**CM20314 Experimental Systems Project - Group 11 - Deliverable 1: Proposal Specification**

**1  BACKGROUND**

**1.1 Domain**

The team has chosen to focus on preventing food-based allergic reactions, specifically at catering venues.

After several initial ideation meetings, there was a substantial discussion around the choice of the project domain. Several possible problems were explored, each spanning their respective areas. After much deliberation, it was felt the largest impact would be made within the domain of health.

This decision was a result of both having the ability to reach an initial group of stakeholders quickly, as well as the agreed understanding on why this was such an important issue to tackle. For an individual suffering from severe allergies, it is impossible to overstate how important it is to clearly communicate their requirements at catering venues such as hotels, airlines, restaurants, etc. It is the team’s intention to make this process as reliable and streamlined as possible.

It has been decided that the optimal approach should be one of prevention, opposed to treatment. It is thought sufferers of severe allergies have already taken the most effective measures in terms of treatment; for example keeping a dose of epinephrine close at all times. Instead, there is a collective agreement that the problem to tackle is preventing these incidents from happening in the first place, especially abroad.

The main contending proposition was an improvement to the current online volunteer management system for the Scouts. [3] This system, called ‘Compass’, is designed primarily for team leaders to manage subordinate volunteers. ‘Compass’ is seriously lacking both features, like sending emails en masse to subordinates, and a modern frontend.

In the end, it was decided that the current proposition concerning prevention of severe allergies would be both more achievable and original than the improvements for ‘Compass’, as a majority of the work would have been replicating features from the old system.

**1.2 Challenges**

Since the goal is to clearly communicate allergies to catering staff, there is a need to store these allergies along with other potentially related medical information. For this, it is required to follow GDPR regulations [1] for EU member states, as well as the Data Protection Act for the UK [2]. This is on top of potential data protection laws specific to other countries.

In order to comply with these from the very start, any time there is a need to collect data, there will be an explanation as to why it is needed and how to update or remove it if necessary. In regards to storing the data securely, it will be kept locally on the phone to remove the added risk and responsibility of storing it remotely. In addition to this, any data will be encrypted before being written to disk, preventing other people from maliciously or accidentally reading and or tampering with the data.

Access to any information stored should be limited to those who need it. It’s important to be accessible by the end-user, catering staff, and possibly paramedics, but no one else.

Given the potential grave consequences, it must be ensured allergies are presented in a clear and unambiguous way. The team has come up with several potential avenues to achieve this, including translating text to the appropriate language and incorporating images of allergens.

**1.3 Motivation**

The main motivation behind the idea is the story of a user who during a trip in Greece had a severe allergic reaction to some food. When in Cyprus on holiday with their family, the user ordered spaghetti bolognese from the hotel restaurant. While ordering they told the waiter about their allergy to eggs. Despite being assured that the spaghetti wouldn’t contain any, the user had an allergic reaction to the food. Fortunately they were able to treat it in time and suffered little to no consequences.

This story inspired the team to help people avoid being put in a similar situation. In the above mentioned story two main issues were brought up: 1. Difficulty in communication to the catering staff; the user revealed that communicating to the waiter was not an easy job. 2. Ambiguity in communication, the user said that they later discovered that the food itself didn’t contain eggs but it was cooked in eggs.

The aim of the project should be to remove these issues completely:  ensuring that catering staff clearly and quickly understand what food may cause a reaction and that there be no uncertainty in the way food is prepared so as to avoid any sort of cross contamination.

**1.4 Stakeholders**

The team rapidly individuated the stakeholders as the following: travellers, people suffering from allergies, medical staff, paramedics and first responders and catering staff. All of these people are affected (or potentially) by people having an allergic reaction or anyone travelling abroad who needs some clarity when ordering food.

Travellers can be affected by the project as they could benefit when travelling abroad having emergency contacts and their medical history all in their pocket. People suffering from allergies are the main stakeholders of the project as they are more exposed to the danger of contaminated food. Reassuring their travels and meals out is one of the main aims of the project. Medical staff, paramedics and first responders can also benefit from the project, as quickly knowing how to treat a patient can save a life. Catering staff are also affected by the system. They are the ones who are always dealing with customers and need to unambiguously and rapidly understand someone’s allergies so that they can let customers enjoy food without any worries.

A preliminary engagement with two stakeholders revealed that the system currently in place may cause some confusion and isn’t always clear. Currently allergy menus are handed out by catering staff upon customers request. One of the stakeholders revealed that while they don't have any allergies, they’ve hosted various people from over the world due to their job. They said (translating from Italian): “The system currently in use makes it difficult for my guests to order, food menus aren’t always in English and it ends up being my responsibility to translate. The one time I had someone with allergies was even more difficult as I had to filter out what they could and couldn’t order”.

The proposed system isn’t the first of its kind; there are many other alternative solutions to this problem. However, all of the alternatives have something missing:

1. Allergy UK is a website selling physical translation cards to make others aware of allergies despite language barriers. The website provides 3 physical credit-card-sized cards per language: English on one size and the language of the country the user has intention of visiting on the other. They provide cards for 70 different allergies and in 35 different languages. The problem here is that users would have to request cards in advance, before travelling. In addition to this, the cards are limited to allergies and have no mention of any other health issue which could potentially save someone’s life if the information were quickly available. Finally Allergy UK’s service isn’t free and a set of 3 cards is £15.
2. Allergy Travel Cards (Translate Your Allergies) is an app free to download on the play store and provides allergy cards for 190 countries, translating the 14 most common allergies or lifestyle choices into 36 different languages. Users can create cards on the fly without the need to connect to any network. The app has a free version which is limited to 6 languages, the premium version expands to 36 languages and adds support to over 190 countries. This system is similar to the proposed one by the team however, it is limited to only a feature for allergy cards and does not include anything for medical records, medication or contacting emergency numbers. In addition to this, it is not free.

**2 PROPOSED SYSTEM**

The aim of the proposed system is to allow people who are travelling abroad to stay safe and be able to share their allergy information without the need of learning another language. As mentioned, this system is targeted at people who are travelling abroad but also to restaurant staff who would potentially be serving those people. As seen in the user stories, the language barrier in these scenarios can cause problems which is something the team aims to eliminate through the use of the proposed system. Expanding on this, the team have decided certain side features will also be very useful in tackling the problem.

The system will be able to store medical records in the selected languages as well in the event of some medical emergency. In addition, it will be able to show emergency contacts including the number for the user’s country’s embassy. Through the team’s research, the team found that using pictures and allergen code will be better suited. An additional feature discussed is the generation of a QR code on a user’s device; a staff member can scan said code and then view the user’s allergies on their own device which will help with any social restrictions still in place.

As seen earlier, systems for the mentioned features exist. However, they are all separate and what the team aims to do  is combine it all into one easy to use application. Existing allergy card systems, applications and physical cards, are limited in the sense that there are only a select number of languages or allergies while the team looks to be able incorporate as many as possible through the use of user input rather than them simply selecting from a predefined list. With regards to information for people travelling abroad the team found one aimed at Indonesians, but this is something that can be extended to people of other nationalities.

Whilst there are many benefits that can come from this system, there are certain issues which need discussion. Firstly, the legal implications of inaccuracy of translations. Who will be responsible if something happens to the user if the translation is incorrect and they are given something containing their allergy. Secondly, the user’s allergies and medical records will be stored in some form; this raises an ethical and legal issue. How this data is handled is crucial and the team will need to make sure everything the team does will follow the laws in every country the team aims to have the system to be used in.

**3 PROGRAMME AND METHODOLOGY**

**3.1 Methodology**

The team has already completed two significant steps upon time of writing. The first of these was the initial brainstorming of problems and researching to narrow down options until concluding that the core problem the team wanted to focus on was communicating allergy and health information across a language barrier in the application. The next step taken was basic research into the problem domain and assessing current solutions to the problem. The results of this research can be found in the background section.

The next step for the project is to talk with stakeholders (paramedics, people with allergies and hospitality workers) and find what issues they are facing in this problem domain and gather information on limitations of the systems currently in place. The team will meet to discuss the problems stakeholders are facing and discuss potential solutions.  This will be followed by more research into these features which can then be discussed with stakeholders to assess feasibility and helpfulness. This process will be repeated a few times until a requirements specification (and tests) can be developed based on feedback from stakeholders and team discussion. Once core requirements have been developed, implementation of core features can begin. Once prototypes of core features are developed, they should be shown and ideally tested by the stakeholders to receive further feedback. After this stage, feedback is considered and changes have been made where necessary. Other features can now be developed, and the process repeated. By the end of this process, the project should be ready for testing.

**3.2 Project management and software development approach**

For the project the team will use the Agile software development methodology, Scrum. Since the proposed system is fairly niche, Scrum is advisable. Throughout development the team will learn more about the market and what it wants as a result of the continuous feedback received from stakeholders. Thanks to the flexibility of Scrum, any new ideas and features can be added to the system requirements with little repercussion. Flexible system requirements will ensure a final product that meets the needs of stakeholders.

**Azure DevOps - https://azure.microsoft.com/en-us/services/devops/**

To manage the project the team will use Azure DevOps. Azure DevOps provides a complete set of tools to [manage Agile software development projects](https://www.bmc.com/blogs/software-project-management/). Utilising Azure DevOps the team can ensure development goes smoothly and that the principles of Agile development are abided by.

**GitHub - https://github.com/**

To assist with the development of the source code, the team will use Github. Github allows for real-time collaboration without concern of duplicative or conflicting work. It provides an online platform, which is accessible by every member, where the team can store, organise, and track the progress of the code and files necessary for the system. In addition to this, every member of the team is familiar with Github and have used it before.

**Java -** [**https://www.oracle.com/java/technologies/downloads/**](https://www.oracle.com/java/technologies/downloads/)Java is the programming language the team will use to develop the proposed system. Java allows for effective collaboration between developers because of its modularity and data abstraction. In addition to this, Java has platform independence, meaning the developed application will be able to run on Android OS. Furthermore Java is a programming language everyone on the team has experience with and is comfortable using.

**3.3 Android Studio - https://developer.android.com/studio**

To assist with the development of the app, the team will use Android Studio, an IDE designed to assist with Android app development. The built-in Android emulator will allow for members of the team who don't own an Android device to be able to test the application. Given the fact that the final product will be an Android app, utilising the features of the Android Studio will therefore help to increase the team's productivity during development.

**Discord -** [**https://discord.com/**](https://discord.com/)The team will use a Discord to provide a platform for communication. A Discord server allows for anyone to contact the team whenever it is needed. This will allow for more effective collaboration, and any issues can be brought to the attention of the team when they occur.

**Google Drive -** [**https://drive.google.com/**](https://drive.google.com/)To store and share research and other documents the team will use Google Drive. It provides a location accessible by every member of the team where all documents can be accessed, viewed and edited when needed.

**3.4 Roles and Workplan**

The team has elected a Scrum Master. Other roles in the team are largely flexible with members happy to switch between coding, research and report-writing roles when needed. The team’s work-plan is laid out in the Gantt chart (Fig. 1) below. The brainstorming phase is already completed along with the initial research. Talking to stakeholders will be an ongoing process throughout the project to get their ideas and feedback on features. This phase and the research on this discussion will be ongoing until the requirements specification is fully consolidated. The requirements specification can be started after some initial discussion with all stakeholders to fix core features. The requirements specification will be iterated continuously until stakeholders are confident a solution has been found to the problem. Throughout the requirement-building process the team will also decide on how each requirement will be tested. After central requirements have been decided, work to implement core features can begin. Further down the line, extra features can also be developed as more requirements have been fixed. By week 16, requirements and their respective tests should be mostly finalised and core features should be implemented in a prototype. After this milestone, stakeholder testing of the product can begin to get their feedback, starting with core functionality. Following this testing, the team can implement or remove features depending on their feedback (making changes to requirements and testing as needed). This leaves a 4 week period for debugging and testing the finished application before the deadline.

Milestones (as shown on the Gantt Chart (Fig. 1)):

1. Week 6: D1 deadline.
2. Week 11: D2 deadline. New specification released.
3. Week 16: Initial requirements and their respective tests largely finalised (before stakeholder testing begins) and a prototype with core functionality built.
4. Week 27: D3 deadline (rough). This includes proof of concept demonstration, testing plans, rationale, testing/debugging evidence, and critical reflection.
5. Week 31: D4 deadline (rough). This includes analytic evaluation, empirical evaluation, and the process of engaging with stakeholders throughout the project.

**3.5 Risk assessment**

During the development of the proposed system, a variety of potential risks may arise. These risks need to be mitigated to ensure a smooth development. To mitigate any risks continuous communication must be assured. Any problems should be made apparent to the team as soon as possible. Allowing for the team to plan accordingly to resolve or completely avoid the problem. To allow for continuous communication, the team will use a Discord server as a platform for communication. Meetings held every week also allow for communication between the team to take place.

A potential risk that will be mitigated is members of the team being unsatisfied with the sprint task allocated to them. This will be mitigated by allowing each member to choose their own sprint tasks to undertake, choosing tasks aligned with their current skill set. This same method will be used to mitigate the risk of people on the team not being satisfied with their role in development.

By using the Agile methodology, Scrum, the risk of requirements changing has been mitigated. The flexibility of Scrum means the team will be able to respond to changing requirements without any chance of project failure.

During development there is the risk of a member of the team leaving due to certain circumstances. In response to this, the team will re-distribute the workload between the remaining members of the team or reduce the scale of the proposed system. A similar approach will be taken in situations where a member of the team is unable to work for a period of time.

There is also the risk of a member not completing their assigned sprint-task before the sprint deadline. In this situation, the team would have to plan for the sprint-task’s completion in the next sprint. If the team member was struggling with the sprint-task, another member may be assigned to provide support in the next sprint.

Disagreements are likely to occur throughout the development of the proposed system. These disagreements will be resolved by the designated Scrum Master making the final decision. If the decision affects the entire system, a vote will be made by every member of the team on what they think should be done but the Scrum Master will always have the final say.

**4 FIGURES**

Chart

Description automatically generated

Fig. 1, Gantt chart to show progression over weeks (starting at week 0). The (Excel) chart can be updated with progress to show how far ahead of or behind schedule each task is.

**5 REFERENCES**

[1] Guide to the General Data Protection Regulation (GDPR): 2018. *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/711097/guide-to-the-general-data-protection-regulation-gdpr-1-0.pdf*. Accessed: 2021- 11- 09.

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[4] Translation Cards | Allergy UK | National Charity: 2021. *https://www.allergyuk.org/our-services/translation-cards/.* Accessed: 2021- 11- 11.

[5] 2021. *https://play.google.com/store/apps/details?id=com.wright.paul.allergytranslationcardapp&hl=en\_GB&gl=US.* Accessed: 2021- 11- 09.

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