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# Project Plan

MINA – IT2D

VERSION 1.3

DIYALO

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## Version Management

Version number	Changes
1.0	Initial version of the document
1.1	Improved based on teachers' feedback
1.2	Updated Intermediate results
1.3	Project Goal done smarter. Added SCRUM methodology to the activities in the activities chart. Added Project Owner and a more developed conclusion to the risk analysis and references chapter

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## Chapter 1: Introduction

This chapter describes in detail the background of the stakeholders.

Diyalo foundation is a problem-solution oriented foundation that would want to bridge together the knowledge gap of people all around the world. The foundation has a wide range of clients from various sectors such as National Innovation Centre, Robotics Association of Nepal, TATA, KPN, Stanford University, TU Delft, and the like.

Diyalo has teamed up with the National Innovation Centre, Nepal, to support enthusiastic innovators, generate entrepreneurs, commercialize local products, and help Nepal to become economically prosperous. Together, they have created a robot built with a highly modular software framework. The robot is an autonomous data driven service robot which has already implemented several functionalities, such as face recognition.

The project team IT2D has been given the task to find a solution for this robot to navigate in a human-present environment, thus enabling it to be socially aware.

The IT2D group will be required to successfully program the robot with motion tracking as well as gesture tracking. The group will also be required to present a demonstration of progress during the SCRUM review at the end of every sprint.

The division of the roles within the development team is as it follows:

- **Leader** – Alexandru Gumanuc
- **Quality Control** – Rares Matei Husărescu
- **Minutes tacker / Secretary** – Jadyne Jacques
- **Interpersonal** – Ruikun Yuan
- **Scrum Master** – Ayodeji Olagoke
- **GitHub Merge Master** – Krystian Wiazowski

Information about the project is listed below:

- **Project Name:** Mina
- **Product Owner:** Mahip Raj KC
- **Project Managers:**
  - Mahip Raj KC from *National Innovation Centre*, Nepal
  - Subash Ghimire
  - Aavash Thapa and Jord Drontmann from *Diyalo Foundation*

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- **Project Stakeholders:**

- Mahip Raj KC, Aavash Thapa and Jord Drontmann as project managers
- Rene Laan and Bert Meijerink as project supervisors
- A 4\* Hotel to be used as a testing environment.
- Future users which will make use of the robot

## Chapter 2: Project Results

The client wants to use an autonomous operating robot to streamline guest management at an host organization (such as a hotel or restaurant). The aim is to provide comprehensive guidance within the facility while also executing specific minor tasks, such as delivering room keys to new guests. By doing so, the desired outcomes are improved guest satisfaction and enhanced operational efficiency. Furthermore, this initiative would result in a decreased dependency on labor, leading to a reduced need for a large workforce and consequent cost savings for the organization.

The project aims to improve a non-cognitive service robot to move autonomously using motion tracking and gesture tracking. The success of the project will be measured by the ability of the robot to navigate a defined space without human intervention and avoiding collision, based on the programmed motion and gesture tracking.

This will involve programming the robot to detect and respond to its surroundings in real-time, allowing it to move freely and safely in an unstructured environment while still having a manual trigger for minor operations. This goal is highly relevant to the current state of robotics technology in Nepal and client's needs. The project has a set deadline of 9 weeks to complete.

### Requirements

- Start a “Track Command” in the simulation environment provided.
- Identify a human in the scene and approach the human - maintain 1.2 meters distance.
- Unless the “Track Command” is not turned off, move around the map with the target human maintaining 1- 1.5 meters distance.
- Identify and focus on one human in the scene.
- Detect human gestures: waving hands, stop signs (Could Have).
- Create different event messages and pass it in the message network (Could Have).

### Pre-conditions

The following preconditions are expected from the client for the project to be successful:

- The client must be available by email during the agreed upon workdays (Monday – Wednesday: 8:30-17:00 and Friday 8:30-17:00)
- The client must be present during scheduled meetings with the team to track progress or discuss project development.
- The client must sign off/approve all documents delivered, including this project plan.

## Chapter 3: Project Activities

The success of any project depends on the careful planning, execution, and management of project activities. The project activities refer to the tasks, activities, and deliverables that are required to achieve the project objectives and goals. A Work Breakdown Structure (WBS) is a powerful tool used for breaking down the project scope into manageable and specific work packages or activities.

### Planning and Project Management

- Attend the kick-off presentation. Define the project scopes and objectives.
- Develop the project plan together with an initial schedule for the project. The schedule must contain the tasks together with the respective deadlines and the meeting system within the team and with the client and/or stakeholders.
- Establish the team roles and responsibilities within the team. The following are examples of team roles:
  - Team leader
  - SCRUM Project Owner
  - SCRUM Master
  - Quality control
  - Git Merge Master
  - Secretary/Minute taker
  - Development team
- Establish a team code to which the team will have to comply for the duration of the project.
- Establish a document containing the coding conventions that must be followed while developing the application.
- Establish the stakeholder(s) of the project.
- Setup the simulation environment.

### Scrum methodology

- Define the product backlog that contains all the requirements and tasks that must be completed by the end of the project.
- Plan the Sprints, their duration and the amount of sprints required to finish the project.
- Plan the Sprint Demos with the necessary stakeholders, and most importantly the client. Determine the time, date and the frequency they occur.
- Plan the meeting Stand-ups, the time, date and the frequency to discuss the progress of the project with the team.
- Conduct the Sprint Review, with or without other stakeholders, to gather feedback over the progress done during the specific sprint.

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- Conduct the Sprint Retrospective with the team to reflect on the completed sprint. Identify what went well, what could be improved, and point actions that could improve team's performance for the next sprint.
- Repeat the cycle for each sprint. Each cycle is documented.

## Documentation

- To facilitate the flawless development of the project as well as keeping collaboration with all the stakeholders up to standard, several documents will be delivered throughout the project. These include:
  - Project Plan (Plan of action)
  - Design Document
  - Test documentation
  - SCRUM documentation
    - Backlog containing all the user-stories.
    - Sprints together with their retrospectives
    - Definition of done

## Software implementation

- Module/Script that will allow the autonomous robot to track and follow a human in motion.
  - If the above-mentioned activity will be fully completed according to the set-up planning, another activity/task that will be delivered. Thus, a module/script that will allow the autonomous robot to recognize different gestures and react accordingly.
- Integration of the above-mentioned activity with the existing hardware (ecosystem)
- Testing and debugging the final (software) product.

## Final stage / Project Closeout

- A final presentation of the project
- An archive (zip file) containing the application.
- A version management environment used for the development.
- All the documents mentioned in the “Documents” activities.

An shallow overview of how WBS was used to establish the above mentioned tasks can be found in this [attachment](#).



## Chapter 4: Project Limits

This chapter describes the time boundaries of the project and conditions that must be fulfilled for it to be successful. The Project starts on the 17th of April 2023 and the deadline for the final product and all documentation is on the 16th of June 2023. In return, if everything is submitted on time and is satisfactory, each team's member will receive 9 EC's. The goal of the project is to develop software that will allow the robot called "Mina" to follow people, interact with them and show the paths, via AI object and movement tracking.

### Boundaries

In this sub chapter we will list the boundaries of the Diyalo assignment. All the criteria will be listed here for a clear understanding of the purpose of the assignment during the project timeframe. The client and the group will agree to the standards.

- Object Tracking
- Gesture recognition

### Success Requirements

For the project to be fully successful, it is mandatory for:

- All project activities from chapter 3 must be carried out successfully and in a timely manner
- The project requirements as agreed upon in the Project Plan and MoSCoW analysis documents are fulfilled

## Chapter 5: Intermediate Results

There are multiple professional products that will be presented as a part of the progress of the project. Those are:

- Signed Team Code (Week 1)
  - This document specifies the conventions by which the group will work on the project and abide by.
- Plan of action (Week 1)
  - Document describing the project and includes outcomes and how it is going to progress.
- Peer Evaluations (Week 4 and 8)
  - Number of forms directed to each team member to include the description of each colleague, describing their behaviour, tips, and tops.
- Design Document (Week 8)
  - A document outlining what the product does. It contains conceptual/logical data model, ERD and/or system architecture.
- Product Backlog (Week 8)
  - Contains all the tasks with user stories and user points to deem the project *complete*.
- Version Management (Week 8)
  - Shows all the versions and changes that happened to the documentation and product.
- Test Documentation (Week 8)
  - Documentation set consisting of: Test Plan, Test Cases and Test Report. Those are describing the tests that are going to be conducted and providing a summary of what was the result of them.
- SCRUM (Week 8)
  - Definition of Done
  - Documentation set completing the rest of the SCRUM methodology requirements, containing Retrospectives and Sprints' Backlog
  - Demo Presentations (Week 3, Week 5, Week 7, Week 9, Week 10)
- Timesheets (Week 8/Weekly)
  - An excel sheet with time allocation of each team member.
- Complete application (Week 8 and Week 9)
  - Code that was developed, compressed in the zip format.
- Final Presentation (Week 10)
  - Showcase of the progress and product that the group developed.

## Chapter 6: Quality Control

Ensuring a high-quality solution that meets the needs of Diyalo is crucial during the Quality Control Phase. The primary objective of this phase is to detect and rectify any issues before the solution's deployment, which guarantees a positive user experience and the project's long-term success.

### Quality Control Phase

The Quality Control (QC) Phase is a critical step aimed at ensuring that the solution meets the required standards and specifications.

**This phase involves the following steps:**

- ✓ **Verifying** that the application has been implemented according to the design and specifications defined in the research and development phases.

**Testing** the application and its components to evaluate their accuracy and robustness under different conditions, such as variations in lighting, background, scale, rotation, occlusion, or noise.

- ✓ **Evaluating** the application's performance, stability, and scalability to ensure it can meet the desired level of performance, stability, and scalability under normal and peak workloads.
- ✓ **Identifying** and fixing any bugs, issues, or other problems found during testing.
- ✓ **Conducting** user acceptance testing with representative users or stakeholders to assess the application's usability, accessibility, and user satisfaction. User acceptance testing also helps to identify any usability issues or inconsistencies that may affect the application's adoption and usage.
- ✓ **Verifying** that the application is secure and compliant with relevant security standards and regulations.

### SCRUM methodology

To ensure successful implementation of the Diyalo software, it is necessary to use the Scrum method, which emphasizes iterative development and continuous feedback.

This approach is particularly suitable for the Quality Control phase, where the focus is on identifying and resolving issues at an early stage and continuously enhancing the solution's quality.

**The Scrum methodology involves the following steps in the QC phase:**

- ✓ **Sprint Review:** After completing each sprint, the team will hold a meeting to review the work done, identify any challenges encountered, and brainstorm ways to improve for the next sprint.

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- This review is an opportunity for the team *to reflect* on their progress and *adjust* their approach as necessary.
- ✓ **Sprint Retrospective:** In this process, the team will look back on the sprint and evaluate their development process to identify areas that need improvement. By reflecting on their methods and outcomes.
  - The team can *optimize* their approach for greater efficiency and effectiveness in future sprints.
- ✓ **Continuous Testing:** Throughout the development process, the team will conduct ongoing testing of the application to detect any issues early and make necessary changes.
  - This approach *ensures* that the software is thoroughly tested and refined before release, reducing the likelihood of bugs, and improving user satisfaction.
- ✓ **User Acceptance Testing:** This process involves testing the solution in a simulation environment to ensure that it meets their requirements and expectations.
  - By involving users in the testing process, the team can receive valuable feedback and validate that the solution is fit for purpose.
- ✓ **Scrum master's Verification:** The Scrum Master is responsible for verifying that the product backlog and sprint backlog meet the definition of done.
  - This *ensures* that the solution is of high quality and meets the team's agreed-upon standards.
- ✓ **Code Review:** The team will conduct code reviews to evaluate the quality and maintainability of the code.
  - By reviewing each other's code, the team can *identify and correct* errors or inconsistencies, ensuring that the code is of high quality and meets coding standards.

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## Quality Control and SCRUM

**Scrum is well-suited for the Quality Control phase in the Diyalo project for several reasons:**

- ✓ **Iterative Development:** Scrum emphasizes iterative development, allowing the team to continuously improve the solution as they receive feedback from users and stakeholders.
  - This approach is well-suited for the QC phase, where issues and problems can be identified and addressed early in the development process.
- ✓ **Continuous Feedback:** Scrum encourages continuous feedback and communication between team members, stakeholders, and users.
  - This helps ensure that the solution meets the needs and so the issues are identified and addressed in a timely manner.
- ✓ **Flexibility:** Scrum is flexible and allows for changes to be made as needed, making it well-suited for a project with a complex and evolving set of requirements.
- ✓ **Emphasizes Quality:** Scrum places a strong emphasis on quality, making it well-suited for the QC phase, where the focus is on verifying that the solution is of high quality and meets the requirements of the client.
- ✓ **Improved Visibility:** Scrum provides visibility into the development process and allows stakeholders to see the progress being made, making it easier to identify any issues or problems and address them.

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## Quality Control and SDLC

The **SDLC** is well-suited for the Quality Control phase of the Diyalo project for several reasons:

- ✓ **Comprehensive Approach:** The SDLC provides a comprehensive approach to software development that covers all aspects of the project, from planning to maintenance.
  - This approach *ensures* that the solution is developed in a systematic and organized manner, with a clear focus on quality.
- ✓ **Emphasizes Documentation:** The SDLC places a strong emphasis on documentation, which is crucial for the QC phase.
  - Documentation *ensures* that the solution is well-documented, making it easier to understand, maintain, and enhance in the future.
- ✓ **Testing and Quality Assurance:** The SDLC includes testing and quality assurance as integral parts of the development process.
  - This *ensures* that the solution is thoroughly tested and refined before release, reducing the likelihood of bugs, and improving user satisfaction.
- ✓ **Well-Defined Phases:** The SDLC is a process-oriented approach that breaks down the development process into well-defined phases.
  - This makes it *easier* to manage the project, track progress, and identify issues and problems at each stage of development.
- ✓ **Clear Deliverables:** The SDLC defines clear deliverables for each phase of the development process.
  - This *ensures* that the team knows what is expected of them at each stage of development and that the client has a clear understanding of what they will receive at the end of the project.

## Quality Control and Code Conventions

The team will adhere to a set of well-defined code conventions to ensure consistency, readability, and maintainability of the software.

The team most widely accepted style guide for Python code is PEP 8, some of the key aspects of our code conventions include:

- ✓ Naming conventions
- ✓ Code formatting
- ✓ Comments

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- ✓ Imports
- ✓ Error handling

The complete Code Conventions document can be found in this [attachment](#).

## Quality Control and Standard Selection

Ensuring a high-quality solution that meets the needs of the autonomous service robot is crucial during the Quality Control Phase.

*The primary objective of this phase is to detect and rectify any issues before the solution's deployment, which guarantees a positive user experience and the project's long-term success.*

## Quality Control and Documents

The team chosen to use IEEE standards to guide the software development and quality control processes. IEEE is a professional organization focused on electrical, electronics, computer engineering, and computer science fields, making it a more suitable choice for the project, which deals with an autonomous service robot.

The documentation is organized in a logical structure, making it easy for readers to navigate between different sections. Cross-reference related sections of the documentation and providing a table of contents, index, and other navigational aids to assist readers in finding the information they need. All citing in any document is done according to the APA v7 format.

## Scrum Tools for Project Collaboration and Management

The team will use GitLab as primary code repository and issue tracking platform, Slack for real-time team communication, and GitHub as a secondary code repository.

These tools will streamline collaboration and ensure efficient project management during the Quality Control Phase.

The following steps will be taken to improve integration testing:

- ✓ Test Planning
- ✓ Continuous Integration
- ✓ Test Automation
- ✓ Test Coverage
- ✓ Test reporting

## Chapter 7: Project Organisation

### Development Team

The project consists of the following development team members:

#### **Alexandru Gumanuic** (Project Leader)

The Role of a Project Leader is to guide and lead the rest of the team to a better outcome and to a successful result of the project, by explaining the details of every task that needs to be archived and give them feedback on their results to improve.

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#### **Ayodeji Olagoke** (Scrum Master)

Scrum masters manage product and software development teams as a servant leader. They ensure that teams follow Agile practices and scrum framework values, work to increase team efficiency, and provide motivation and guidance for process improvement.

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#### **Jadyn Jacques** (Secretary/Minute taker)

The Purpose of Minutes is to have notes on every single important detail when we are gathering information during meetings with our clients or in team meetings which will guide us on what tasks need to be done and which are necessary to do.

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#### **Krystian Wiazowski** - (*Git Merge Manager*)

The Git Merge Manager is responsible for merging branches of the development repository, providing merge advice, and resolving merge conflicts. Also, the Git Merge Manager should keep track of the different versions of code in the repository.

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#### **Rares Matei Husărescu** (Quality control)

The Role of Quality Control is to keep the team and the plan to a reasonable manner in that intend means that the team will be having the best chemistry while working and compiling with each other and accomplishing a task with a perfect sense of mindset and behaviour.



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### **Ruike Yuan** (Interpersonal)

The role of an Interpersonal Relations is to make the team more suitable for each other and have the best time and interaction with their colleagues while working on the project.

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### **Mahip Raj KC** (Product Owner)

The product owner plays a critical role in agile development and is responsible for maximizing product value and success. They prioritize features, gather requirements, and work with stakeholders to deliver a high-quality product that meets customer needs and business goals.

[mahip@nicnepal.org](mailto:mahip@nicnepal.org)

Availability of the development team:

Both the client's and the team's schedule changes on a weekly basis, which should be considered when planning meetings, so that each stakeholder is available to attend.

The members in the development are required to be available during the team working hours and in team/client meetings.

Days	Team availability					
8:30-21:00 (online)	Alexandru Gumaniuc	Ayodeji Olagoke	Jadyn Jacques	Krystian Wiazowski	Rares Matei Husărescu	Ruike Yuan
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

\*This table is the general reference; the actual availability depends on the real scenario.

### **Clients**

The project consists of the following clients:

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- ✓ NIC (National Innovation Centre) (Nepal)
  - Mahip - [mahip@nicnepal.org](mailto:mahip@nicnepal.org)
  - Subash - [subash.ghimire@nicnepal.org](mailto:subash.ghimire@nicnepal.org)
- ✓ Diyalo Foundation
  - Aavash Thapa - [a.thapa@diyalofoundation.org](mailto:a.thapa@diyalofoundation.org)
  - Jord - [jord@diyalofoundation.org](mailto:jord@diyalofoundation.org)

#### Stakeholders:

- NIC (National Innovation Centre) - Nepal
- Diyalo Foundation
- Project 6.2 Diyalo Development Team
- Hotels that provide environment for testing the project

#### Communication within the development team and with clients:

The team communicates with clients to understand requirements, establish an agreement, and set some ground rules for meetings, such as how often they want to meet and how the customer will be notified of milestones. During a meeting, any member can ask for assistance with parts they do not understand well. Meetings are held at least once a week, and the frequency of meetings depends on the team's work progress. This way, both parties can see how far they have come in the past week. Based on the weekly quota, the team can plan and adjust the needs of the project for the future. In addition, the team has decided to use WhatsApp, Teams (for online meetings), Gitlab (collaborative software development platform), and Outlook, which contains team member and client emails, as this is the best way to communicate with clients. The team may also set up a shared repository on GitHub, where development codes of the project are stored.

Finally, the team may use *Slack* as an additional digital tool for collaborating with the clients, which will enable a smooth working environment between stakeholders.

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## Chapter 8: Planning and Scheduling

This chapter describes the time boundaries of all the established [project activities](#) together with the time required to finish the project.

The Gantt chart found in the [this document](#) displays the planning and scheduling of this project. Moreover, it is expected of every member to spend a total of at least 252 hours, meaning around 28 hours a week on this project.

## Chapter 9: Risk Analysis

This chapter provides a structured risk management framework and aims to categorise and describes the possible risk that could occur during this project after brainstorming and consulting the risk repository from other completed projects while providing different responses or actions to prevent, avoid or contain the risks identified.

### Risk Category:

The next step of risk identification involves establishing relevant risk categories that are specific to the project. Namely:

<b>Risk Categories</b>	<b>Description</b>
Internal	This includes all risks that can be caused by a member of the project team. In the scopes over both the technical, organizational and project management risks
External	This includes all risks that is caused by the client or project supervisors. These are risks that cannot be planned for

### Risk Status:

Effective risk management, can occur when project teams identify the status, whether they are active or inactive. This helps the team, project supervisors and other stakeholders understand the risks currently being monitored and those that have not been recorded.

<b>Risk Categories</b>	<b>Description</b>
Active	This includes all risks that have recorded and are currently being monitored for probability changes (Mary Levinson , 2010)
Inactive	This includes all risks that have not been logged

### Risk Trigger:

Possible risks triggers include but are not limited to:

<b>Risk Event</b>	<b>Risk Trigger</b>
Unexpected absence	A team member doesn't show up for a planned meeting or assessment
Low level of technical skills (coding conventions, understanding concepts and languages)	A team member can't write code in a required programming language
Late submission of individual assignments	A team member delivers code or documentation after an agreed deadline
Loss of Data (Hardware/ Software)	A team member loses his personal computer or pulls over unpublished code from GitHub
Submission not up to par based on document/ project checklist	A team member disregards scoring rubrics for a deliverable
Client Demo takes more than the scheduled time	Presentations take longer than allotted time

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Team member leaves group/ gets kicked out	A team member breaks the code of conduct
Absence due to illness	A team member shows symptoms of an illness
Little to no response from the client	Client doesn't respond within 2 working days
Client makes huge changes to the product's requirements	Client introduces new complex concepts after research phase
Time zone difference between the Netherlands and representative's country of residence	Client isn't available at a planned meeting
Client company goes bankrupt	Client's company declares terminates development

### Risk Evaluation and Handling:

The segment combine principles of the next two elements of the risk management cycle as stated in the subheading above. It aims to provide classification, risk response planning etc. below

Category	Title	Probability 1-5 (low-high)	Impact 1-5 (low - high)	Status (Active or Inactive)	Score $P * I$	Risk manager	Back up Team Member	Mitigating plan ( <b>Avoid:</b> How you will circumvent the risk in its entirety <b>Evade:</b> How you will lower the probability of the risk from happening. <b>Contain:</b> How you will lower the impact of the risk if it happens)
<b>Internal</b>	Unexpected absence	4	5	Inactive	20	Jadyn	Ayodeji	<b>Avoid:</b> Presence is mandatory at all meetings, seminars, and ateliers with exceptions of reasonable conditions quoted in team code <b>Evade:</b> Notify team and project supervisors on WhatsApp or via email <b>Contain:</b> Penalize group members according to the team code.
	Low level of technical skills (coding conventions, understanding concepts and languages)	3	5	Active	15	Alexandru	Krystian	<b>Avoid:</b> Conduct a skills gap analysis <b>Evade:</b> Utilize the retrospective to identify when deadlines had to be pushed back to identify the individual's level of understanding <b>Contain:</b> Reassign tasks according to areas of strengths or assign a pair to the task.

	Late submission of individual assignments	2	5	Active	10	Jadyn	Alexandru	<b>Avoid:</b> Use of sprint planning to allocate submission deadlines <b>Evade:</b> Setting stricter deadlines for individual or pair deliverables <b>Contain:</b> There may be a need to commit extra hours to make up for the time lost.
	Loss of Data (Hardware/ Software)	4	2	Inactive	8	Ayodeji	Ruike	<b>Avoid:</b> Backup all work on different cloud servers <b>Evade:</b> Handling your devices carefully <b>Contain:</b> Use last backup and prioritize working on said area.
	Submission not up to par based on document/ project checklist	3	5	Active	15	Krystian	Alexandru	<b>Avoid:</b> Working strictly based on the checklist/ scoring rubrics provided <b>Evade:</b> Merger, document, and code quality checker review submissions <b>Contain:</b> Assigning extra time to work on document/ code by the member and others
	Client Demo takes more than the scheduled time	5	2	Inactive	10	Jadyn	Alexandru	<b>Avoid:</b> Presenter being time conscious and proactive during presentation <b>Evade:</b> By running demos and creating slides before the D-day and inspecting presentation devices/ room that are to be used <b>Contain:</b> Send remaining demo items to the client via email for feedback
	Team member leaves group/ gets kicked out	2	5	Inactive	10	Rareş	Krystian	<b>Avoid:</b> Individual group members being and asking for help if instructions are unclear <b>Evade:</b> Active communication in group chats about deadlines and planned activities <b>Contain:</b> Restructuring the sprint planning, project backlog if needed and getting the message across to all stakeholders
	Absence due to illness	4	5	Active	20	Krystian	Jadyn	<b>Avoid:</b> Follow covid rules and regulation and quarantine to prevent spreading illness if applicable <b>Evade:</b> Notify team and project supervisors on WhatsApp or via email <b>Contain:</b> Notify project supervisor

<b>External</b>	Little to no response from the client	5	5	Inactive	25	Alexandru	Rareş	<b>Avoid:</b> Notify clients of the requirements the group needs to provide the best solution <b>Evade:</b> Notify project supervisor to discuss the best option moving forward <b>Contain:</b> Move on with response from the project supervisor
	Client makes huge changes to the product's requirements	4	2	Inactive	8	Alexandru	Jadyn	<b>Avoid:</b> Document bi-weekly with client <b>Evade:</b> Notify clients if the change in requirements can be done in that time frame <b>Contain:</b> Notify project supervisor
	Time zone difference between the Netherlands and representative's country of residence	4	3	Active	12	Alexandru	Ayodeji	<b>Avoid:</b> Plan with client for a suitable and reasonable time <b>Evade:</b> Notify clients if absurd schedules are not suitable for project members <b>Contain:</b> Notify project supervisor
	Client company goes bankrupt	1	5	Inactive	5	Ayodeji	Ruike	<b>Avoid:</b> Draw up advantageous contract with client before start of project <b>Evade:</b> Monitor company's stock prices regularly <b>Contain:</b> Notify project supervisor with drawn contract

### Risk Exposure or Score:

The project team identified and evaluated a number of internal and external risks, which are listed in the table above. The handling procedure can be divided into four separate priorities based on the individual combinations of the score column i.e. probability and impact (Lavanya, N. & Malarvizhi, T, 2008). For both columns, a low is being considered as ranging from 0-2 whereas medium as 3 and a high is categorized as either a 4 or 5. Therefore an Impact - Probability matrix was drawn as follows:

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		Probability (P)		
		High ( $4 \leq P \leq 5$ )	Medium ( $P = 3$ )	Low ( $P < 3$ )
Impact (I)	High ( $4 \leq I \leq 5$ )	Very High Priority	High Priority	Moderate Priority
	Medium ( $I = 3$ )	High Priority	Moderate Priority	Low Priority
	Low ( $I < 3$ )	Low Priority	Low Priority	Low Priority

Based on the matrix, the highest priority has been given to risks with high probability and high impact. Such risks include unexpected absence, absence due to illness, and little to no response from the client.

The second priority is assigned to risks with high impact but a slightly lower probability or vice versa. This includes late submission of individual assignments and submission not up to par based on document/project checklist.

The third priority is given to risks with a medium probability and impact or high impact but an extremely lower probability. This includes risks such as low level of technical skills and team member leaving the group/getting kicked out.=

Finally, risks with the lowest priority includes loss of data (hardware/software), client making huge changes to the product's requirements, time zone difference between the Netherlands and representative's country of residence and client demo taking more than the scheduled time and the client company going bankrupt.

In conclusion, the assignees of each task seek to apply principles of risk controlling on all active or inactive risks based on the priority system established in the risk exposure segment regardless of the possible score of a less prioritized system being higher. Therefore, a risk with a low impact and high probability has a lower priority than medium risk and probability.



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## References

Lavanya, N. & Malarvizhi, T. (2008, March 3). Risk analysis and management: a vital key to effective project management. Paper presented at PMI® Global Congress 2008—Asia Pacific, Sydney, New South Wales, Australia. Newtown Square, PA: Project Management Institute.

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