Features	Real World Product	Prototype	Description
1	Basic GUI	✓	✓	User interface for navigation of the various features.
2	Feature rich GUI	✓	✓	Advanced user interface to include all features and menus.
3	Key Word and Relevance searching	✓	✓	Search through the Locker for specified information, including images.

Goals & Objectives

Data Storage

Features		Real World Product	Prototype	Description
1	Export PDF Record	✓	✓	Organize and compile medical data to include in a PDF format.
2	Import Record	✓	✓	Link to web EHR portals to integrate medical data.

Goals & Objectives

Application Features

Features		Real World Product	Prototype	Description
1	Notifications	✓	✓	Alerts on the user's device relating to PatientAdvocate information.
2	Calendar & Appointments	✓	✓	Calendar updated from web EHR portal with new appointments, medication refill reminders, and area to request provider appointments.

Goals & Objectives

Data Gathering

Features	Real World Product	Prototype	Description
1 Basic Web Scraping	✓	✓	Parsing of a mock web EHR portal for targeted information.
2 Specific Web Scraping	✓	✗	Parsing of an existing web EHR portal for all information.
3 Multiple Web Scraping	✓	✗	Parsing of multiple existing web EHR portals for information.
4 Medication Data	✓	✗	Area to describe and log medication uses, also contains medication descriptions.
5 Integrated Data	✓	✗	Fitness, genetic, and other medical data not contained within a web EHR portal.

Goals & Objectives

Machine Learning

	Features	Real World Product	Prototype	Description
1	Image Recognition	✓	✓	Distinguish between a photograph and a document. Documents are parsed for their information.
2	ML With Trends	✓	✗	Machine learning algorithms and statistical analysis for user enrichment.

Goals & Objectives

Development

Features	Real World Product	Prototype	Description
1 Testing	✗	✓	Logs and visual aids to prove application stability.

A CASE STUDY

Our prototype used Jane as our case story. Jane is pregnant and has a one-year old child. Her one year old has some special needs and must-see specialists regularly. Her previous medical records were shared with Sentara providers using their electronic health record portal. Jane recently moved and needs to set up appointments to see her new primary care provider, her child's pediatrician, as well as find local specialists who can care for her child's needs.

Now… A Demo