

Quality ICT B.V.

Client

Project Plan

Christopher Sulistiyo (4850025)

Christopher.sulistiyo@student.nhlstenden.com

ICT & IC Information Technology Department Emmen

Version 1.1 – 21/02/2024

[Version control 3](#_Toc158283802)

[Remarks 3](#_Toc158283803)

[Chapter I – Introduction 4](#_Toc158283804)

[1.1 Layout of the Project Plan 4](#_Toc158283805)

[Chapter II – Project Objectives 6](#_Toc158283806)

[Chapter III – Project Activities 7](#_Toc158283807)

[3.1 Planning 7](#_Toc158283808)

[3.2 Research 7](#_Toc158283809)

[3.3 Design 8](#_Toc158283810)

[3.4 End Product 9](#_Toc158283811)

[3.5 End-Presentation/ Colloquium 9](#_Toc158283812)

[Chapter IV – Project Boundaries 11](#_Toc158283813)

[4.1 Duration 11](#_Toc158283814)

[4.2 Scope 11](#_Toc158283815)

[4.3 Preconditions 12](#_Toc158283816)

[Chapter V - Products & Interim Results 13](#_Toc158283817)

[5.1 Documentation 13](#_Toc158283818)

[5.2 Research and Concept Specifications 13](#_Toc158283819)

[5.3 Design architecture 13](#_Toc158283820)

[5.4 Test Products 14](#_Toc158283821)

[5.5 Final Product 14](#_Toc158283822)

[5.6 End Presentation 14](#_Toc158283823)

[5.7 Period 4 - Interim Products Overview 14](#_Toc158283824)

[Chapter VI - Quality 16](#_Toc158283825)

[6.1 – End Product 16](#_Toc158283826)

[6.2 – Control 16](#_Toc158283827)

[6.3 – Testing techniques and programs 17](#_Toc158283828)

[Chapter VII - Project organization 18](#_Toc158283829)

[Team member, product owner, and contact persons. 18](#_Toc158283830)

[Availability 18](#_Toc158283831)

[Team roles 18](#_Toc158283832)

[Reporting 19](#_Toc158283833)

[Chapter VIII - Planning and Scheduling 21](#_Toc158283834)

[Project realization Phase (17.04.2023-19.06.2023) 21](#_Toc158283835)

[Chapter IX - Cost and benefits 23](#_Toc158283836)

[9.1 Cost 23](#_Toc158283837)

[Chapter X – Risk Analysis 24](#_Toc158283838)

# Version control

|  |  |  |
| --- | --- | --- |
| **Version** | **Activities** | **Date** |
| Initial version 1.0 | Draft version | 06/02/2024 |

Remarks

Any changes and new developments that have a significant impact on the project proceedings will be noted here.

# Chapter I – Introduction

This document provides a detailed description of the project planning, research, and execution of the author’s graduation work placement in the client company, Q-ICT.

The graduation work placement will be executed on the behalf of NHL Stenden University of Applied Sciences, which is based in the north of the Netherlands and offers a large variety of courses in both Dutch and English. The schooling has a heavy emphasis on group and practical project-based work, supported by a thorough theoretical education.

This document is created as one of the necessary requirements.

With NHL Stenden being an international educational institution, there are campuses across the country as well as abroad. The one of relevance for this project is in Emmen and offers four international courses, ICT & IC Information Technology course is one of which. The project will be solely undertaken by the author of this document, a 4th year international IT student as a means to

As the details of this commission have yet to be finalized, this document is subject to change and any alterations will be shared promptly and marked accordingly.

## Layout of the Project Plan

**General information:** Provides an overview of both the sponsoring organizations well as the organization in which the project is to be carried out.

**Project objectives:** Consists of the objectives which are determined by the client as well as the projects' intended results.

**Project activities:** Defines the tasks that need to be performed for the realization of the project, while taking into consideration the prioritization of certain tasks based on significance.   
   
**Project boundaries:** States the project boundaries and the project duration.   
   
**Products and Interim Results:** Specifies the products and results, which extends non-physical products such as client meetings.   
   
**Quality:** Provides an overview of how the quality of the work will be monitored and eventually assessed.   
   
 **Project Organization:** Comprised of organizational information regarding the author and Q-ICT and its inner workings, as well as details regarding the correspondence with the sponsoring organization.   
   
 **Planning and Scheduling:** will show the schedule of tasks to be done as well as their dependence on other tasks for their completion or quality. Including various charts and diagrams, it will outline the time-scope as well as the desired time-consumption of the tasks.    
   
 **Costs and Benefits:** Discusses the time and resources required, while taking the benefits of the sponsoring organization into consideration.   
   
 **Risk Analysis:** Gives a detailed account of potential internal and external risks.

# Chapter II – Project Objectives

The primary objective of this assignment is to design and develop a new functionality on top of an existing application that can monitor and present Q-ICT’s internal APIs in a meaningful way, ensuring connection status, error handling that frequently results in errors of the return data, handling of expired API keys, secure storage keys, and external validation of API connections.

The specific objectives of the project are:

* Build an API monitoring functionality on top of the QaaS app using Flutter (Dart) for the client-side front-end code.
* Build on an API monitoring functionality in already existing server using Node.js with TypeScript as a template for the server-side back-end code.
* Firebase
* Ensure cybersecurity best practices
* SentinelOne
* Make error logging functionality in the QaaS app, which includes the capability of listing and exhibiting all the unsuccessful API calls to diagnose issues such as expired credentials, while also being able to inspect the payload for further analysis.
* Investigate the potential data integrity issues arising from N-Central API calls which frequently results in errors of the data returned.
* To make the visualization of the returned data from the API calls in the form of JSON and XML for user friendliness.
* To ensure that the product is scalable and can be easily adapted to accommodate future changes and additions to Q-ICT’s product line.
* To ensure that the product access is secure, and that all sensitive data is protected from unauthorized access or manipulation.
* To deliver the project on time, within spec, and to the satisfaction of the project stakeholders.

# Chapter III – Project Activities

Project Activities details all activities sorted by category that are needed to successfully complete the project.

## 3.1 Planning

* Initial contact with Q-ICT.
* Create a GitHub repo and GCP account.
* Gather information about the project, its boundaries, and goals.
* Have meetings and interviews with the stakeholders and product owner to discuss and discover further boundaries and project specifics.
* Research project planning & management, and the technical part of the research topic, study available materials.
* Make a draft version of this document (Project Plan)
* Discuss the draft version with the company supervisor.
* If required, implement the changes proposed by the company supervisor.
* Make a definitive Project Plan.
* Send the definitive version of Project Plan to the school supervisor within 2 weeks of the initial date of the graduation work placement.
* Set up a project backlog and a SCRUM board.
* Write User Stories and Tasks
* Create Sprint backlogs based on user stories.
* Track when tasks are being completed and trend in burndown charts.
* Receive the previous code and documentation from the previous iteration of this project.

## 3.2 Research

* Gather information about the project commissioner.
* Set up research document on knowledge management, SCRUM, and the project requirements.
* Create a research main question and sub-questions.
* Discuss research questions with the Company and School Supervisor.
* Analyze existing product done by the previous developers.
* Look up programming resources and proprietary integrated development environments.
* Brainstorming to define tasks for the product backlog.
* Determine feasible tasks.
* Determine out of scope tasks.
* Determine out of range tasks.
* Make a list of the proposed features.
* Make a list with the required hardware if any.
* Present the list and ideas to the Company Supervisor and Product Owner.
* Create an advice report for the clients and stakeholders backed up by theory.
* Discuss concepts, ideas, and tasks with the client.
* Write down the findings and discussion in a research report document.
* Analyze the feedback from the Company Supervisor.
* Create a feature/task priority document, set up the Backlog board accordingly.
* Discuss a draft variant of the Graduation Research Report to Company Supervisor.
* Send the initial draft of the Graduation Report to School Supervisor and receive feedback.
* Implement the feedback and/or task ideas from the client into the task list.
* Discuss the final concept with Company Supervisor.
* Finish the research phase and all related documents.

## 3.3 Design

* Create a coding convention.
* Create a Definition of Done with the Company Supervisor.
* Create the visual design of the platform.
* Create a test plan, making sure the platform works as planned.
* Create a document for User Stories, explaining what the system will do.
* Create a User Manual, explaining to the users how to use the system.
* Choose the required hardware.
* Decide on fonts, color palette and other design elements.
* Outlining required languages and components
* Make a definitive choice of our concepts.
* Sketch the final product.
* Visualizing the final product with mock-ups (if applicable).

## 3.4 End Product

* Finalize and use the definitive version of the concepts and tasks.
* Develop the product.
* Develop the responsiveness of the product.
* Plan weekly sprints and sprints reviews.
* Test the product according to the test plan and requirements and log the results.
* Implement the professional product in accordance with the frameworks and requirements of the stakeholders.
* Make sure the professional product meets the given standards.
* Respect the testing plan and scheduling.
* Discuss and implement feedback coming out of the testing phase.
* Make a report on the final product.
* Wrap up all the documentation, proofread and finalize.

## 3.5 End-Presentation/ Colloquium

* Clean up the project (code).
* Sort and archive all documents.
* Make sure the connections, the live version, the database, API connections, cloud functions, and other cloud services are working.
* Collect essentials for the final presentation.
* Build a coherent presentation detailing both the product and the road to achieving it.
* Presenting the definitive product to the project commissioner (first and second school supervisors), as well as clients
* Receive feedback and the grade for this graduation work placement.
* Reflect on what has been done, and what could have been done better. (Retrospective)

# Chapter IV – Project Boundaries

This chapter will give further insight into what the final product will consist of and what is not within the scope of this project. Should there be any changes to the scope of this project, this section will be updated accordingly.

## 4.1 Duration

The project will take place throughout period 4 of the fourth year of the author’s study in NHL Stenden, incisively from….. The duration of the project varies from 90-99 working days depending on the circumstances of the conflicts that will be aroused during the development.

## 4.2 Scope

No budget is given for this project.

This project is, in part, a continuation of a previous project done by another ICT Dutch student group in their 2nd year of their study at NHL Stenden Emmen. As stated by the client from the initial meeting, the final product of the project would be a web-based application that implements a JavaScript framework in the form of a dashboard. For this project to be successful, the dashboard will need to fulfill certain criteria. The dashboard needs to be able to display certain meaningful data from the database architecture of both 7.0 and 6.1 software versions of the machines. Additionally, the dashboard should be run on multiple platforms (desktop and Android/mobile).

In brief the dashboard application should be capable of the following:

1. The dashboard should be able to display data in a meaningful user-friendly way from the company’s database as to help the customers visualise the data easier. The data that will be displayed should implement 3 best practices of system manufacturing KPIs (Key Performance Indicator):
   * OEE (Overall Equipment Effectiveness)
   * Predictive Maintenance
   * Graphs
2. The dashboard should be able to display which software is running on the weigher machines. The software version of the machines consists of 6-digit numbers, in which the manner of the sequence is the following:
   * The year where the machine is made, with the second digit being removed (year 2023 would be 223)
   * Minus sign in between (-)
   * The last 3 digits would be the incremental number of the machine (e.g., 223-001)
3. The dashboard should be able to display how long has the weigher been running.
4. The dashboard should be able to recognize and display the status of the weighers.
   * If a weigher is idle and store how long has the time passed.
   * If a weigher is waiting for feed, or for the packer.
   * Average bags packed per minute.
5. The dashboard should be able to display the current performance of the machines, and how it is compared to their average and maximum performance.
6. The dashboard should be updated every 20 minutes with the new data from the central database.
7. The dashboard should be able to list all the breakdowns or manual stops, or other incidents that have happened.

## 4.3 Preconditions

Below are listed conditions that should be met for the project succeed:

* The team needs to implement SCRUM Agile management framework in the project.
* Deliver the required research documents.

The author has been asked to develop the platform with scalability in mind, as this will not be the final iteration of this product and might be carried out further by other development teams later down the line.

# Chapter V - Products & Interim Results

Within this chapter, the expected deliverables and interim results of both periods are listed and briefly explained. This section will be updated should the need for further documentation or products arise during the project.

## 5.1 Documentation

The documentation of the project will be comprised of a project plan, a research report, minutes of the most informative team meeting, advisory documentation based on the research report (potentially as part of one of the aforementioned documents), a product backlog made up of tasks based on the prepared user stories, user manuals and a project report.

The documentation of working hours is done by means of an excel file that allows each team member to enter their individual hours with a brief description what was achieved in that time. Based on the product backlog, burndown charts, that are updated and reviewed weekly, as well as detailed sprint backlogs are created for the realization phase.

## 5.2 Research and Concept Specifications

This will contain the different concepts thought of during the project and the definitive concept chosen with clear reasoning and arguments. These include – a study title, a working group and investigators, background and rationale, specific aims, and analysis framework.

Furthermore, extensive research will be conducted on scrum and knowledge management, and how they can be used in the realization of the project.

This documentation will help to keep track of the progress of the overall product conceptualization and the intermediate products, that will be stated in the final project plan. The backbones of this will be represented by the research report, to ensure educated choices are made for the selection of methods and overall approach for the product development.

## 5.3 Design architecture

Software architecture refers to the fundamental structures of a software system and the discipline of creating such structures and systems. Each structure is comprised of software elements, relations among each other, and properties of both elements and relations.

The architecture of a software system is a metaphor, analogous to the architecture of a building. It functions as a blueprint for the system and the developing project, laying out the tasks necessary to be executed by the teams. Different ideas will be explored to see what fits the project the best, and a definitive choice will be made in consultation, together, with the clients.

The database architecture is provided by the client. Database architecture refers to the organization of data within a database system. It defines how data is stored, organized, and accessed by the users and applications that interact with the database.

## 5.4 Test Products

The product will undergo a rigorous testing process, which will be planned and documented using a minimum of three test design techniques. The approach of testing laid out in the test plan documentation is to be reflected in the resulting reports, and parts that have been found to not be applicable will be marked as such. As part of the planning, a risk analysis is conducted, to help prioritize the most vital areas of the product in testing.

## 5.5 Final Product

At the end of the agreed project allocated timeframe, a complete final product will have been delivered.

## 5.6 End Presentation

Once the allotted time for the project concludes, the results of which will be shared in a manner specified by both the client as well as the lecturers, to display the results as well as give a general insight into the project timeline and working methods.

## 5.7 Period 4 - Interim Products Overview

The table below shows the various documents that need to be finished during this period along with their respective deadlines.

|  |  |
| --- | --- |
| **Task** | **Deadline** |
| **Minutes / Documentation of important meetings:** Transcripts of the most important meetings, and emerging information to be shared with all involved parties. | As needed |
| **Daily Scrum meetings** | Daily |
| **Hours Document (Accountability):** A table showing the team’s working hours, that is to be updated by 5pm each Friday at the latest. | Weekly overview, fill in daily |
| **Code of Conduct:** A document detailing expectations and rules regarding work ethics, signed by all team members | Week 1 |
| **Project Plan (Initial Version):** A document to provide insight into the scope and purpose of the project. | Week 1 |
| **Research Document:** All research necessary for the realization phase compiled in one document. | Week 1-2 |
| **Product backlog:** A prioritized list of features, requirements, and enhancements that need to be developed for the product. | Week 1-2 |
| **Midterm evaluation** | Week 4-5 |
| **Sprint review** | Week 2-10 |
| **Sprint retrospective** | Week 2-10 |
| **Sprint backlog** | Week 1-10 |
| **Mutual Peer Evaluation** | Week 10 |
| **Presentation of realization phase results** | Week 10 |
| **Thesis** | Week 9 |
| **Knowledge Management Information System** | Week 10 |
| **Individual assessments** | Week 10 |
| **Version Control** | Per document |

*Table 1: Interim Products*

# Chapter VI - Quality

## 6.1 – End Product

The product of this project is to deliver a working, easily scalable and maintainable web application where the client can view the statistics of any machines they have produced, as well as their clients should be able to access these data of their machines. The information can be seen for each machine one by one and can also be visualised from a graph.

This web application must be easily accessible, each component must be created in a separate environment so that each part can be managed easily or scaled up if there is the need to, without breaking the rest of the features or containers.

Special attention needs to be put in the security aspect. Access must be limited to logged users, and each incident listed must be manually curated by approved users. The database must also be protected from any injections or security flaws and the data must be sanitised and uniformised, if possible. More info about the database structure can be found in the Database Architecture document.

## 6.2 – Control

Code wise, everything will be managed in GitHub, as the author will follow the best practices of quality of code guidelines, which consists of several programming conventions such as Comment conventions, Indent style conventions, Line length conventions, Naming conventions, Programming practices and Programming principles and Ethics Principles. To control the quality of the code, uploading to the Main/Master branch requires the code review and authorisation from the Company Supervisor, as checking the code pre-emptively will reduce unnecessary time spent fixing the program and thus delays. Changes to the most upper branch are forbidden, each new update needs to be committed from a separate branch that has been pulled from the most current safe build.

The interim results such as documentation and various features of the program will be checked by all group members and proofread by the members delegated to this, and feedback will be requested from university staff and the client.

The communication from the author and the company supervisor will be on Teams, Outlook e-mails, and WhatsApp messages, but also physical meetings, in the building of Q-ICT. To make sure that the project is going smoothly, and both parties are on the same page regarding what is being created and what must be made, weekly report sessions will be held between the author and the Product Owner, with the possibility to the school’s supervisor to join.

The meeting between the author and the School Supervisor

## 6.3 – Testing techniques and programs

Testing will be done in stages. First while developing it, the author will have sessions to test the different parts, accordingly to the Test Documents and the Use Cases that have been written for it. This phase will also focus more on code quality. The second part will involve the clients and possible external parties, which will produce feedback. This part will focus on the features available and how they work.

Having several groups of testers, in different stages, with a variety of methods, ensures that the product is of excellent quality and that issues when it comes to the product launch are kept to a minimum.

As basis, the Master Test Plan document will be used, along with the Acceptance Test Plan document. Whereas the system tests that are executed with the introduction of a larger new feature are logged in a table and repeated if they fail. The plan for said tests is contained within the MTP.

# Chapter VII - Project organization

## Team member, product owner, and contact persons.

There is only one member of the team, along with 2 supervisors from Q-ICT and one supervisor from NHL Stenden.

|  |  |  |  |
| --- | --- | --- | --- |
| Christopher Sulistiyo | [c.sulistiyo@qict.nl](mailto:c.sulistiyo@qict.nl) | +31 627553451 | Author |
| Manuel Weidjik | [manue](mailto:levente.stieber@student.nhlstenden.com)l@qict.nl | +31 20 330 2216 | Company  Supervisor |
| Mark Kolk | [m.kolk@qict.nl](mailto:m.kolk@qict.nl) | +31 6 85454829 | Product Owner |
|  | [@nhlstenden.com](mailto:aleksei.skorjak@nhlstenden.com) | +31 6 16054757 | School Supervisor |

## 

## Availability

The author is available on working days between Mondays until Fridays between 8:30-18:00. He can be contacted by email, Teams, WhatsApp, SMS, or a call. Outside of these times the author is not expected to be working on the project but may be reached out due to the flexibility of certain occasions, special occasions, i.e., shortly upcoming deadlines or goals not achieved according to the scrum or activity board. However, the deadline will be kept in mind and the working hours might be adjusted based on that.

Any of the absence days will have to be explained by the author with the Monthly Report. The author will decide how to proceed, putting the project completion as the main objective. Also, all hours must be recorded in the Monthly Report document on Teams with a brief description of what was achieved.

## Team roles

There are a couple of roles within the team:

* The team leader is responsible for coordinating tasks within the group and making sure those tasks are completed on time and meet the quality expectations. Moreover, they are responsible for piloting the project in the right direction and acting as a bridge in communicating between the clients, teachers, and the group. They also schedule meetings with the teachers and client if needed.
* The developers are focused on doing the assigned tasks and what they are told to do. They can also assist the team leader with certain tasks, such as taking the minutes.
* The company supervisor as the SCRUM Master, is focused on facilitating the backlog among the developers, and making sure that the Scrum team carries out every sprint perfectly.
* Product Owner defines the why is it worth to develop the product, who it is for, and what features, requirements should it contains, and to main the product backlog.

## Reporting

The team will meet at least once a week with the product owner to discuss progress for individual tasks and overall project progress. Moreover, every member gets to speak up about their concerns to the group. This is to ensure that there are no unspoken conflicts or issues. All this will be taken down in the meeting minutes available in the Teams environment. Using the weekly quota, the team can plan and adjust the needs of the project going forward. Furthermore, the team has decided to use WhatsApp and Teams as the main ways of communication. Email has been chosen for contact between students, lecturers, and clients, with MS Teams as an alternative.

Initially, during the research and documenting phase, a hybrid project planning method will be used. Whenever work must be done, tasks will be created and assigned to one or more team members along with a deadline. To keep track of current and past tasks, Jira will be used, along individual tracking of hours and progress. At least 2 weekly meetings will take place where the tasks will be discussed, and new tasks will be added.

During the period where SCRUM method is being used, group members are expected to keep their tables detailing the work hours up to date, as well as accurately noting down what feature they have worked on when in the burn down charts. Once a sprint concludes, the sprint is reviewed together with the entire group and new user stories for the following one are selected based on the product backlog. This backlog is also updated with any new tasks that may have popped up during the sprint and unfinished tasks are updated and reentered.

Finally, the team came to an agreement to use GitHub as the digital tool for collaborating within the project group. This will enable a smooth workflow for the team members, as well as securing older product versions in case of a mishap. This platform will be able to show the working progress of the members during the project, as well as keep track of the SCRUM tasks by using its Project feature. This method of work will be implemented during the developing stage of this project.

# Chapter VIII - Planning and Scheduling

As effective planning and scheduling are essential for delivering a high-quality software application within budget and on time, by taking a structured approach to project planning, the development team can ensure that it is working efficiently and effectively towards achieving the project objectives.

Below the prioritization of project deliverables, estimation of their timeframes and a Gantt chart depicting set time frames are described.

## Project realization Phase (17.04.2023-19.06.2023)

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Task** | **Weeks** | **Can only take place after:** |
| A | Team role assignments | 1 | - |
| B | Code of Conduct | 1 | A |
| C | Project Plan (draft version) | 1 | B |
| D  E | Research KM  Research SCRUM | 1  2 | C  C |
| F | Product Backlog & Epics | 2 - 9 | - |
| G | Sprint Backlog | 3 | E |
| H | Research Document (draft version) | 4 | E |
| I | Research Document (final version) | 8 | H |
| J | Evaluation | 9 | I |
| K | Self-reflection | 9 | K |
| L | Presentation | 9 | I |
| M | Weekly reports | 1-9 | - |
| N | Client meetings | 1-9 | - |
| O | Sprint tasks | 2-9 | - |

A screenshot of a graph

Description automatically generated

*Chart 1: Gantt Chart*

It is important to note that unexpected hurdles may arise during the execution phase, leading to deviations from the original plan. These deviations may arise due to factors such as prolonged feedback and approvals from clients or situations where activities require more resources than initially anticipated as well as plain lack of knowledge. Therefore, it is crucial that the team and the planning remain flexible and provide enough room to accommodate changes as required to ensure successful project completion and customer satisfaction.

# Chapter IX - Cost and benefits

This chapter will discuss various costs and benefits relating to this project.

## 9.1 Cost

For this project there is no budget set. However, should the team require anything in terms of software, the university and/or the client may provide this.

Building the project should not prove expensive since the product is a software application. The expenses may come with hosting and maintenance of the product, for which the development team is not responsible.

9.2 Benefits   
The project will provide benefits in terms of allowing the project commissioner, as well as its clients, to have data visualisation of the gathered data for internal use or client/dealers’ usage. The dashboard will ultimately enable Manter to improve the efficiency of their weighing and packaging machinery by providing data and insights related to their performance and maintenance.

As for the students, building a web dashboard for a real client will provide students with real-world experience and an opportunity to apply their knowledge and skills in a practical setting.

# Chapter X – Risk Analysis

This chapter handles the possible risks that may be encountered during the project and ways to handle the problems. This is visualized on the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk** | **Possibility** | **Possible Outcome** | **Prevention** | **Measure taken** |
| Graduation Work Placement is not finished on time | Likely | The author will be forced to take extended periods in his study in NHL Stenden Emmen | Not possible |  |
| Contracting COVID-19 | Less likely | Team will have to quarantine for 2 weeks, and the project will be set back. | Maintain 1.5-meter distance and use face masks when needed | Team will have to work during down time not to fall behind, getting vaccines and respecting measures |
| Common illness | Less likely | The team will be set back for a moment. | Good health care and communicate properly with team | Assume tasks of ill members |
| Tasks not finished on time | Possible | Set back until tasks are finished | Proper planning and time management | Sprint reviews, plan next sprints differently, issue warnings if other causes |
| Insufficient task | Less likely | Set back until task schedule is done correctly | Actively ask members for document / peer review, proof-reading. | Plan next sprint accordingly |
| Lack of technical knowledge | Less likely | Team might not be able to realize certain parts of the project. | Research proper technical skills needed, practice these and ask for assistance if needed | Research what skills the team is lacking, |
| Departure of a project member | Very unlikely | Team will be set back | Proper communication between members to be able to react to signs of a member dropping out quickly and effectively. | Assume the tasks of the dropped member, change team roles |
| Loss of data | Unlikely | Loss of data/files. The amount depends on the most recent back-up. | Frequent back-ups / version control | Restore files from latest back-up / revert to an earlier version |
| Insufficient testing | Possible | End-product of lesser quality | Structured Test Plans and sufficient time to complete the tests | Review test reports and run tests again |
| Hardware malfunction | Unlikely | Set back until hardware is replaced | Actively check if hardware is in working condition | Order a new part as fast as possible and replace it |
| Lack of proper communication with client | Possible | This will slow the development of the project. | Frequent communication with the client, follow up emails, messages through WhatsApp, calling on the phone in case of emergency | Weekly meetings, multiple ways of communication and reaching out |
| Security issues | Unlikely | Personal information could be stolen. | Testing for security issues. | Consultation regarding Secure Programming and following best security practices |
| Security issues on the libraries used | Possible | Update on the libraries, or change the libraries | Use newer, community trusted libraries, with frequent updates. | Check for updates and be sure that the libraries used can be applied in the future. |
| Additional research required by the client | Possible | The team’s progress will be slowed down, causing troubles with keeping the deadline. | Good communication between the team and the client. | The team will try to communicate as efficiently as possible with the client to avoid any misunderstanding. |
| Workload Too Heavy | Possible | Due to the possibility of the team being unfamiliar with some of the subject matter, there is a possibility there may be miscalculations regarding the sprint planning | Reassess progress frequently and communicate any setbacks with the other team members and clients. | Plan sprints accordingly and have weekly sprints reviews. |

*Table 2: Risks*