



Documentation

CHRONIC DISEASE PREVENTION (PROJECT 2)

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Chronic Disease Prevention Application (Project 2)

Documentation

by Team Chronic Disease

1. Project Description

1.1 Client : Wilkin Chan

1.2 Purpose : Improve clinical outcomes of patients with multiple chronic diseases, by allowing doctors to identify potential screenings that need to be conducted.

1.3 Project Scope

- 1.3.1 Build a SMART-on-FHIR app for doctors to identify whether a patient has met the criteria of colorectal cancer and cardiovascular disease screening. The criteria should be based on the [RACGP guidelines](#) provided by the client.
- 1.3.2 Allow doctors to select the potential intervention for the patient.
- 1.3.3 These interventions are recorded as FHIR resources.
- 1.3.4 The criteria of screening are retrieved from FHIR resources.
- 1.3.5 Since the client already has a working interface for selecting screenings, the team is only required to build the area highlighted red in his concept interface

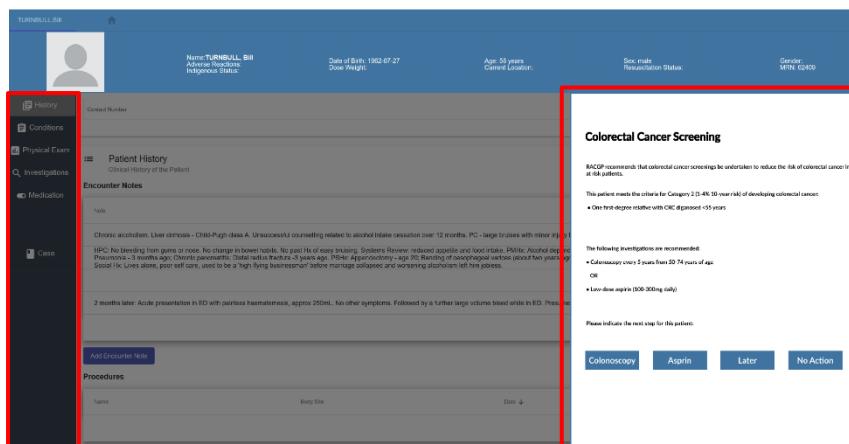


Figure 1 Client's concept interface

1.4 Function Overview:

Screening page	<ul style="list-style-type: none">● Doctors can view criteria and patient's risk of for a chosen screening● Doctors can choose an investigation and medication for screening● Screenings shown are automatically put through the criteria for that screening against the patients FHIR profile
Criteria page	<ul style="list-style-type: none">● Doctors can edit screening criteria for chronic diseases every 3-5 years● Doctors can add new screening criteria for a chronic disease

1.5 Problem Space

Once a patient has been diagnosed with a chronic disease, they will need to spend a lifetime seeking the help of medical practitioners. Therefore, it is better to identify and record their symptoms as early as possible to prevent potential life threatening situations that can be onset by the chronic disease. Before soliciting a patient's information to diagnose potential symptoms doctors require a consistent relationship with the patient. This is due to the required patient-centred appointments to identify patient's hidden symptoms. Some symptoms can only be identified through analysing the transcript of patient's dialogues.

According to the client's pitch in Week 1, doctors may unexpectedly identify other possible symptoms for chronic disease during an appointment. It is always better to identify these potential causes earlier so that actions can be taken to address the disease. A common issue with this existing methodology is that these symptoms may present themselves acutely. This poses potential risk as the symptom could be missed. Currently after a symptom has been found it requires further investigation by the practitioner through other medical examinations which are organised manually through communication between various medical practitioners.

There is also a secondary use case of the app that coincides with the first. According to the client, some patients may come with their own agendas, which doctors may not have time to address with the time constraints set in each appointment. This leads to elongated appointments and increases the risk of doctors not identifying the core reasons for the visit as they are often pressured for time. Ultimately, the unstable patient treatment schedule has led to poor clinical outcomes as diseases are either misidentified or left untreated.

1.6 Project Timeframe

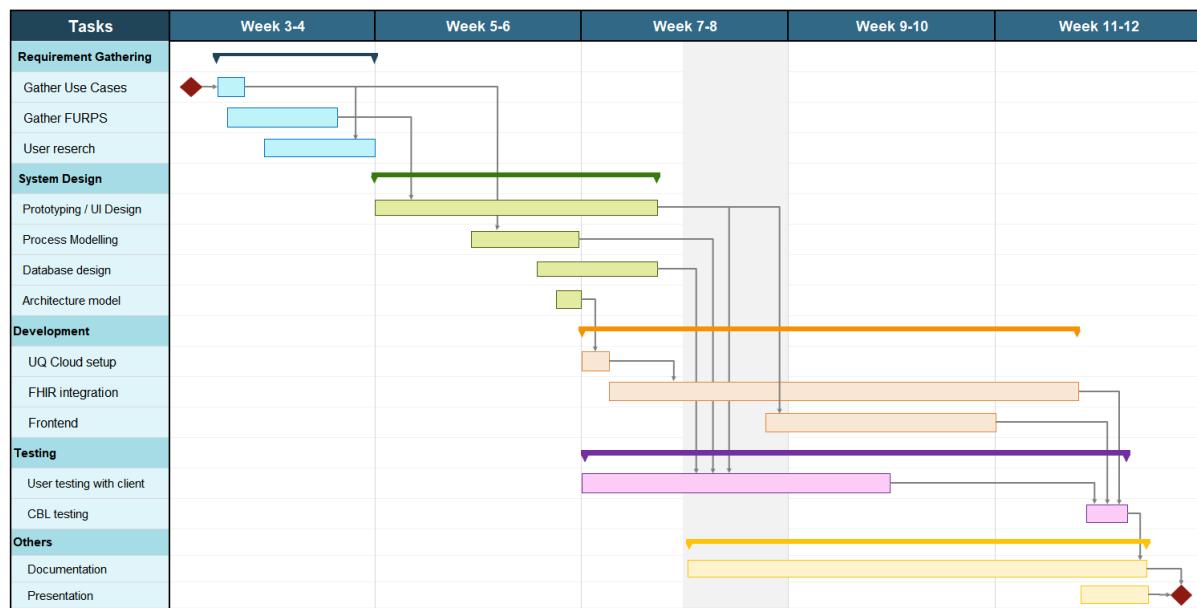


Figure 2 Project Gantt Chart

The team adopted a mixture of Agile and Waterfall approach to SDLC. This is because most team members had to balance a workload between work and other group projects. It was the general consensus that it is better to finish compartmentalized stages in one go, whereas dividing complicated work into smaller tasks with 2-week sprints. Therefore the team followed Agile SCRUM to reiterate various stages of requirement gathering, development and testing, while maintaining a waterfall structure in project planning and documentation stages.

1.7 Team Communication

In the beginning of the project, a **Team Charter** was produced and attached in *Appendix 1*. It serves as a guideline to adhere to throughout the development process. The team consists of frontend engineers, backend engineers and documentation writers.

The team produced weekly deliverables to be approved by the client in Friday's class sessions. Subsequently, requirements, prototypes, and diagrams were iterated consistently according to client's feedback. *Discord* was used for communications outside class sessions.

For regular team meetings, Tuesday and Friday class sessions were used to track team tasks, progress, and issues. Extra meetings were held on *Discord* and *Slack* to draft ideas and discuss team issues. At the end of each week, all communications were documented as **Weekly Meeting Logs** and uploaded to *Google Drive* for next week's review. These documents are attached in *Appendix 8*.

Finally, [GitHub](#) was used for code integration. It allowed the team to track issues, as well as managed versions through various branches for Frontend and Backend to develop concurrently.

2. Requirements Analysis

2.1 Target User:

A Doctor who is treating an individual potentially requiring screening for various chronic diseases (*Week 3 Meeting Logs*)

2.2 User Needs :

A user persona is made based on use cases gathered from the client.

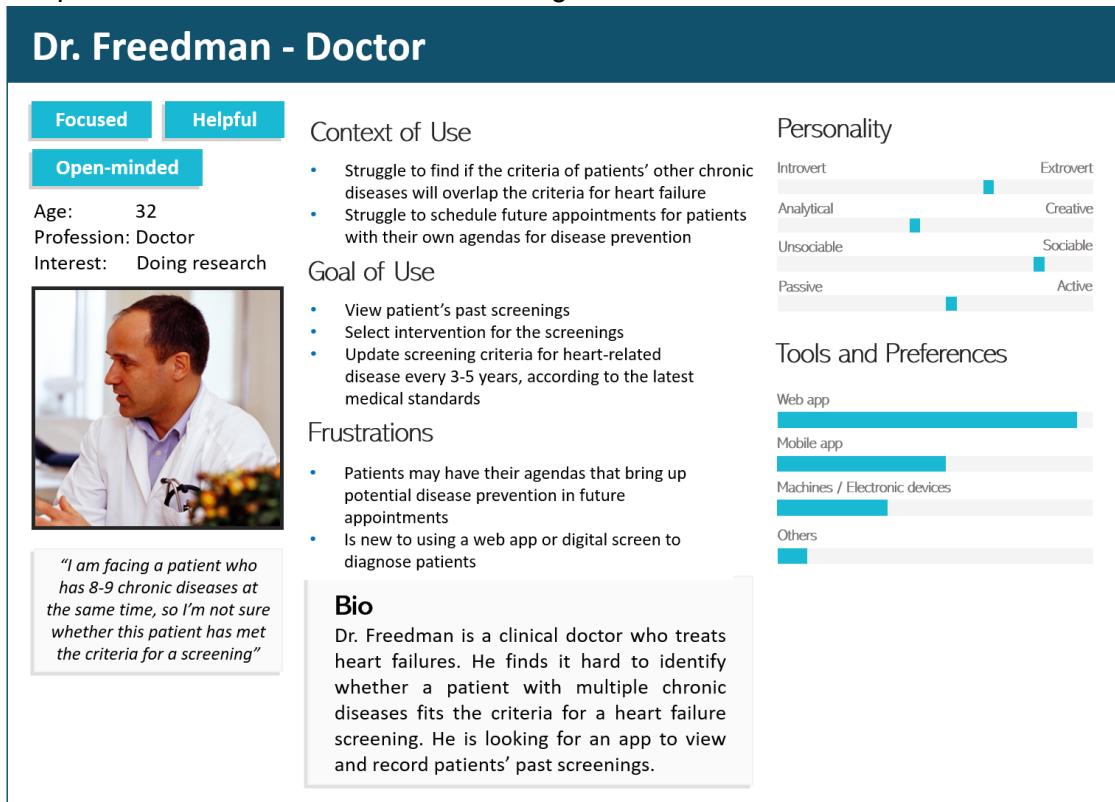


Figure 3 User persona

2.3 Functional Requirements

1. Screening page

- 1.1. Doctor can view the criteria of the screening, according to [Guidelines for preventive activities in general practice \(9th edition\)](#) (*Week 3 Meeting Logs*)
- 1.2. Doctor can view the patient risk priority of the chosen screening (*Week 5 Meeting Logs*)
- 1.3. Doctor can add recommendations for the chosen screening (*Week 3 Meeting Logs*)
 - 1.3.1. Doctor can assign multiple medications needed for the screening
 - 1.3.2. Doctor can assign multiple investigations needed for the screening
 - 1.3.3. Doctor can choose multiple topics to be discussed with the patient
- 1.4. Doctor can navigate through multiple screenings with "Next" and "Previous" button (*Client's concept interface*)

2. Criteria page (*Week 3 Meeting Logs*)

- 2.1. Doctor can view screening criteria
- 2.2. Doctor can edit the existing criteria
- 2.3. Doctor can delete existing criteria
- 2.4. Doctor can add new criteria

2.4 Non-functional Requirements

Non-functional requirements are recorded based on User Research in Appendix 2.

1. Usability

- 1.1. Navigation through pages and screenings should be within 3 mouse clicks
- 1.2. Insertion of multiple medications and investigations should be simple and easy
- 1.3. Adding, editing and deleting screening criteria should be simple and easy
- 1.4. This interface should allow doctors to perform clinical processes efficiently

2. Performance

- 2.1. The app should be able to pull data from database within 3 seconds
- 2.2. The app should be able to load data from FHIR resources within 5 seconds

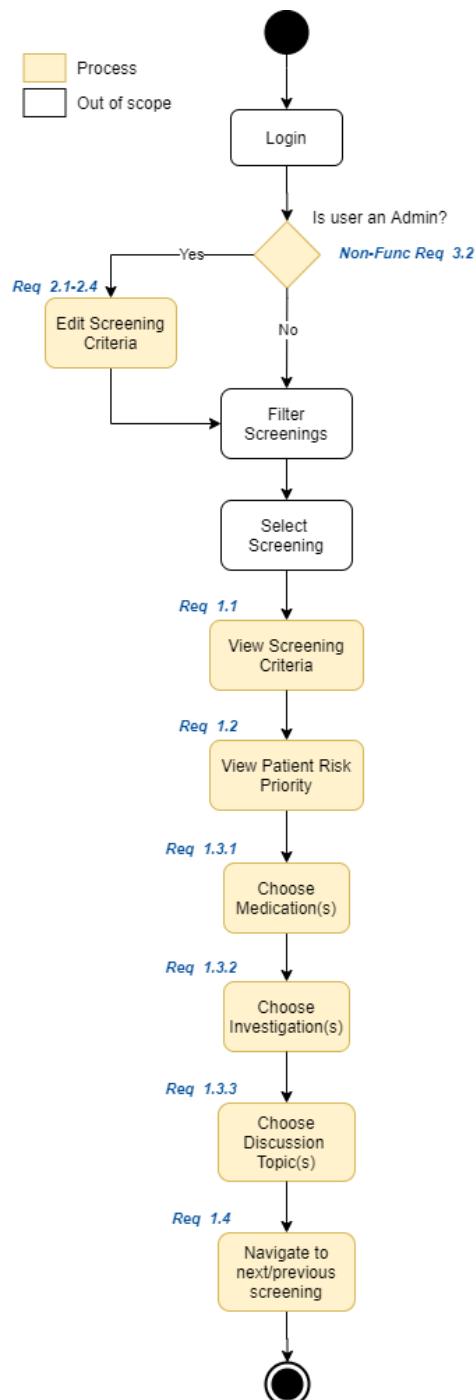
3. Security

- 3.1. Only authenticated users are allowed to view patient screenings (*Week 3 Meeting Logs*)
- 3.2. Only admin users are allowed to view the Edit Criteria page (*Week 6 Meeting Logs*)

All requirements gathered will be addressed in designing system flow (*Section 3*), user interfaces (*Section 4*), and testing protocols (*Section 5*).

For additional resources, user research for target users is attached in Appendix 2. Evidence of client's requirements outside Meeting Logs are attached in Appendix 7.

3. System Design



3.1 System Flow (Frontend)

On the left is an activity diagram made in accordance to the requirements in Section 2 (*Req* labels). The iteration process is recorded in Appendix 4.

3.1.1 Out of Scope activities

According to the project scope (Section 1.3.5), the interface for selecting screenings has already been done. Thus, “Filter Screenings” and “Select Screening” are omitted in this project. Nonetheless, these activities are considered when designing and testing user experience.

3.1.2 Is user an Admin?

Since only admin users are allowed to “Edit Screening Criteria”, **OAuth2 of SMART-on-FHIR** is used as an authentication server to assess users’ permission level. For details, see *Section 5.1.2*.

3.1.3 Screening Criteria values

Screening criteria for a disease is pulled from a local criteria database and rendered with **FHIR Resources**. For details, see *Section 5.1* and *Section 5.2*.

3.1.4 Medication and Investigation values

In order to transfer accurate medical data among doctors, **SNOMED Clinical Terminology** is used as intervention options. For details, see *Section 5.2.7*.

Figure 4 Activity diagram for the SMART-on-FHIR app

3.2 System Interaction (Backend)

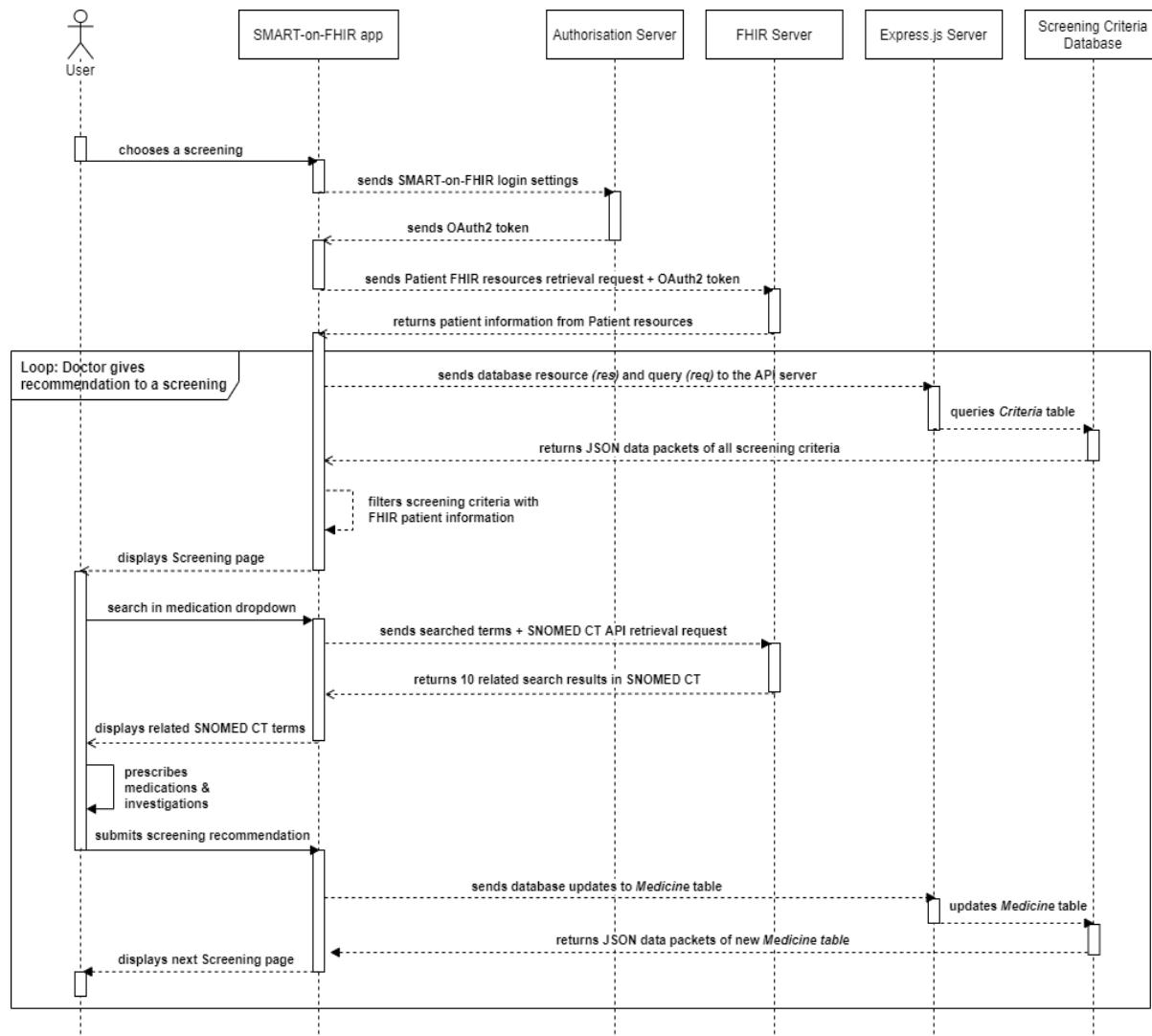


Figure 5 Sequence Diagram of Backend Interactions with FHIR Server

3.3 Database Design

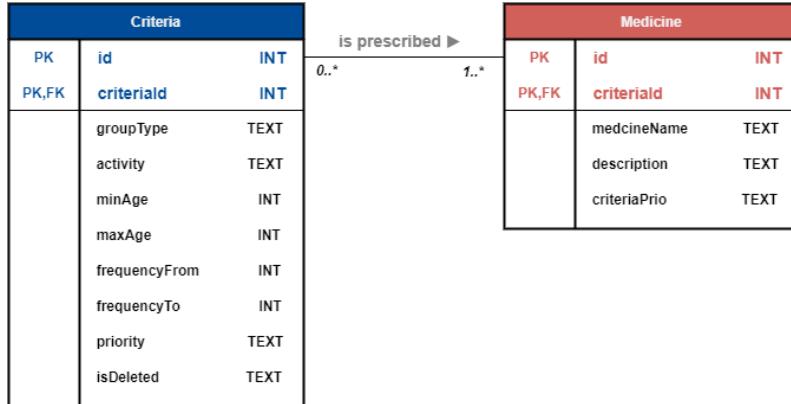


Figure 6 Entity-Relation diagram for Screening Criteria database

The **Criteria** table is designed to implement **Req 1.1 and 2.1-2.4**. Its columns are determined by the guidelines provided by the client:

COLUMN NAME	DESCRIPTION	EXAMPLE FROM CODEBASE
id	ID of this criterion.	2
groupType	Type of criteria group (diseases in the guidelines)	“Vascular Disease”
activity:	name of the screening which contains this criterion.	“Type 2 Diabetes Screening”
minAge & maxAge:	the age range where a patient will suit this criterion. It represents the guideline's age risk in “Who is at risk?”. e.g. Hypertension risk priority depends on cardiovascular disease freq.).	minAge: 35 maxAge: 99
frequencyFrom & frequencyTo:	the chance of a criterion occurs. It represents the guidelines' risk % in “Who is at risk?” (e.g. Hypertension risk priority depends on cardiovascular disease freq.).	frqFrom: 12 frqTo : 24
priority:	the priority of a screen's criterion. It represents the 3 risk categories: High , Moderate and Low from the guidelines	“Moderate”
isDeleted:	if user is deleting the record. (1 for TRUE, 0 for FALSE)	0
criteriald:	ID of the screening.	6

The **Medicine** table stores medicines when users enter medications (**Req 1.3.1 and 1.3.2**)

COLUMN NAME	DESCRIPTION	EXAMPLE FROM CODEBASE
id:	ID of medicine in this table	1
criteriald: (FK)	The criteria which users enter the medicine for	4
medicineName:	clinical name of the medicine, determined by sctid	“Pharmacotherapy”
description:	description of the medicine (e.g. usages, side effects)	“blood pressure (BP) persistently over 160/100 mmHg”
criteriaPrio	Priority of the criteria the medicine is connected to	Low

After designing the database, CRUD operations are written in **criteria_repository.js** and **medicine_repository.js** to modify the tables, and are called in other parts of the code.

```
/** 
 * Returns all of the available criteria records.
 */
app.get('/api/criteria', (req, res) => {
    criteriaRepo.getAll().then((customers) => {
        res.json(customers);
    })
    .catch((error) => {
        console.log(error);
        res.send("Error");
    })
});
});
```

Figure 7 Code snippet to read records from Criteria table, in server/app.js

```
/** 
 * Handles creating and updating a new criteria record.
 */
app.post('/api/criteria', (req, res) => {
    criteriaRepo.getById(req.body.id).then((queryRes) => {
        if (queryRes == null) {
            console.log(req.body)
            criteriaRepo.create(req.body.groupType, req.body.activity,
                req.body.minAge, req.body.maxAge, req.body.frequencyFrom,
                req.body.frequencyTo, req.body.priority, req.body.isDeleted,
                req.body.criteriaId).then((queryRes) => {
                    res.json(queryRes);
                });
        } else {
            criteriaRepo.update(req.body).then((queryRes) => {
                if (queryRes.id === 0) {
                    res.json("Success updating record");
                } else {
                    res.json("Error updating record");
                }
            });
        }
    });
});
```

Figure 8 Code snippet to create and update records in Criteria table, in server/app.js

Step	
1	When a user queries the database, the query will be stored in the queryRes variable.
2	app.get() and app.post() will access the backend API for the table.
3	criteriaRepository class, which stores CRUD operations, will call getAll() and getById() to retrieve records from the table.
4	criteriaRepo.create() will convert the retrieved data into a JSON record.
5	criteriaRepo.update() will insert or update the record in json files in the server folder

4. UI & Prototype Design

4.1 Medium-Fidelity prototype

Four medium-fidelity Adobe XD prototypes were made to test if the team designer's interface had met client and team member's expectations. The goal of each prototype was to focus on an aspect of the application: content, comprehensiveness, aesthetics and overall usability. The iteration through prototypes are attached in Appendix 3, while detailed client feedbacks are attached in Appendix 8.

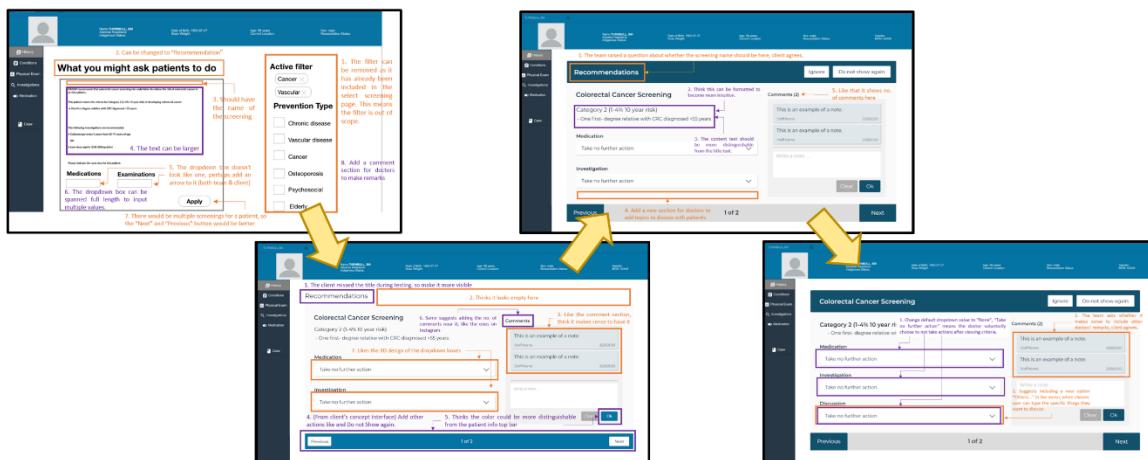


Figure 9 Iterations of medium prototype

4.2 High-Fidelity prototype

The high-fidelity prototype was developed in accordance with the medium-fidelity prototype. It integrates with FHIR resources and the local database to provide realistic clinical contexts when user testing with medical students. Apart from the user experience, the application connection to the FHIR server and launching in CBL testing platform were also tested on.

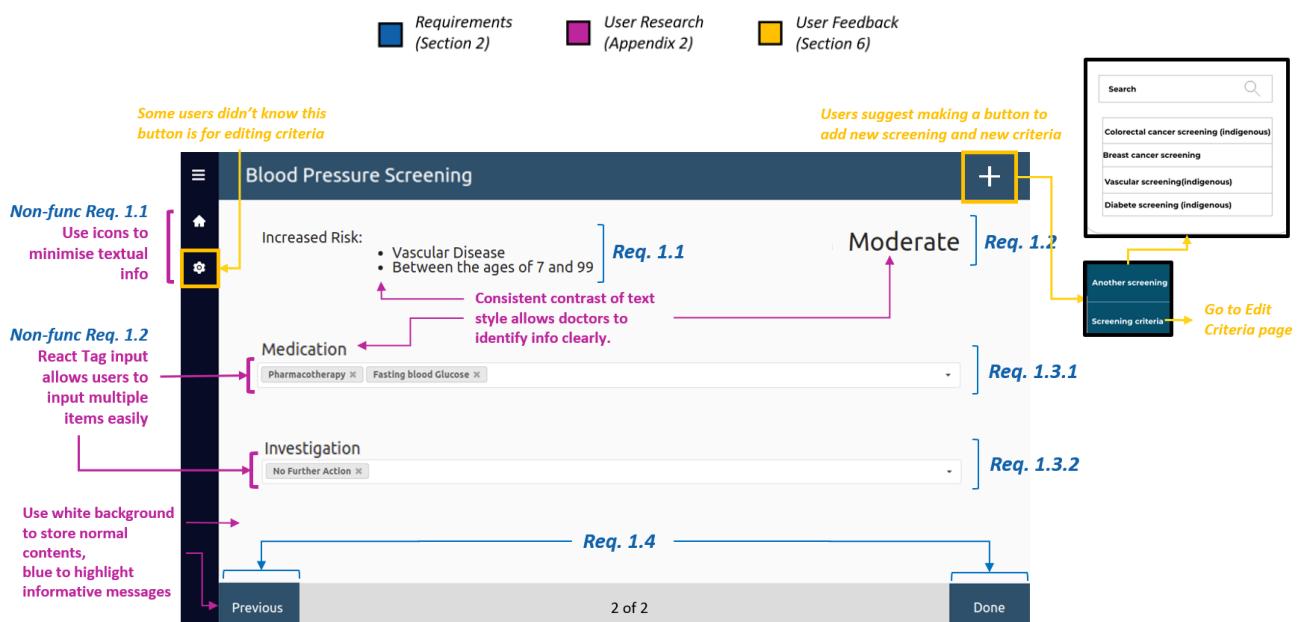


Figure 10 Screening page

Group	Activity	Age	Frequency	Priority	Actions
Vascular Disease	Blood Pressure Screening	7 - 99	24 - 36	Moderate	Req. 2.2 Req. 2.3
Vascular Disease	Cholesterol and Other Lipids Screening	35 - 99	12 - 24	Moderate	Req. 2.3
Vascular Disease	Colorectal Cancer Screening	40 - 99	0 - 24	Moderate	Req. 2.3
Cancer	Breast Cancer Screening	40 - 65	6 - 12	Moderate	Req. 2.3
Cancer	Type 2 Diabetes Screening	25 - 65	0 - 36	Moderate	Req. 2.3
Vascular Disease	Kidney Disease Screening	30 - 99	12 - 36	Moderate	Req. 2.3
Vascular Disease	Type 2 Diabetes Screening	17 - 99	12 - 24	Moderate	Req. 2.3
Vascular Disease	Stroke Screening	45 - 99	6 - 36	Moderate	Req. 2.3

Avoid using red and green color together, as medical workers may have color deficiency.

Figure 11 Edit Criteria page

Screening Form

Users think this should be "Add/Edit Criteria"

Screening group Vascular Disease	Frequency From 24
Activity Blood Pressure Screening	Frequency To 36
Min Age 7	Priority Moderate
Max Age 99	Submit Reset

Figure 12 Add/Edit Criteria popup box

5. Implementation

5.1 Architecture Model

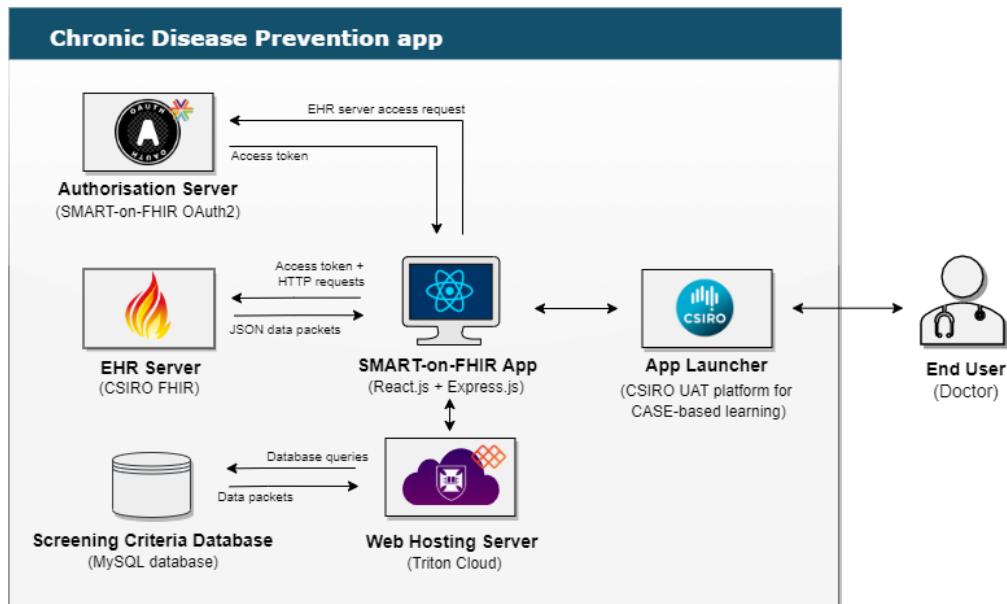


Figure 13 Architecture model

5.1.1 FRONTEND

React Native

React native provides the app's interface while Express.js is used to import API into the app. The team uses them as frontend engineers are familiar with React.

5.1.2 BACKEND

SMART-on-FHIR OAuth2

OAuth2 grants an authentication token for accessing the EHR server.

EHR FHIR Server

The app sends HTTP requests and an access token to the FHIR server to retrieve data in JSON format. This data is then parsed to determine the potential screenings which a patient may require based on previous medical history.

Triton Cloud (UQCloud)

Triton is the platform that hosts the web app on a virtual server. The team used Triton Cloud since most developers are familiar with this tool.

5.1 Project Installation

Step 1	Open Command Prompt, go to the project directory and run <code>npm start</code> .
Step 2	Open http://localhost:8081 to view it in the browser. It required the production build folder in <code>./chronic_disease/build</code> .
Step 3	Run <code>npm run client-install</code> to install required node packages for the <code>chronic_disease</code> project. Build the production <code>build</code> file in the <code>server</code> folder.
Step 4	Run <code>npm run server-install</code> to install required node packages for <code>server</code> folder
Step 5	Run <code>npm run create-db</code> to create the database for the application to function. Loads the sample data into the database.
Step 6	Run <code>npm run frontend</code> to start the frontend development server that can be used by the application whilst developing.

5.2 Use of SMART OAuth2

1. Save the credentials required to be authorised by OAuth. (*in server/app.js*)

```
const smartSettings = {
  clientId : "chronic_disease",
  redirectUri: "/app",
  scope : "launch/patient patient/*.read openid fhirUser",
  iss : "https://launch.smarthealthit.org/v/r2/sim/eyJrIjoIMStsImIi0iJzbWFydC03Nzc3NzA1In0/fhir"
};
```

2. When launching the app in /launch, request [`req`] the resource [`res`] by authorising with the `smartSettings` array. (e.g. `req = getAll()`, `res = patient's screening`)

```
app.get("/launch", (req, res, next) => {
  smart(req, res).authorize(smartSettings).then(next);
});
```

3. After the client is authorised, retrieve requested patient information into the variable `patientInfo` from FHIR R4.

```
app.get("/app", (req, res) => {
  smart(req, res).ready().then(client => {
    handler(client, res).then(result => {
      patientInfo = result;
    }).catch(err => {
      console.log(err);
    });
  });
  res.redirect('/');
});
```

4. If `patientInfo` is not empty, instantiate a Screening page with necessary patient information to determine screening criteria.

```
app.get("/api/screenings", (req, res) => {
  if (patientInfo !== undefined) {
    screenings.getScreenings(patientInfo, criteriaRepo.getAll()).then(screenings => {
      res.type("json").send(screenings);
      res.status(200);
    })
  }
});
```

5.3 Use of FHIR

FHIR is a major component of the application. This application relies on retrieving data from the Patient resource collected, and updating the following FHIR resources in the process.

5.3.1 Patient

The Patient resource is the main method used to evaluate whether the user was eligible for a certain medical screening. It uses the following patient information to do so:

- **Identification for laboratory results related to a screening**
 - e.g. from client's guidelines, "serum total cholesterol >7.5 mmol/L" is identified as having high risk of hypertension.
- **Age, weight, and time since last screening**
 - e.g. from client's guidelines, "≥40 years of age and being overweight or obese" is identified as having high risk of type 2 diabetes.

The above information is retrieved from the patient, then run through criteria that had been stored in the Screening Criteria database. It is important to note that originally the team plans to use CDS hooks to retrieve information. However, due to the developer's inadequate time to implement an extension to a FHIR resource and authorization problems, there were issues with the team connecting to the CSIRO FHIR server.

```
/*
 * Determines the age of the patient information received from a fhir r4 resource.
 * @param patientInfo JSON Object from fhir r4.
 * @returns {number} The age of the patient in years.
 */
function determineAge(patientInfo) {
    const dobString = patientInfo.birthDate;
    const dob = new Date(dobString);
    const curDate = new Date();
    return curDate.getFullYear() - dob.getFullYear();
}

/*
 * Evaluates the patientInfo against the criteria and appends.
 * @param patientInfo JSON Object from fhir r4
 * @param criteria JSON Array with criteria information
 * @returns {[{}} The determined screenings and information.
 */
async function getScreenings(patientInfo, criteria) {
    const screenings = [];
    const age = determineAge(patientInfo); // 1. After retrieving patientInfo into an array, convert its date of birth into age.
    await criteria.then(criteria => {
        criteria.forEach(function (info) {
            if (age > info.minAge && age < info.maxAge) {
                screenings.push(info);
            }
        });
    });
    return screenings;
}

var componentList = []
axios.get("/api/screenings").then(screenings => {
    for(var i = 0; i < screenings.data.length; i++) {
        const toPush = {
            content: createScreen(screenings.data[i]),
            title: screenings.data[i].activity
        };
        var add = true
        for(var j = 0; j < componentList.length; j++) {
            if (componentList[j].activity == toPush.title) {
                add = false
            }
        }
        if (add) {
            componentList.push(toPush)
        }
    }
    setComponent(componentList)
})
```

5.3.2 Appointments

The appointment resource is used to query patients' check time since last screening. For example, it would be queried to see when a patient's colorectal cancer screening had been conducted. If it is outside the recommended time range, then the criteria would pass him through for a colorectal recommendation. Then, if the doctor decides to take action on the screening that was suggested, this resource would be updated .

5.3.3 SNOMED CT

SNOMED CT is used when the doctor is selecting a patient's medication based on the screening recommendation. The resource is a clinical data dictionary which stores terms into a code system so that developers can retrieve accurate terms using its identifiers. This reduced medical errors caused by semantic misunderstanding or language barriers. Its usage does not require prior OAuth authentication. Thus, to implement SNOMED CT, just query the SNOMED API based on a filtered search term.

```
const searchThing = e.target.defaultValue
axios.get(`https://ontoserver.csiro.au/stu3-latest/ValueSet/$expand?url=http://snomed.info/sct?fhir_vs=ecl%3C%3C18629005&filter=${searchThing}&count=10`)
.then(res => {
  console.log(res.data.expansion.contains)
  const temp = []
  for(var i = 0; i < res.data.expansion.contains.length; i++) {
    temp.push({text: res.data.expansion.contains[i].display, value: res.data.expansion.contains[i].display})
  }
  setState(temp)
})
```

1. The FHIR server ValueSet resources
 2. Call the SNOMED API with `url` attr
 3. Enter the term to be searched in the `filter` attr
 4. Enter the search result into the drop-down menu data list for Medication and Investigation

Figure 14 Code snippet in src/AddMedsToCriteria.js

5.3.4 Schedule

The Schedule resource was implemented last as a future feature for the application. Due to time and resource limitations, this feature was only implemented in a development sandbox and never made it to final production. Nevertheless, the team has ideated the resource's usage: once the Appointment resource has been updated regarding the screening details, an appointment would be scheduled based on further input from the doctor such as time, location, etc.

6. Testing

6.1 Method

During the testing session, each participant was given a clinical scenario to perform. They were asked to do tasks using the Think-aloud method. This method allows participants to elaborate their thoughts while interacting with the interface. After that, a SUS (System Usability Scale) form was provided to collect quantitative data.

6.2 Design of user testing

To address non-functional requirements, the goal is to appraise the application's ease of use, usefulness, and efficiency in the perspective of medical students. The test also assesses users' fluency to perform all actions in the functional requirements, including assigning treatments, adding and editing screening criteria. The fluency will reflect the intuitiveness of the user interface.

According to the theory of Rogers (2005) that usability testing in the health domain should be more scenario-based, because it provides opportunities for learning how the system actually functions and malfunctions, through demonstrations of how users (doctors) accommodate and adapt to the technology change without influencing patient safety. The scenario-based testing also provides a more holistic view of the application compared to traditional straightforward task testing. The development of a usability scenario is guided by Russ and Saleem (2018).

In order to collect qualitative data for future development, the Think-aloud method was adopted. This method allows test hosts to comprehend users' mental model, as well as the causes of their actions.

6.3 Result

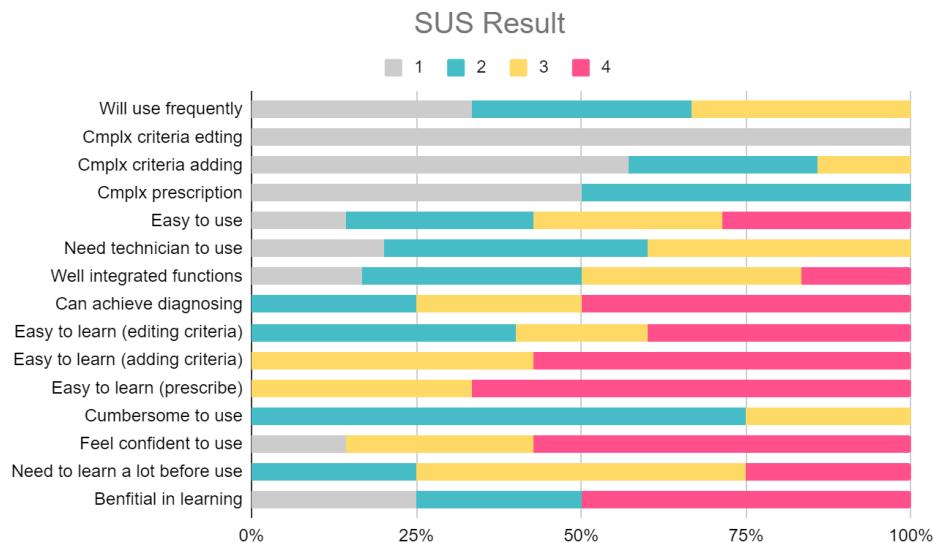


Figure 15 System Usability Scale Results

The SUS questions above are divided into three main dimensions:

- Question 1- 8 : Perceived usefulness
- Question 9 - 13 : Perceived ease of use
- Question 14 - 15 : Attitudes

On average the SUS score is 80.5 – Grade A. This means that the usability of the web app is of excellent quality. The statistics of the user testing result could be found in Appendix 6.

6.4 Analysis

In the “usefulness” dimension, most users are able to achieve a diagnosis, and prescribe the right treatments according to the given clinical guidelines. Two participants provided an interesting insight — they asked for solutions in case there were extra screenings that they thought would be suitable for patients. As the purpose of this application is clinical decision support, allowing doctors to prescribe their added screenings could possibly improve patient outcomes. More importantly, the system is made according to the guidelines given by the client only. Consequently, the system may not generate the screenings outside the scope of the guidelines. Thus, the team would implement an interface which allows doctors to add extra screenings.

Also, one should note that merely 50% of users thought the application has “**well integrated functions**”. This can be reflected from users’ confused reaction when asked to add and edit screening criteria.

“Where can I edit the criteria? Why can't I edit the criteria on the same page?”

-- Participant A (Think-aloud)

The quote explains their confusion, in which they think they could edit the criteria on the same page. After asking for elaboration, the team found that they either did not notice the “Edit Criteria” button on the side navigation bar, or they didn't think that's the button which will navigate them to add and edit criteria page. To rectify this, the team will move the “Edit Criteria” button from the side navigation bar to the Screening page.

In the “ease of use” dimension, 60% users rated 3-4 in “**Ease of Use**”, demonstrating a flat learning curve among users. However, 75% of users think they “**Need to learn a lot before use**”, and 60% **need technician's assistance to use it**. In order to facilitate their learning process, onboarding flows (animated tutorial of interaction) could be provided for first-time users as guidance. As visual promotions are highly intuitive, not only will it facilitate the learning process, but it will also increase user engagement (Korzetz et al., 2020). Alternatively, each main function should be accompanied with an  button to explain its meaning and appropriate interaction.

Within the Edit Criteria page, users think editing new criteria is simpler than adding a new criterion. **While 100% of users find it easy to edit criteria, there is only 70% for adding criteria**. From observation, most users are able to identify the “Edit” button because it's in the same row of each screening list, but the “Add” button is above the list of criteria. Furthermore, the low color intensity of the “Add” button also explains why users take longer to add new

criteria, since it makes the button unnoticeable. To correct this, the add criteria button could be in the same place with delete and add button. Hence, instead of separating screening page and setting page completely, users can directly add or edit criteria in criteria page.

In addition, some users gave suggestions on the criteria's metrics. The current scope only covers age, frequency, screening group and priority. Yet, there are other metrics that play a vital role in diagnosis, such as family history, race, and etc. The team plans to explore deeper in this scope in the future.

Due to the pandemic, the team had limited access to target users, with only 6 medical students participating. Although the team can get deep insight from target users, the sample size is far from the quantitative requirement. Therefore, the SUS results might not provide actual application's usability.

6.5 Conclusion

Overall, the user testing has critically reflected on the application's ease of use, usefulness and users' attitude. 95% users are able to perform most tasks listed in the functional requirements: prescribing treatment, add or edit criteria. Nonetheless, there are feedbacks showing that target users may not be able to perform some tasks efficiently.

Future teams can use this as a reference in future testing, as a comparison to the usability of their improved application.

7. Future Development

Visualisation of Screening Criteria

This idea is proposed by the team's UX designer, who left the team for health reasons before she was able to implement it. According to user research in *Appendix 2*, doctors may make medical errors when working long hours. In order to prevent cognitive fatigue, the team should aim for replacing textual information with graphics where possible. For instance, each criteria risk percentage can be shown as a heat map, with red, yellow and green representing risk level (Bezemer et. al 2019). Therefore, the team would assess the potential of her idea in the future.



Figure 16 heat map
showing health risks of
different patient types

Database Structure and Query Optimisation

This is not implemented in the current stage, as the client only requires the application to handle colorectal cancer and cardiovascular disease criteria (*Section 1.3.1*). In the long term, the team will make database query processing faster as the database scales up. It is important since from the guidelines provided by the client, it seems that there will be more screening criteria than that the current database is handling. Therefore, the team's backend engineers suggest removing redundant servers and code required for authentication.

Explore Deeper into Screening Criteria Metrics

User feedback suggested that the current criteria metrics are inadequate to detect whether a patient meets a screening criterion. After that, the team has ideated new metrics from guidelines such as family history and ethnic background. Nevertheless, there is not adequate time to implement this at the current stage. This is because the database will require restructuring, and the code to determine whether patients meet the criteria (according to that metric) will also need to be implemented. Therefore, the team suggests holding a focus group with a group of health professionals to understand practical experiences in using these guidelines. For team discussion results see *Appendix 8 Week 12*.

Incorporate A/B Testing

In the current user testing, the session exceeded the estimated time with the Think-aloud method. The team was not able to test whether users can operate each action efficiently (Non-functional requirement 1.4) as participants spent most of the time elaborating their thoughts. As a result, A/B testing will be conducted between different versions. The A/B testing should be more summative, so the team will be able to focus on the end-user performance, such as usability errors, time on task and etc. In addition, UX experts should be also invited to do heuristic evaluation, so as to better apply usability principles to the interface and compliance.

App Launching on EHR Server

Last but not least, the team should launch the application using an EHR platform. In Week 11, the team encountered an issue when transferring the application from the development sandbox to the FHIR server. As mentioned in *Section 5.3.4*, this has led to delays in implementing some FHIR resources. As a result, the team would strive to implement this in the future.

8. Reflection

Zhijiang Wang:

This was the first time I used React to collaborate with a team. Some part of my code is really not semantic, as I still write it in my personal habits, which do hinder the productivity of the whole team. Because our team adopted the approach of developing back end and front end separately, I didn't have the chance to explain what's going on in my code. When other group members finish wrapping up api , and get back to check front end stuff. I think the whole experience became extremely painful for them. However they are still being supportive and kind to me. I really appreciate their kindness. There was a change of the scope about this project from the client, which caused us to have different mindsets towards the whole project. In terms of user experience, we did not have access to the target users group at the initial stage. As a result of that we find some of the functions did not match their needs. Especially they find the metrics of criteria that we defined are not well explained. Thus i think a focus group of the health profession is necessary to gain a holistic view of the domain space from tager users.

Overall, our group members are really kind and productive. If we communicated more frequently, the project might get better. Also for myself, I really need to make sure the code is semantic , and if the team develops the project separately, annotation should be written in important components.

Tsz Yan Nicole Fung:

Overall, I think the team has collaborated well in allocating tasks to the right talent. Since I am experienced in system design and analysis, I feel accomplished and valued by contributing to Weekly Logs and documentation.

Throughout the course, the team has followed Team Charter rules. For instance, two team members have to balance their engineering placement and study, which may hinder their contribution. Thus they are given simpler but more advanced work. This adheres to Team Charter's rule that every team member should contribute equally. When resolving issues the team, especially the team leader, also adheres to Team Charter rules to be supportive, respectful and constructive. For example, the frontend engineer is not experienced in Git, so other team members taught him patiently. In addition, although members who are in the placement cannot be contacted on Discord during work, they will report their progress and actively contribute to team discussions in class sessions.

Nonetheless, some may not have followed team messages fast enough on Discord/Slack, and so causes miscommunications in the project. To rectify this, the Weekly Logs could help to inform them communications they may have missed. However, I think I didn't put effort into making it obvious to the team, which may demotivate the team to find the documents. Therefore, it will be more appropriate to post logs or summary on Discord instead of only storing them on Google Drive. As for documentation, I should have strategically filled out the part where presenters can summarise before Week 12's presentation, so they won't have to scan the Weekly Logs to find discussion results.

Oliver Stack:

This project was personally one of the first times collaborating with a client who had designed the specification sheet themselves. Not only did I, individually, have to interpret the client's vision but had to consistently collaborate with group members' interpretations as well which was definitely one of the more challenging aspects of the project. The main issue of creating a scope with a new team is the issue of under/overestimating team members ability to contribute to the project. I personally wish that I had been more hands on with some of the initial front-end design framework as towards the end of the project, when I was required to implement features, most of my time was spent deciphering what has been previously implemented, learning the syntax of the language, and, reinterpreting the vision of the head front-end developer.

The biggest hindrances of the project through my perspective would have to be one of the team members dropping out halfway through the course as well as myself taking on a part-time engineering job experience. A team member dropping out can not be helped and was a challenge that our group adapted to effectively with Nicole especially stepping up to share the entire load of documentation and collaboration with the client. A huge help towards the end of the project especially when other assessment documentation was converging. My own challenge of balancing my part-time job however could be seen as a definite detriment to my contribution quality to the project. I chose to take on a job for personal reasons expecting to handle the work-study balance well, however, ended up favouring the job resulting in a decline of contribution. Towards the end of the project I did put my job on hold for the final sprint which in hindsight was a necessity.

Moving towards more of my specific contributions to the project, I was tasked with implementing the fhir connection and authentication using our express backend. This decision to use two applications for the front and back end actually ended up being our downfall as majority of the documentation on how to connect to fhir was written in react/html with only little assistance provided for express and by the time we discovered this it was too late to redo our entire structure. Connecting to fhir using express was relatively easy however the documentation provided was quite technically worded and provided a single example that had errors embedded in its own code. This was especially challenging for myself as I have never done any backend development and specifically choose to be a part of this sub team to learn. Conversations with Jim from CSIRO helped my understanding as well as consistent collaboration with my team member Tristan allowed us to most implement our fhir connection into our final product with minor issues relating to the authentication. Overall, the experience did allow for a more thorough understanding of network systems, however, a second team member experienced in the field and/or more specific implementation examples relating to our express implementation would have been immensely helpful.

Tristan Wright:

Throughout the duration of this project there were many obstacles that were overcome in order to successfully create a Smart-on-FHIR application. As the team leader it was my responsibility to ensure that communication was occurring between members allowing for productive work to be completed on time. This was my first time leading a project that involved a large number of members and thus communication strategies were required in order to provide adequate channels of communication between members. This increased the productivity of members as questions and tasks could be discussed efficiently reducing the time-on-task by developers.

After forming our initial team we introduced roles within the team in order to manage the required work to be completed throughout the semester. This involved selecting the proposed technologies to design and implement the application. Nicole volunteered to manage documentation, design and track meeting minutes whilst they were conducted throughout the studio sessions during the semester. Zhijiang focussed on designing the implementation of the applications frontend. Myself and Oliver chose to implement the api communication and business logic of the application. This required us to have extensive discussions with our client at milestones throughout development to ensure that the proposed design of the application was being achieved. Shao was given the responsibility to manage the prototype design of the application and conduct testing throughout the project development. Unfortunately she could not continue with this course and thus her tasks had to be redistributed within the team. Nicole was able to incorporate testing into her workflow whilst Zhijiang was able to complete the frontend development with the help of myself and Oliver.

A major struggle which occurred during the development of the application was adhering to the set timeline in which we agreed upon. This became an issue as the specification that was provided by our client was altered after the first month of development. It included a fundamental change to the system and required a redesign of the backend of the application. A database was needed in order to store custom information criteria that was provided by the client to determine the screenings which a patient may require. This differed from the initial implementation which relied on FHIR resources to determine this criterion. In order to overcome this challenge we utilised our development strategy and changed the goals for the given sprint to produce a working prototype whilst adhering to the development schedule.

This was my first time accessing and using a FHIR based API service. The documentation was overwhelming and there were little provided examples that worked successfully. During the design and implementation process I relied on trial and error in order to connect with the FHIR api service. This proved a difficult task for a single member, and I requested assistance from teammates using the before mentioned communication channels to complete the implementation. Discussions were conducted between my team, our client and the members of CSIRO to understand the inner design of the system. This experience as a whole has improved my knowledge, not only as a developer but it has improved my teamwork, communication and leadership abilities.

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Appendix

Appendix 1: Team Charter



School of Information Technology and Electrical Engineering

COMP3000 Team Charter

Date: 18/08/2020

Team Name: Chronic Disease

Team Members

Name: Zhijiang Wang

Email (Use your UQ email): zhijiang.wang@uqconnect.edu.au

Name: Oliver Stack

Email (Use your UQ email): oliver.stack@uqconnect.edu.au

Name: Tristan Wright

Email (Use your UQ email): tristan.wright@uq.edu.au

Name: Tszy Yan Nicole Fung

Email (Use your UQ email): tszyannicole.fung@uq.net.au

Name: Shao Qi Tan

Email (Use your UQ email): shaoqi.tan@uq.net.au

Online tools

Messaging or Discussions

Other messaging tools

Facebook group

Google Groups

Other messaging tool

Discord



School of Information Technology and Electrical Engineering

COMP3000 Team Charter

Online Meetings

- | | |
|---------------------------|-------------------------------------|
| Zoom | <input checked="" type="checkbox"/> |
| Skype | <input type="checkbox"/> |
| Google Hangouts | <input type="checkbox"/> |
| Other online meeting tool | |

Creating documents

- | | |
|----------------------------------|-------------------------------------|
| Google Drive – Doc, Sheets, etc. | <input checked="" type="checkbox"/> |
| Office 365 – Word, Excel, etc. | <input checked="" type="checkbox"/> |
| Overleaf | <input type="checkbox"/> |
| Other document tool | |

Responding to messages and emails

How often should we check messages and emails?

Messages Daily

Emails Every two days

When assessments are due should we check more often? Yes

Communication response time (see 6) within one hour

Meetings/time

Whole of team meeting day and time (see 1b) Tuesday 16-18, Friday 10-12

Additional work sessions each week (see 1c) Monday 10:00am (around 2 hours)

Time to fix an issue (see 15a) one day

Privacy

Do we need to record online meetings?

Yes No



School of Information Technology and Electrical Engineering

COMP3000 Team Charter

Problems or Disagreements

What should we do if we have a problem with another team member's behaviour or work?

Good communication between members. Interventions. Tutor talks if necessary.

Team Roles

Leader (to keep the group motivated or on task): Tristan Wright

Note or minute taker: Tsz Yan Nicole Fung

Other team role(s): Front-end, Back-end

Will we rotate roles? Yes No

If so, how often will we rotate? Every 4 weeks

Other comments:

N/a

Signed and Accepted

MD O

Tsza

Tristan

**Our Commitment**

1. As a team, we commit to:
 - a. Use our best endeavours and efforts throughout the project.
 - b. Attend all course studio sessions, the whole of team meeting as specified above, and any additional meetings agreed on by the team.
 - c. Dedicate necessary time and effort as is required by the team including the additional hours per week specified above.
 - d. Contribute to the project equally.

Work consistently and complete all required tasks on time and at a quality as agreed by the team.
2. We will work together by:
 - a. Supporting each other;
 - b. Being respectful and inclusive;
 - c. Sharing resources;
 - d. Listening to each other;
 - e. Providing feedback to each other;
 - f. Always being constructive and polite; and
 - g. Maintaining a high level of communication.

How we will communicate

3. We will use the team communication channel for all our team communication.
4. Where necessary, we will also communicate via email and/or other online tools using the details for each team member provided at the start of this charter.
5. Each of us commits to checking the team communication channel at least daily, except on weekends and public holidays.
6. We will respond to messages on the team communication channel within the communication response time specified above.

How we will make decisions

7. Decisions about the project will be made by consensus (with all team member's agreement).
8. We will work towards reaching agreement by working through pros and cons and assessing what is best for the project.
9. Where we cannot achieve consensus, decisions will be made by majority vote.
10. Where there is a deadlock, the decision will be made by the team leader.
11. Once a decision has been made, we all agree to accept and support that decision.

Managing work

12. We will allocate work equally.
13. When allocating work, we will clearly define:
 - a. Who is expected to complete the work;
 - b. The task that is expected to be completed;
 - c. When the work is to be completed; and,
 - d. The expected standard of the work.
14. If a team member is not able to complete the work allocated to them, they must advise the team of this as soon as possible.
15. If a team member has not completed the work allocated to them within the set timeframe or not to the specified standard:
 - a. The issue must be raised with that team member directly and agree what that team member must do to complete or fix the work. The team member must complete or fix the work within the time to fix an issue as specified above.
 - b. If the team member fails to complete or fix the issue within this time, the team leader must send an email to that team member asking them to complete or fix the work within a further 24 hours. That email should be copied as a 'cc' to the tutor.
 - c. If the work is not completed within that time further extended time, the team leader shall email their tutor advising them of this and ensure that a copy of this email is sent to the team member.

Appendix 2: User Research

Most HIT project failure could be attributed to non-technical factors of poor interface design (Kaplan & Harris-Salamone 2009). Therefore this research focuses on interface design principles for doctors.

Typically, when eliciting technology acceptance from healthcare workers, **perceived ease of use**, **perceived usefulness** and **attitude** are the three main factors used to measure usability (Wu et. al 2007, Dünnebeil 2012). While perceived usefulness means to what extent one thinks using the system would improve his/her job performance, perceived ease of use means to what extent one thinks using the system would be effortless (Davis 1989).

To ensure ease of use, the user experience should **prevent cognitive fatigue** of doctors. Healthcare workers will often need to work night shifts, which their fatigue will lead to medical errors (Dean et. al 2006). Consistent contrasts of position, color, or text style could build a clearer visual hierarchy, and so help users to identify various types of information better (Still 2018). Moreover, 7%-11% male practitioners have color deficiency, which means they cannot distinguish red from green (J.A.B 1999). In order to prevent this, the interface should use blue color for informational messages, white background for normal contents, and avoid using red and green together (Horsky et. al 2012).

To ensure usefulness, the user experience should **add value to doctors' original clinical workflow**. For digital systems, healthcare providers would often need its direct interoperability to resolve uncoordinated care (Lane et. al, 2018). Consequently, Health technology's value added could be its semantic interoperability using health data standards such as SNOMED CT.

Other than that, **efficiency** could also be useful to a doctor's clinical workflow. Various studies have listed "disruption of clinical workflow" as the cause of low adoption rate because it hinders staff's speed to perform the same task (Morgan 2019, Inokuchi et al. 2018, Varpio 2015). In practice, the three-click rule is a way to increase users' reachability to interface elements, and thus ensures efficiency in user interface (Wisniewski 2008).

Appendix 3: Prototype Iterations



Prototype (ver.1): Content approved in Week 3

The screenshot shows a patient profile for 'TURNBULL, Bill' with details like Name: TURNBULL, Bill, Date of Birth: 1962-07-27, Age: 58 years, Sex: male, and Current Location: Resuscitation Status:.

What you might ask patients to do

2. Can be changed to "Recommendation"

3. Should have the name of the screening

4. The text can be larger

5. The dropdown box doesn't look like one, perhaps add an arrow to it (both team & client)

6. The dropdown box can be spanned full length to input multiple values.

7. There would be multiple screenings for a patient, so the "Next" and "Previous" button would be better

Active filter

- Cancer
- Vascular

Prevention Type

- Chronic disease
- Vascular disease
- Cancer
- Osteoporosis
- Psychosocial
- Elderly

Prototype (ver.2): Aesthetics approved in Week 3

The screenshot shows a patient profile for 'TURNBULL, Bill' with details like Name: TURNBULL, Bill, Date of Birth: 1962-07-27, Age: 58 years, Sex: male, and Current Location: Resuscitation Status:.

Recommendations

1. The client missed the title during testing, so make it more visible

2. Thinks it looks empty here

Colorectal Cancer Screening

Category 2 (1-4% 10 year risk)

- One first-degree relative with CRC diagnosed <55 years

6. Some suggests adding the no. of comments near it, like the ones on Instagram

Medication

7. Likes the 3D design of the dropdown boxes

Take no further action

Investigation

Take no further action

4. (From client's concept interface) Add other actions like and Do not Show again.

5. Thinks the color could be more distinguishable from the patient info top bar

Comments

This is an example of a note.
Staff Name 25/8/2020

This is an example of a note.
Staff Name 25/8/2020

Write a note...

3. Like the comment section, think it makes sense to have it

Previous 1 of 2 Next

Prototype (ver.3): Comprehensiveness approved in Week 4

The screenshot shows a patient profile for 'TURNBULL, Bill' with details like Date of Birth: 1962-07-27, Age: 58 years, Sex: male, and Gender: MRN: 62409. On the left, a sidebar lists 'History', 'Conditions', 'Physical Exam', 'Investigations', 'Medication', and 'Case'. The main area has a 'Recommendations' section with a note: '1. The team raised a question about whether the screening name should be here, client agrees.' Below it is a 'Colorectal Cancer Screening' section with a purple box containing 'Category 2 (1-4% 10 year risk)' and '- One first-degree relative with CRC diagnosed <55 years'. To the right, there's a 'Comments (2)' section with two entries: 'This is an example of a note.' (Staff Name: [redacted], Date: 25/8/2020) and 'This is an example of a note.' (Staff Name: [redacted], Date: 25/8/2020). A note at the bottom says '4. Add a new section for doctors to add topics to discuss with patients'.

Prototype (ver.4) Final version approved in Week 5

The screenshot shows the same patient profile and sidebar as the previous version. The 'Colorectal Cancer Screening' section now includes three expandable sections: 'Medication' (with 'Take no further action'), 'Investigation' (with 'Take no further action'), and 'Discussion' (with 'Take no further action'). A note at the bottom says '1. Change default dropdown value to "None", "Take no further action" means the doctor voluntarily choose to not take actions after viewing criteria.' To the right, there's a 'Comments (2)' section with the same two entries as before. A note at the bottom says '1. Suggests including a new option "Others..." in the menu, when chosen user can type the specific things they want to discuss'.

Appendix 4: Activity Diagram Iteration

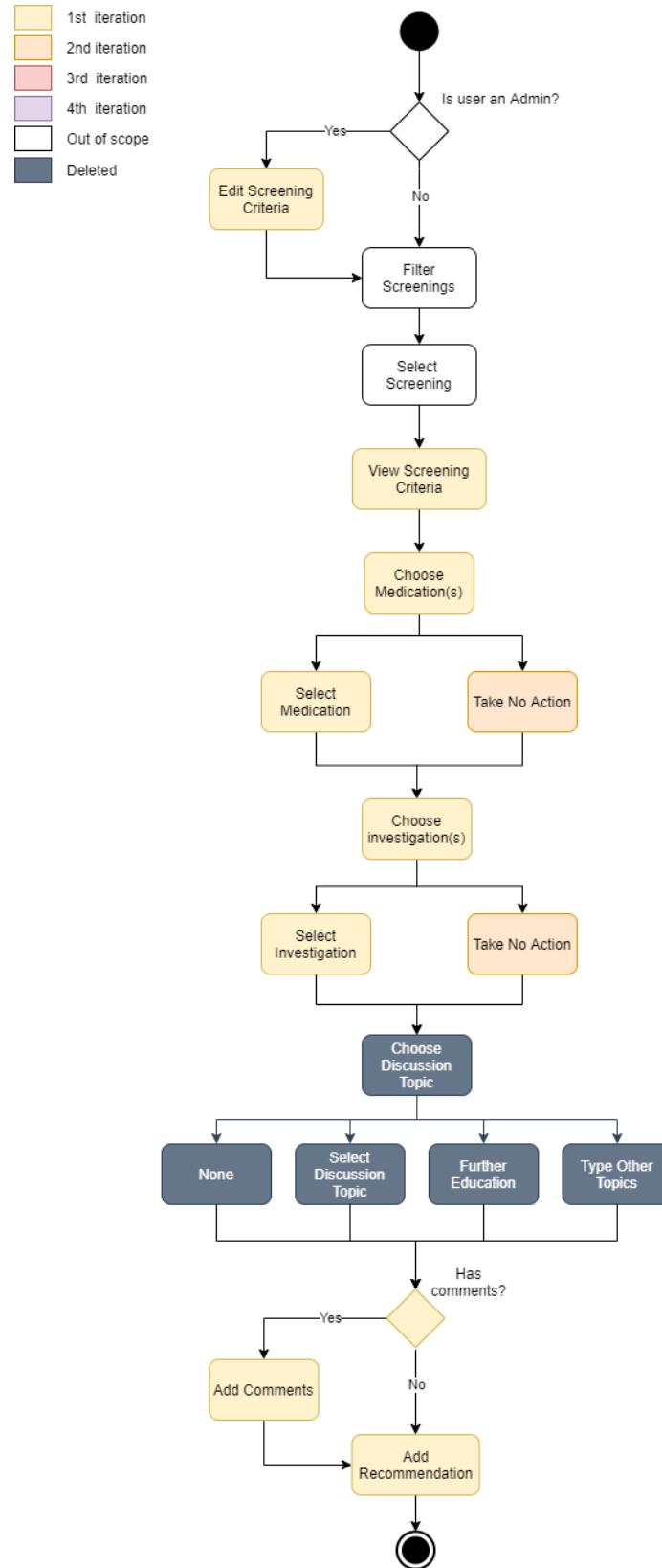


Figure 17 Iterations of process flow

Appendix 5: User Testing Protocol

Protocol of SUS

Creator name	Team Chronic Disease
Aim	<ol style="list-style-type: none"> 1. Make sure whether our system meets a standard of usability. 2. Get insight for betterment of the system. 3. Obtaining the feedbacks of internal logic of this application
Number of participants	6

Background

Purpose of the web app:

Assist doctors to identify whether a patient meets the criteria of a screening, and give interventions for the screening such as medication and investigations.

FHIR resources:

The criteria of the screenings are retrieved from FHIR resources and displayed to doctors.

Preparation

Materials needed:

- Laptop that can access to the high-fidelity prototype
- The web application
- Usability testing sheet(google drive)
- Tools for recording user's feedback (pen and paper/laptop)
- guidelines for preventive activities in general practice PDF

Task:

1. Recommendation page

- View the criteria for a cancer screening
- View the remarks from previous doctors, and assign the medication and investigation
- Choose the topic “Further Education” to be discussed with the patient
- Add remarks for other doctors to see, and navigate to the next screening

2. Settings page

- Navigate to the Settings page and view the existing criteria of Type 2 Diabetes
- Delete and add criteria

Timeline

Time	Activities
0-5 mins	<p>Explain the concept and interaction mode for users.</p> <ul style="list-style-type: none"> · The goals of the chronic disease application. · Function of this application (assisting doctor to prescribe appropriate treatments and give doctor access to edit and add criteria because screening criteria changes every 3-5 years) · what they could gain from using this application, · How they interact with this app.
5-13 mins	Giving users task to achieve(for host check the task table below)
13-16 mins	<p>Provide google sheet for users to answer https://docs.google.com/spreadsheets/d/1SxdXeQO2PiCM4iiHqJ7go4888-sBn_WSN7k19ZMwiw4/edit#gid=0</p>
16- 20 mins	<p>Having an informal interview with users to gain qualitative data.</p> <ul style="list-style-type: none"> · Do you think this tool has potential to enhance your understanding of prescribing medication for patients?(explain why if that's possible) · Do you think that this tool has potential to enhance your case-based learning experience? · Etc

Tasks

Task	Observation	Task Purpose	Notes
#1 View the criteria for a cancer screening, then assign interventions for this patient.	<p>Comprehensiveness:</p> <ul style="list-style-type: none"> · The number of mistakes made before clicking the correct element. <p>Functionality:</p> <ul style="list-style-type: none"> · Any UI elements not working as intended? 	<p>From Use Case:</p> <p>Simulate a situation where a doctor is doing a screening check-up for a patient.</p> <p>Functional Testing</p>	

#2 Navigate to the settings page edit the criteria of colorectal cancer (change frequency to twice a year, age to 76)	Comprehensiveness: <ul style="list-style-type: none"> The time used to finish the task The number of mistakes made before clicking the correct element. Functionality: Any UI elements not working as intended?	From FURPS: Since screening criteria changes every 3-5 years, the current criteria is out of state they need to upgrade certain criteria. Functional Testing	
#5 Add new screening criteria (<i>colorectal cancer category 2</i>) according to the guidelines	Comprehensiveness: <ul style="list-style-type: none"> The time spent on typing new criteria and checking guidelines. Whether they type the right content in right section Functionality: Any UI elements not working as intended?	From Activity Diagram: Edit colorectal cancer screening criteria Functional Testing	
#5 Delete the criteria they added	Comprehensiveness: The number of mistakes made before clicking the correct element. Functionality: Any UI elements not working as intended?	From Activity Diagram: Edit colorectal cancer screening criteria Functional Testing	

Interview Notes area

- Do you think this tool has potential to enhance your understanding of prescribing medication for patients?(explain why if that's possible)
- Do you think that this tool has potential to enhance your case-based learning experience?

Appendix 6: User testing Results

Question	1	2	3	4	5	Average	1	2	3	4
I will use this tool frequently	1	3	3	3	2	2.400	1	1	1	0
I found using this tool for editing screening criteria complex	1	1	1	2	3	1.600	1	1	0	0
I found adding new criteria unnecessarily complex.	1	2	2	1	1	1.400	3	2	1	0
I found prescribing a medication unnecessarily complex.	3	2	2	1	2	2.000	3	3	0	0
I thought the application was easy to use.	5	2	2	5	1	3.000	1	2	2	2
I think that I would need the support of a technical person to be able to use this system.	2	1	3	3	2	2.200	1	2	2	0
I found the various functions in this application were well integrated.	2	2	3	3	5	3.000	1	2	2	1
I can achieve diagnosing using this system.	5	3	2	5	3	3.600	0	1	1	2
Learning to edit current criteria is easy for me.	4	2	2	3	4	3.000	0	2	1	2
Learning to add new criteria is easy for me.	4	4	4	4	3	3.800	0	0	3	4
Learning to prescribe medication is easy for me.	4	3	3	3	4	3.400	0	0	1	2
I found the application very cumbersome to use.	2	2	3	1	2	2.000	0	3	1	0
I felt very confident using the system.	4	5	3	4	5	4.200	1	0	2	4
I needed to learn a lot of things before I could get going with this application.	2	3	1	5	3	2.800	0	1	2	1
I see benefits to my learning from the 'apps' incorporated within this tool.	2	3	4	5	3	3.400	1	1	0	2
Overall, I find this system useful.										
5 - Strongly Agree, 4 - Agree, 3 - Neither Agree nor Disagree, 2 - Disagree, 1 - Strongly Disagree										

Figure 18 SUS questions and scores

Screening page

Lung Cancer Screening

Category 2 (1-4% 10 year risk)

Patient history: Type 2 diabetes

Management: It would be ideal to offer smoking cessation advice at every visit for those at high risk of complications

Medication

Take no further action

Investigation

Take no further action

An adding button which enable user to add other screening for patient and also navigate them to criteria page

In the future, the team could add categories to organise the criteria. The categories could be based on the guidelines provided by client.

Previous 2 of 2 Done

Lung Cancer Screening

Search

Colorectal cancer screening (indigenous)

Breast cancer screening

Vascular screening(indigenous)

Diabete screening (indigenous)

Another screening

Screening criteria

Pop up a search window which allow users to search and prescribe new screening

Navigate to criteria page

Previous 2 of 2 Done

Criteria page

Criteria					
Group	Activity	Age	Frequency	Priority	Actions
cancer	colorectal	40 - 60	12 - 24	moderate	
Add criteria button aligning with delete and edit button in action area.					

Appendix 7: Extra Notes as Evidence of Client Requirements

This section includes client's quotes about requirements that are not in Meeting Logs.

From Week 1's pitch

1. Roles of doctors:
 - a. Diagnose and treat diseases
 - b. Promote health awareness and prevent disease
 - c. Stay up to date with knowledge [Req 2.1-2.4 Criteria change every 3-5 years]
 - d. Keep patient records
2. Key Components
 - a. SMART-on-FHIR app
 - b. Identify whether patients meet the screening criteria [Req 1.1]
 - i. Include check-time since last screening
 - c. Offer guideline-based screening based on above [Req 1.3.1-1.3.2]
 - d. Let doctors select preferred interventions [Req 1.3.1-1.3.2]
 - e. Record Interventions [Req 1.4]
3. Key part of disease prevention is identification
 - a. A common example from the client's provided guideline will be identifying the level of patients' disease risk (High, Moderate or Low) according to cardiovascular disease (CVD) risk.
 - b. He also mentioned the "Guidelines for preventive activities in general practice" guidelines are based on research studies and evidence.

From Week 7 when approving documentation through Google Docs

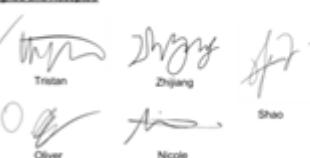
'the other key issue is that some patients come in with their own agendas and it's remembering to bring up potential disease prevention or even enabling the scheduling of future appointments that this tool would be beneficial e.g. "we didn't get time to discuss this today but it could be good to make an appointment to go through your bowel cancer risk because your father did suffer from bowel cancer..."'

Appendix 8: Weekly Meeting Logs

Week 3

 <p>School of Information Technology and Electrical Engineering</p> <p>COMP3000 Weekly Meeting Log</p> <p>Date: 18th August 2020 (Tue) 21st August 2020 (Fri)</p> <p>Team Name: Team Chronic Disease</p> <p>Items Discussed/Worked On</p> <ul style="list-style-type: none"> ❖ Chose Project 2 - Chronic disease prevention app ❖ Made the first Team Charter ❖ Made a team Discord and Slack channel ❖ Made a Google Drive folder for team file sharing ❖ Consulted the client for project expectations ❖ Allocated roles to team members (frontend & backend engineers, Frontend and Backend for short) ❖ Discussed what tools to use for building the backend (retrieving data from the FHIR API or from a database made by team) <p>Issues That Arose</p> <ul style="list-style-type: none"> ❖ ISU1: Frontend think the filter feature in the Settings page can be put in the Main page to make filter screenings more convenient ❖ ISU2: Since the requirements are scattered around different pages, it is hard to for some teammates to follow ❖ ISU3: Backend have trouble figuring out whether they should use FHIR API or they should create a database from scratch <p>Actions Required</p> <ul style="list-style-type: none"> ❖ Action for ISU1: <ul style="list-style-type: none"> > Make a prototype to visualize the alternative design, then let the client approve the design ❖ Action for ISU2 & ISU3: <ul style="list-style-type: none"> > Schedule a follow-up meeting with client to organize the requirements into a list/diagram <p>Deliverables/Plan To Be Completed By The Next Week</p> <ul style="list-style-type: none"> ❖ Task: An extra meeting with Client on before next Tuesday to organize requirements and approve the first prototype ❖ Task: Frontend should finish making Prototype (ver.1) by next Monday 	 <p>School of Information Technology and Electrical Engineering</p> <p>COMP3000 Weekly Meeting Log</p> <p>Consultation Activities With The Client</p> <ul style="list-style-type: none"> ❖ Client: Showed the initial concept of the app with a prototype ❖ Team: Understood that the target users are clinical doctors ❖ Team: Understood that the goal is to allow doctors to view a screening and give recommendations (medication and investigations) accordingly <ul style="list-style-type: none"> > Decided to prototype the Recommendation page first ❖ Team: Understood that the app's pages may include <ul style="list-style-type: none"> ■ Main page for selecting a screening to view ■ Summary page to show the content of the screening, in the form of either a pop-up or a new page ■ Recommendation page in the form of either a pop-up or a new page ■ Settings page for filtering screenings <ul style="list-style-type: none"> > Some teammates think the filter should be in the Main page instead ❖ Team: Understood that the FHIR server is going to contain information from Guidelines for preventive activities in general practice (10th edition), including symptoms and risks of various chronic diseases <p>Other Comments N/A</p> <p>Signed and Accepted</p> <div style="text-align: center;">  <p>Tristan Zhiyong Shao Oliver Nicole</p> </div>	 <p>School of Information Technology and Electrical Engineering</p> <p>COMP3000 Weekly Meeting Log</p>
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Week 4

 <p>School of Information Technology and Electrical Engineering</p> <p>COMP3000 Weekly Meeting Log</p> <p>Date: 24th August 2020 (Mon extra meeting) 25th August 2020 (Tue) 26th August 2020 (Fri)</p> <p>Team Name: Team Chronic Disease</p> <p>Items Discussed/Worked On</p> <ul style="list-style-type: none"> ❖ Frontend drafted Prototype (ver.1) on Monday ❖ Addressed ISU1: Consultation Activities With The Client on Prototype (ver.1) ❖ Addressed ISU2: Discussed interaction flow the app with client on Monday's extra meeting ❖ Addressed ISU3: Consulted the client for project requirement details, decided to implement a database for screening criteria ❖ Frontend made Prototype (ver.1 → ver.2) on Tuesday ❖ Consultation Activities With The Client on Prototype (ver.2) <p>Issues That Arose</p> <ul style="list-style-type: none"> ❖ ISU1: Frontend think the filter feature in the Settings page can be put in the Main page to make filter screenings more convenient ❖ ISU2: Since the requirements are scattered around different pages, it is hard to for some teammates to follow ❖ ISU3: Backend have trouble figuring out whether they should use FHIR API or they should create a database from scratch ❖ ISU4: Backend's website deployment depends on the tool Frontend uses to develop UIs <p>Actions Required</p> <ul style="list-style-type: none"> ❖ Action for ISU4: Discuss this issue next week <p>Deliverables/Plan To Be Completed By The Next Week</p> <ul style="list-style-type: none"> ❖ Task: Frontend should reiterate the design of Prototype (ver.2) according to client's feedback ❖ Task: The team should get familiar with the two cases suggested by the client 	 <p>School of Information Technology and Electrical Engineering</p> <p>COMP3000 Weekly Meeting Log</p> <p>Consultation Activities With The Client</p> <ul style="list-style-type: none"> ❖ Client reviewed Prototype (ver.1) on Monday <ul style="list-style-type: none"> > Client: Suggested adding "Further Education" and "No Actions Taken" as Investigation and Medication drop-down menu options > Client: Suggested removing the filter on the right as it is not necessary for the Recommendation page, but perhaps have the filter in the Setting page or somewhere accessible ❖ Discussed activity flow of the web app <ul style="list-style-type: none"> > Produced Activity Diagram (ver.1) ❖ Client: Since the Guidelines for preventive activities in general practice (10th edition) is very lengthy, suggested the team to start with 2 common cases of chronic disease first: <ul style="list-style-type: none"> > Vascular diseases (p.119 if opened with Google pdf OR p.106 within the document) > Cancer - Category 2 (p.119 if opened with Google pdf OR p.106 within the document) ❖ Client reviewed Prototype (ver.2) on Friday <ul style="list-style-type: none"> > Team: Added "Further Education" and "No Actions Taken" as Investigation and Medication drop-down menu options <p>Other Comments N/A</p> <p>Signed and Accepted</p> <div style="text-align: center;">  <p>Tristan Zhiyong Shao Oliver Nicole</p> </div>	 <p>School of Information Technology and Electrical Engineering</p> <p>COMP3000 Weekly Meeting Log</p>
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Week 5



School of Information Technology and
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COMP3000 Weekly Meeting Log

Date:

1st September 2020 (Tue)
4th September 2020 (Fri)

Team Name:

Team Chronic Disease

Items Discussed/Worked On

- ❖ Frontend finished Prototype (ver. 2 → ver. 3)
- ❖ Followed up progress on addressing criteria editing feature in Prototype (ver. 3) on Tuesday
 - ISU5 arose
 - ISU6 arose
- ❖ Created a GitHub repository for continuous integration of code
- ❖ Added new team role **Documentation writer** (Writer for short)
 - Tidying up Weekly Logs and Team Charter
 - Documenting prototype iterations, implementations, architecture etc.
- ❖ Resolved ISU4: Frontend decided to use React.js to build frontend, so Backend can deploy the website with a database compatible with React.js websites
- ❖ Frontend finished Prototype (ver. 3 → ver. 4) with more aesthetic design
- ❖ **Consultation Activities With The Client** for Prototype (ver. 4) on Friday
 - Resolved ISU5 by clarifying requirements
 - ISU6 restated

Issues That Arose

- ❖ ISU4: Backend's website deployment depends on the tool Frontend uses to develop UIs
- ❖ ISU5: Frontend aren't sure in the "Comments" section, whether to show other doctors' comments, since the Recommendation page is for the user to edit the screening only.
- ❖ ISU6: Frontend aren't sure how to implement a tool for editing screening criteria

Actions Required

- ❖ Action for ISU5:
 - Clarify with the client on Friday
- ❖ Action for ISU6:
 - Frontend should communicate with the Backend on how the database will structure the data for CRUD functions

Deliverables/Plan To Be Completed By The Next Week

- ❖ Task: Writer should start tidying up the changes in different prototype iterations
- ❖ Task: Frontend should keep reiterating the design to make Prototype (ver. 5)



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Consultation Activities With The Client

- ❖ Team: Asked if it is necessary to show other doctors' comments in the "Comment" section
 - Client: Thought it makes sense to include them [ISUS resolved]
- ❖ Team: Seek approval for "Discussion" drop down menu in Recommendation page
 - Client: Approved but suggested including a new option "Others..." in the menu, when chosen user can type the specific things they want to discuss
 - Team: Couldn't the doctors discuss other things in the "Comment" section?
 - Client: Clarified that "Others..." in "Discussion" refers to the topic, not the contents to be discussed. Whereas the "Comment" section is for remarks of the screening that the doctor wants other doctors to see (e.g. The patient is not happy with the medication).
- ❖ Client: Restated a requirement from last week, which is a tool in the Settings page where doctors can update the criteria to the latest one
 - Team: Can the criteria be edited by anyone or by the admin accounts only?
 - Client: Admin only

Other Comments

N/A

Signed and Accepted

Zhihang / Tristan
Zhihang Tristan

Nicole Oliver
Shao

Week 6



School of Information Technology and
Electrical Engineering

COMP3000 Weekly Meeting Log

Date:

8th September 2020 (Tue)
12th September 2020 (Fri)

Team Name:

Team Chronic Disease

Items Discussed/Worked On

- ❖ Discussed Backend implementation:
 - Requires
 - Website — deployed in UQ Cloud server
 - FHIR server — doctors to retrieve patient's health data with patient's ID
 - Criteria database — database to hold criteria
 - Steps to query data:
 1. UQ Cloud server get patient's ID from FHIR server and retrieve their screenings
 2. Use database holding all criteria
 - Implement vascular diseases and colorectal cancer criteria first
- ❖ Resolved ISU6: Frontend designed a Settings page for Prototype (ver. 4)
 - Prototype (ver. 4) aims to address client's new requirement of adding/deleting/modifying existing criteria
 - The implementation is not hard, but may need to add new columns to the existing database, so the Criteria database structure will need to be more complicated
 - ISU7 arose
- ❖ One of the frontend team member dropped the course due to health reasons

Issues That Arose

- ❖ ISU6: Frontend aren't sure how to implement a tool for editing screening criteria
- ❖ ISU7: The team aren't sure if there is an alternative of the criteria editing feature

Actions Required

- ❖ Action for ISU6:
 - Explain difficulties of implementing criteria editing feature with the client next Tuesday
- ❖ Action for ISU7:
 - Discuss further about this issue

Deliverables/Plan To Be Completed By The Next Week

- ❖ Task: Backend should implement Criteria database in UQ Cloud server, so the team can request data easily from it
- ❖ Task: Backend should implement ways to pull data from FHIR server, sort data by running if... else statement (also criteria)
- ❖ Task: Frontend should start coding the frontend
- ❖ Task: Writer should start documenting the architecture of the app



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Consultation Activities With The Client

- ❖ The client is unable to attend both Tuesday and Friday's lecture to review the prototype or participate in the team's design activities
- ❖ Writer has updated the Activity Diagram (ver. 1 → ver. 2) and posted it on Discord channel for client to approve, client suggested removing "Further Education" option for the "Investigations" (as that's now covered in the Discussion section)

Other Comments

N/A

Signed and Accepted

Tristan Shao
Zhihang Nicole
Shao Oliver

Week 7



Date:
15th September 2020 (Tue)
18th September 2020 (Fri)

Team Name:
Team Chronic Disease

Items Discussed/Worked On

- ❖ Frontend finished coding the Recommendation page, attempted to merge code with Backend code on GitHub
 - ISU7 from last week restated
- ❖ Resolved ISU7: Frontend finished Prototype for Settings page (ver. 4 → ver. 5)
 - Prototype (ver.5) aims to address client's new requirement of adding/deleting/modifying existing criteria
 - The implementation is not hard, but may need to add new columns to the existing database, so the Criteria database structure will need to be more complicated
 - ISU8 arose
 - Addressing ISU7: Our team decided to continue implementing the criteria editing feature
 - Some suggest that the criteria editing feature is not in the client's initial requirements in Week 3, and the team may not be able to implement and test this feature by Week 10.
 - However, the criteria editing feature is the main feature of the web app

Issues That Arose

- ❖ ISU7: The team aren't sure if there is an alternative of the criteria editing feature
- ❖ ISU8: Frontend does not have a local server to compile Backend code

Actions Required

- ❖ Action for ISU7:
 - Discuss further about this issue
- ❖ Action for ISU8:
 - Frontend created a new GitHub branch to deploy pure React.js code

Deliverables/Plan To Be Completed By The Next Week

- ❖ Task: Backend should implement Criteria database in UQ Cloud server, so the team can request data easily from it
- ❖ Task: Frontend should finish coding the Settings page
- ❖ Task: Writer should finish documenting iterations of the prototype

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Consultation Activities With The Client

- ❖ Since some team members are studying for mid-semester exams, the team decided to take a break from coding or producing deliverables for design activities.

Other Comments

N/A

Signed and Accepted


Tristan


Nicole


Oliver


Zhiqiang

Week 8



Date:
22nd September 2020 (Tue)
25th September 2020 (Fri)

Team Name:
Team Chronic Disease

Items Discussed/Worked On

- ❖ Team followed up with the project's progress
 - ISU9 arose
 - Backend was waiting for response from the FHIR server owner
 - Frontend implemented the Settings page, which served as the fifth Prototype (ver.4-ver.5)
 - ISU10 arose
 - Addressing ISU10: Backend created a new Backend branch to develop server code, while master branch's commits are reverted so that Frontend can pull from master without merging with the Backend code
- ❖ Writer documented requirements

Issues That Arose

- ❖ ISU9: The team agrees that the components of the web app is scattered around without much integration
- ❖ ISU10: The Frontend cannot pull from master branch on GitHub since it contains Backend code

Actions Required

- ❖ Action for ISU9:
 - Frontend should discuss with Backend how to insert JSON data into the React.js frontend
- ❖ Action for ISU10:
 - Backend should resolve the code conflict with Frontend

Deliverables/Plan To Be Completed By The Next Week

- ❖ Task: Backend would Get the API request and get the database running
- ❖ Task: Frontend would finish the Settings page
- ❖ Task: Writer should finish documenting iterations of the prototype

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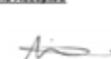
Consultation Activities With The Client

- ❖ The team is at the stage of developing the web app and documenting previous requirements. Therefore, there is no deliverable this week to seek client's feedback in.

Other Comments

N/A

Signed and Accepted


Tristan


Nicole


Oliver


Zhiqiang

Week 9



School of Information Technology and Electrical Engineering

COMP3000 Weekly Meeting Log

Date:

6th October 2020 (Tue)
9th October 2020 (Fri)

Team Name:

Team Chronic Disease

Items Discussed/Worked On

- ❖ Team followed up with each member's progress
 - Frontend finished coding interface of Edit Criteria page
 - Backend is still waiting for response from the FHIR server owner
 - Backend made a Docker container for functional testing
 - Writer finished making Activity Diagram, Architecture model, and user requirement
 - ❖ Discuss user testing plan for both functionality and non-functionality testing
 - Frontend will document functional testing plan and result, and send it to Writer
 - Writer will gather all testing plan and results to analyse user feedback
 - ❖ Review documentation
 - Project description
 - ISU11 arose
 - User requirements
 - Made changes to functional requirements as some requirements are removed after user testing with the client
 - ISU12 arose
 - ISU13 arose
 - Resolved ISU13: The team decided to explain the requirement changes in Appendix, visualised with annotated prototypes

Issues That Arose

- ❖ ISU11: Not sure whether Writer has documented all use cases
- ❖ ISU12: Writer cannot catch up with the changes in codebase
- ❖ ISU13: Writer are not sure whether to also document changes of requirements because the changes show the team's effort in communicating with the client

Actions Required

- ❖ Action for ISU11:
 - Have a meeting with the client next week to confirm project scope and use cases
- ❖ Action for ISU12:
 - More frequent communication and Writer should review codebase on GitHub
- ❖ Action for ISU13:
 - Discuss with team



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Deliverables/Plan To Be Completed By The Next Week

- ❖ Task: Backend would redesign the database to fit FHIR resources
- ❖ Task: Frontend would finalise user interface, so as to discuss with Backend how to integrate data next week
- ❖ Task: Writer should start drafting user testing plan

Consultation Activities With The Client

- ❖ The team is at the stage of developing the web app and documenting previous requirements. Therefore, there is no deliverable this week to seek client's feedback in. However, the basic user interface has already been established for client's approval.
- ❖ The team is preparing a meeting next week for the client to catch up with project progress, the client is contacted on Discord to schedule the meeting.
 - Client agrees to come on next Tuesday class session
 - The team will confirm use cases, project scope, user interface, as well as report team progress

Other Comments

N/A

Signed and Accepted

Zhipeng

Tristan

Oliver

Nicole

Week 10



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COMP3000 Weekly Meeting Log



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COMP3000 Weekly Meeting Log

Date:

13th October 2020 (Tue)
16th October 2020 (Fri)

Team Name:

Team Chronic Disease

Items Discussed/Worked On

- ❖ Team finalising the UI of the web app
 - Frontend integrated Settings and Editing Criteria page together since they function similarly
 - Backend wrapped up the API used in displaying criteria, medication and investigation of the screening
 - Writer finished 1st user testing protocol draft
- ❖ Resolved ISU11: Confirmed with client the requirements of the web app
 - Client suggested changes in persona table
- ❖ The team reviewed 1st user testing protocol draft
 - Frontend will make changes according to the current prototype
 - Frontend plans to rewrite the draft into a US testing protocol
 - ISU14 arose
 - Resolved ISU14: Asked tutor, tutor suggested putting a color-coded version of diagram in the Appendix to show changes made throughout interactions with client
 - ISU15 arose
 - Resolved ISU15: Asked tutor, tutor suggested putting user testing protocol in the Appendix, and write a summary justifying test methods and results

Issues That Arose

- ❖ ISU11: Not sure whether Writer has documented all use cases
- ❖ ISU14: Writer are not sure whether to display changes in activity diagram throughout client user testings, since some of the processes are still an effort.
- ❖ ISU15: Frontend are not sure whether to display user testing plan in the main documentation, or put it in the Appendix
- ❖ ISU16: Backend is not sure how the CBL integration can be implemented, therefore stuck when developing the web app's criteria database

Actions Required

- ❖ Action for ISU11:
 - Have a meeting with the client next week to confirm project scope and use cases
- ❖ Action for ISU14:
 - Ask Chelsea/tutor
- ❖ Action for ISU15:
 - Ask Chelsea/tutor
- ❖ Action for ISU16:
 - Ask Jim on Slack about how the CBL integration works

Deliverables/Plan To Be Completed By The Next Week

- ❖ Task: Backend would be putting the web app to test
- ❖ Task: Frontend would finish the Settings page
- ❖ Task: Writer should finish editing documentation according to client feedback

Consultation Activities With The Client

- ❖ Confirmed with client the requirements of the web app
 - Client suggested changes in persona table
 - Confirmed project scope
 - Client suggested one more use case that can be considered:
 - "Yes, the other key issue is that some patients come in with their own agendas and it's remembering to bring up potential disease prevention or even enabling the scheduling of future appointments that this tool would be beneficial
 - e.g. "we didn't get time to discuss this today but it could be good to make an appointment to go through your bowel cancer risk because your father did suffer from bowel cancer..."
- ❖ Client give feedback on the user interface
 - Client likes the idea of using a tag input field for entering multiple medications and investigations

Other Comments

N/A

Signed and Accepted

Tristan

Zhipeng

Nicole

Week 11



School of Information Technology and Electrical Engineering

COMP3000 Weekly Meeting Log

Date:

18th October 2020 (Tue)
21st October 2020 (Fri)

Team Name:

Team Chronic Disease

Items Discussed/Worked On:

- ❖ Team follow up with each member's progress
 - Frontend integrated data with Backend
 - Backend suggested removing the comment section on the right
 - Backend tries to deploy the website to into server, ISU17 arose
 - Resolve ISU17: Asked Ben, Ben suggests Backend to give him a launching link and patient ID in order to get the UQ Cloud website to work on a FHIR server
 - Review documentation
 - Writer is wrote non-functional requirements after confirming all use cases with client
 - Writer will make a Use Case diagram before next week
 - Backend will write the description for server-web interaction in Section 3.2 System Flow (Backend) documentation, so that Writer can make that into a sequence diagram
 - Review SUS testing protocol
 - ISU18 arose
 - Resolve ISU18: Frontend would write a script for other members before Friday's user testing session
 - ❖ Frontend would be writing the justification for Section 5.2 User testing in the documentation
 - ❖ A user testing with CBL students is scheduled on Friday's session
 - ISU19 arose
 - EHR launcher issue

Issues That Arose:

- ❖ ISU17: Frontend code can deployed in the production server but not on the FHIR server, which the FHIR server block the API written by them due to security reasons
- ❖ ISU18: Frontend may have trouble describing the web app to tested users
- ❖ ISU19: Due to technical reason, the SMART-on-FHIR app could not be uploaded to CBL on Friday

Actions Required:

- ❖ Action for ISU17:
 - Ask Ben and Jim...
- ❖ Action for ISU18:
 - Discuss with team
- ❖ Action for ISU19:
 - Backend will seek suggestions from tutors and other teams

1

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COMP3000 Weekly Meeting Log



Deliverables/Plan To Be Completed By The Next Week:

- ❖ Task: Backend would remake static methods for printing out criteria into a dynamic function
- ❖ Task: Backend would attempt to resolve ISU19
- ❖ Task: Frontend would finish the script for user testing
- ❖ Task: Writer should finish making the Use Case diagram, and drafting Sequence diagram according to a standard SMART-on-FHIR app sequence diagram

Consultation Activities With The Client:

- ❖ Due to technical reasons, the SMART-on-FHIR app could not be uploaded to CBL on Friday, so there are no new progress/feedback to report to the client for justification
- The team decided to do user testing with the medical students they know, instead of only CBL students, in case the same situation happens again

Other Comments:

N/A

Signed and Accepted:

Oliver

Tristan

Nicole

Zhiqiang

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Week 12



School of Information Technology and Electrical Engineering

COMP3000 Weekly Meeting Log

26th October 2020 (Mon) Extra meeting
27th October 2020 (Tue)
30th October 2020 (Fri)

Team Name:

Team Chronic Disease

Items Discussed/Worked On:

- ❖ Team follow up with each member's progress
 - Backend
 - Is tackling issue in the EHR launcher
 - has finished the domain class diagram for System Design (Database)
 - Frontend
 - has modified the testing protocol draft into a SUS testing protocol
 - has performed SUS tests with 5 medic students, the results are on Google Drive
 - ISU19 arose
 - Resolved ISU19: Frontend will summarise the result in Section 6 Testing
 - Writer
 - has finalised most Weekly Logs (check for grammar and spelling mistakes)
 - has finalised Section 1, 2
 - is writing Section 5 Architecture
 - ISU20 arose
 - Resolved ISU20: Backend will fill in Section 5.2-5.3, while Writer could search for a summary of this from the presentation slides
 - ❖ Planning documentation
 - Frontend will write the justification and result analysis
 - Backend will draw the sequence diagram for System Design (Backend)
 - ❖ Preparing presentation
 - Backend will prepare the materials and script for presentation
 - ❖ Following up user testing result
 - Users suggested more metrics should be available. The team thinks it makes sense, and identifies other metrics seen in the guidelines: ethnic background, gender, learning disability, personality disorder, genetic connection, education level (for dementia)
 - Frontend team found that the testing time has exceeded the time estimate. Backend suggests conducting an A/B testing or focus group to gather more accurate users' feedback and reactions
 - Frontend mentioned the UI interface changes from user feedback. Writer documented that in UI design of the documentation

Issues That Arose:

- ❖ ISU19: Writer was not sure what UI needs to be changed according to user testing result, since the result on Google Drive only shows SUS test scores
- ❖ ISU20: Writer need information from Backend to fill in Section 5.2-5.3 about FHIR resources and SMART communication services

School of Information Technology and Electrical Engineering

COMP3000 Weekly Meeting Log



Actions Required:

- ❖ Action for ISU19:
 - Discuss within team
- ❖ Action for ISU18:
 - Discuss within team

Deliverables/Plan To Be Completed By The Next Week:

- ❖ Task: Backend would remove the Medicine table in the database and fix the EHR server connection
- ❖ Task: Frontend would finish writing the justification and result analysis of user testing
- ❖ Task: Writer should put all Weekly Logs and Team Charter into the documentation
- ❖ Task: Writer should finish writing Section 3 System Design, Section 4 Prototype Design with Frontend, and Section 5 Architecture

Consultation Activities With The Client:

- ❖ Since the team is finalising the source code and documentation, there are no prototypes/diagrams/requirements needed to be approved by the client at this stage.

Other Comments:

N/A

Signed and Accepted:

Tristan

Nicole

Oliver

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