

Term Project

## **NUWorld: One-stop App for Huskies**

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## Table of Contents

|   |           |
|---|-----------|
| <b>1. Purpose.....</b>                            | <b>3</b>  |
| <b>2. Objective .....</b>                         | <b>3</b>  |
| <b>3. Scope .....</b>                             | <b>3</b>  |
| <b>4. Funder/Investor .....</b>                   | <b>4</b>  |
| <b>5. Critical Success Factors .....</b>          | <b>4</b>  |
| <b>6. Assumptions .....</b>                       | <b>5</b>  |
| <b>7. Technical Approach.....</b>                 | <b>5</b>  |
| <b>8. Organization.....</b>                       | <b>6</b>  |
| <b>9. Project Plan .....</b>                      | <b>7</b>  |
| a. Work Breakdown Structure (WBS).....            | 7         |
| b. Resource Plan and Responsibilities (RACI)..... | 7         |
| c. Financial Plan.....                            | 8         |
| d. PERT Chart.....                                | 9         |
| e. Gantt Chart.....                               | 10        |
| <b>10. Risk Assessment.....</b>                   | <b>12</b> |
| <b>11. Summary.....</b>                           | <b>14</b> |
| <b>12. Appendix.....</b>                          | <b>14</b> |
| a. Mind Map.....                                  | 14        |
| <b>13. References .....</b>                       | <b>15</b> |

## Revision History

|            |  |
|------------|--|
| 21/01/2024 | Draft #1: Original proposal  |
| 11/02/2024 | Draft #2: Org Structure, WBS, RACI, Financial Budget, UML Diagrams                       |
| 12/03/2024 | Draft #3: Risk Assessment, Gantt chart, PERT Chart, Critical Success Factors, Assumption |

## 1. Purpose

NUWorld addresses the essential need for a streamlined and efficient communication system within Northeastern University campuses. It recognizes the challenges students face in accessing timely and accurate information across diverse aspects of campus life. The project tackles the common issue of fragmented communication by offering a unified platform for inquiries related to academics, admissions, financial aid, campus life, career services, health and wellness, sports and recreation, technology services, library resources, international student support, safety, events, transportation, graduate studies, community engagement, alumni relations, and more. It aims to alleviate the confusion and inefficiencies associated with scattered communication channels. What sets NUWorld apart is its comprehensive coverage and integration of AI-driven chatbot technology. The app's versatility in providing real-time responses to inquiries across various university-related domains distinguishes it from conventional communication tools. NUWorld enhances the overall student experience by offering a centralized, user-friendly platform. The benefits include improved communication, reduced confusion, increased efficiency, and positive impact on the campus community's engagement and satisfaction.

## 2. Objective

NUWorld aims to develop an innovative online service in the form of a comprehensive mobile application. This app will function as an integrated one-stop solution, catering specifically to the diverse informational needs of Northeastern University students. The project is undertaken for Northeastern University, serving as the end-user. The university is the recipient of the project, and it is intended to enhance the overall student experience by providing a centralized, user-friendly platform for communication. While the project itself is not driven by direct financial transactions with end-users, its success is measured by the positive impact on the campus community's engagement and satisfaction. The university, as the organization benefiting from the project, invests in the development and implementation of NUWorld to improve communication, reduce confusion, and increase efficiency across diverse university-related domains.

## 3. Scope

It involves the implementation and development of a user-friendly mobile app with a versatile chatbot capable of providing information on academics, sports schedules, recreation activities, upcoming events, health services, and more, catering to the diverse needs of students. The app will offer real-time updates on academic schedules, allowing students to access course timetables, lecture details, and examination dates promptly. Personalized features will enable students to set preferences, receive reminders for upcoming classes, and seamlessly adapt to schedule changes. NUWorld will house a dynamic event calendar, showcasing a wide array of university events, including lectures, workshops, social gatherings, and extracurricular activities. Users can explore and bookmark events, receive notifications for upcoming ones, and engage in a vibrant campus life. Comprehensive information on on-campus services, including library hours, IT support, health services, and dining options, will be readily available. Users can quickly locate and access services, enhancing their efficiency in utilizing various campus facilities. The app will employ intelligent notification systems, delivering personalized updates based on user preferences and engagement history. Notifications may include deadline reminders, event invitations, or relevant announcements tailored to individual user profiles. At the end of the project, our team aims to deliver a fully functional NUWorld app that meets the diverse informational needs of Northeastern University students, enhancing their overall campus experience through efficient communication and access to timely information.

## 4. Funder/Investor

The primary funding source for NUWorld is Northeastern University itself. The university's investment in this project underscores its commitment to enhancing the overall student experience by providing a centralized and user-friendly information hub. Investing in NUWorld offers substantial benefits to Northeastern University. Firstly, it aligns with the university's dedication to technological innovation, showcasing its proactive approach to meeting the evolving needs of its student community. Secondly, the app significantly contributes to student satisfaction by streamlining access to information, reducing confusion, and fostering a sense of community. Moreover, efficient communication is vital for a modern educational institution, and NUWorld supports the university in achieving this goal. The app's ability to improve accessibility to information enhances the overall student experience, making it a valuable investment for the institution.

While the NUWorld app could be offered to students for free, there are potential revenue streams that could further support the project. Partnerships with external organizations, sponsorships from relevant entities, or the introduction of premium features within the app could generate additional income. The flow of money involves these potential revenue streams, intending to make the app financially sustainable in the long run. The university's investment is justified through the anticipated benefits, including increased operational efficiency, heightened student engagement, and a positive impact on various aspects of campus life. The positive outcomes derived from the app are expected to contribute to the university's overall success and reputation.

## 5. Critical Success Factors

The critical success factors for the project are:

- **User Engagement:** The effectiveness of NUWorld's user interface, chatbot interactions, and personalized features in engaging users and encouraging regular usage.
- **Technological Reliability:** The reliability, scalability, and performance of NUWorld's technical infrastructure, including server uptime, response times, and data synchronization.
- **Stakeholder Support:** The level of support and collaboration from Northeastern University's IT department, administration, and other relevant stakeholders in providing resources, guidance, and alignment with university goals.
- **Continuous Improvement:** The ability of NUWorld's development team to iterate quickly based on user feedback, implement new features, and address technical issues to enhance the platform's functionality and usability.
- **Data Security and Compliance:** Ensuring that NUWorld maintains high standards of data security, including encryption, access controls, and compliance with regulations such as GDPR and FERPA.
- **Integration Capability:** NUWorld's ability to seamlessly integrate with various university systems and databases, ensuring the accuracy and timeliness of information provided to users.
- **User Satisfaction:** The overall satisfaction of NUWorld users with the platform's technical performance, usability, and usefulness in accessing campus information and services.

## 6. Assumptions

Assumptions made for the successful completion of the project:

- **User Adoption:** Assuming that the user interface and experience provided by NUWorld will be intuitive and engaging, fostering widespread adoption among Northeastern University students.
- **Technological Stability:** Assuming that the chosen technologies and infrastructure for NUWorld, including servers, databases, and communication protocols, will remain stable and resilient to ensure uninterrupted service.
- **University Support:** Assuming that Northeastern University will provide the necessary resources, including access to university systems and databases, technical support, and collaboration with relevant departments, to facilitate the development and maintenance of NUWorld.
- **User Feedback:** Assuming that NUWorld will implement mechanisms for collecting user feedback, such as in-app surveys, analytics, and user forums, to inform iterative improvements and updates to the platform.
- **Data Security:** Assuming that NUWorld will implement robust data encryption, access controls, and compliance measures to safeguard user data and ensure compliance with relevant privacy regulations.
- **Integration with University Systems:** Assuming that NUWorld will successfully integrate with various university systems, such as student information systems, course management systems, and event calendars, to provide users with accurate and up-to-date information.

## 7. Technical Approach

The development of NUWorld includes the integration of an advanced chatbot, employing cutting-edge technologies such as natural language processing (NLP) and machine learning. This sophisticated chatbot is designed to comprehend and respond to a wide array of user queries spanning academics, admissions, financial aid, campus life, and various other university domains. By leveraging NLP algorithms, the chatbot ensures an intelligent and context-aware interaction, providing students with accurate and tailored information.

The backend system of NUWorld is meticulously designed to facilitate real-time information updates. This involves seamless integration with diverse university databases and departments. Through a robust backend infrastructure built on Node.js with Express.js, the app ensures that users receive up-to-date information across multiple categories. The incorporation of WebSocket's plays a pivotal role in this process, allowing for instant communication and data synchronization, thereby ensuring a dynamic and responsive user experience.

NUWorld prioritizes user personalization to enhance the overall app experience. The implementation of features enabling users to customize their interactions includes personalized notifications, app preferences, and tailored content delivery. Through a user-friendly interface built with React Native on the front end, the app allows students to set preferences for the type of information they want to access. This personalization contributes to a more user-centric and engaging platform.

Ensuring inclusivity and ease of use for all students is a core principle in the development of NUWorld. The app is designed to be accessible across multiple devices and platforms, accommodating the diverse needs of the

student community. Whether accessed on smartphones, tablets, or computers, the responsive design and accessibility features make the app user-friendly for all. This commitment to accessibility aligns with the broader goal of creating a platform that caters to the diverse needs of Northeastern University students.

In summary, the technical approach involves using React Native for the front end to ensure a cross-platform, native-like experience. On the backend, Node.js with Express.js powers the server, while MongoDB serves as the database. The integration of a chatbot platform, such as Dialogflow, enhances user interactions. Unique technical aspects include real-time updates through WebSocket's, enabling a dynamic user experience, and a user-centric design that prioritizes accessibility and personalization. These technical elements collectively contribute to the creation of NUWorld as an advanced and user-friendly university assistance app.

8. Organization

The company follows a matrix organization structure. This project will be run by a project manager out of the Project Management Office, and technical contributors will be drawn from the appropriate functional groups. The number of people from each department who are working for the project manager are mentioned in the diagram. The employees assigned for the project will be working for the Project Manager but will be reporting to their functional manager. Employees reporting directly to the Project Manager for the NUWorld project is depicted by solid lines and employees who work for the Project Manager and report to their functional managers are shown in dotted lines.

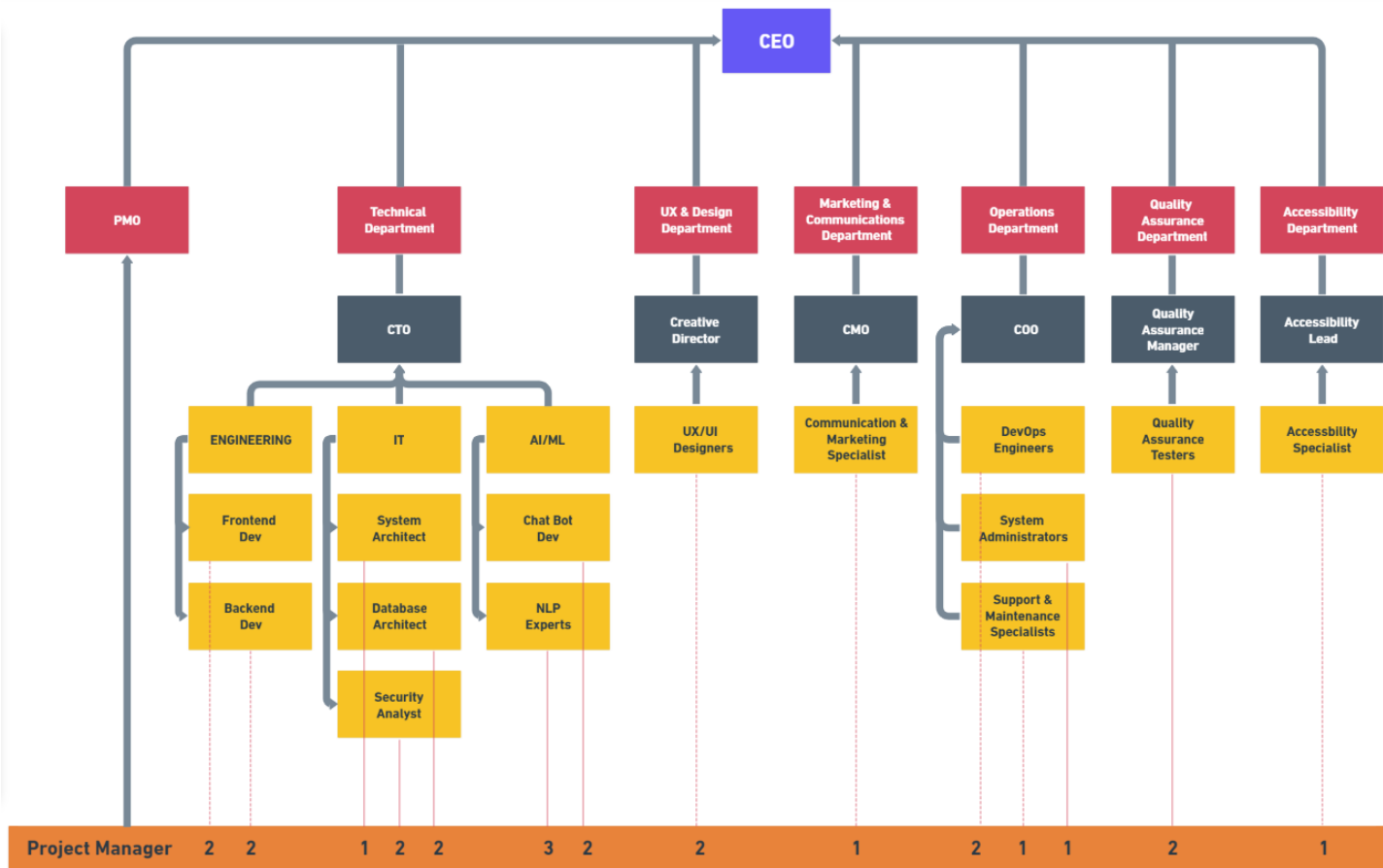


Figure 1. Organization Structure of the company

## 9. Project Plan

### a. Work Breakdown Structure (WBS)

Based on the different modules identified while developing the mind map, I created the WBS below. This table has a list of all tasks required for this project and major tasks are broken down into smaller tasks. It also shows us the dependencies between the tasks which eventually helps us in define and organize the work required.

| Task ID  | Project Tasks   | Responsibility     | Duration (weeks) | Precussor     | Resources                                       | People Required |
|----------|---|--------------------|------------------|---------------|---|-----------------|
| <b>1</b> | <b>NUWorld App Design and Architecture</b>                                  |                    |                  |               |   |                 |
| 1.a      | Design UI/UX  | UI/UX Designer     | 2                | -             | Adobe XD, Sketch, Figma                         | 2               |
| 1.b      | Develop Wireframes and Prototypes   | UI/UX Designer     | 3                | 1.a           | Balsamiq, Sketch, Adobe XD                      | 2               |
| 1.c      | Define System Architecture  | System Architect   | 2                | -             | draw.io, Lucidchart                             | 1               |
| 1.d      | Design Database Schema  | Database Architect | 3                | 1.c           | dbdiagram.io, MySQL Workbench                   | 1               |
| <b>2</b> | <b>Frontend Development for User-Friendly Interface and Personalization</b> |                    |                  |               |   |                 |
| 2.a      | Set Up Development Environment  | DevOps Engineer    | 1                | -             | IDEs like Visual Studio Code                    | 1               |
| 2.b      | Develop User Friendly Interface using React Native                          | Frontend Developer | 4                | 2.a           | React Native framework                          | 2               |
| 2.c      | Incorporate Personalization Features  | Frontend Developer | 4                | 2.b           | React Native libraries                          | 2               |
| 2.d      | Integrate Responsive Design   | Frontend Developer | 2                | 2.b           | Media query tools, Responsive design frameworks | 1               |
| 2.e      | Implement Navigation and User Authentication                                | Frontend Developer | 3                | 2.b           | React Navigation, Authentication libraries      | 1               |
| 2.f      | <b>Milestone 1: Personalization Feature Implementation Completed</b>        |                    |                  |               |   |                 |
| <b>3</b> | <b>Backend System Development for Real-Time Information Updates</b>         |                    |                  |               |   |                 |
| 3.a      | Set Up Backend Infrastructure (Node.js with Express.js)                     | Backend Developer  | 2                | -             | Node.js, Express.js                             | 1               |
| 3.b      | Design and Implement Database (MongoDB)                                     | Database Architect | 3                | 3.a           | MongoDB   | 2               |
| 3.c      | Develop API Endpoints for Data Retrieval and Updates                        | Backend Developer  | 3                | 3.b           | Express.js, RESTful API                         | 2               |
| 3.d      | Implement WebSocket's for Real-time Updates                                 | Backend Developer  | 3                | 3.c           | Socket IO                                       | 1               |
| 3.e      | Ensure Backend Security Measures  | Security Analyst   | 2                | 3.a, 3.b      | Encryption tools, authentication middleware     | 2               |
| 3.f      | <b>Milestone 2: Real-Time Updates Implementation Completed</b>              |                    |                  |               |   |                 |
| <b>4</b> | <b>Chatbot Integration and NLP</b>  |                    |                  |               |   |                 |
| 4.a      | Select and Integrate Chatbot Platform                                       | Chatbot Developer  | 2                | 3.f           | Dialogflow, Microsoft Bot Framework             | 1               |
| 4.b      | Train Chatbot with University-specific Information                          | Chatbot Developer  | 2                | 4.a           | Content creators, domain-specific data          | 2               |
| 4.c      | Implement NLP and Machine Learning Algorithms                               | Chatbot Developer  | 3                | 4.b           | ML frameworks (e.g., TensorFlow, PyTorch)       | 2               |
| 4.d      | Test and Refine Chatbot Interactions  | NLP Expert         | 3                | 4.c           | User feedback tools, chatbot testing frameworks | 3               |
| 4.e      | <b>Milestone 3: ChatBot Development Completed</b>                           |                    |                  |               |   |                 |
| <b>5</b> | <b>App Testing and Deployment</b>   |                    |                  |               |   |                 |
| 5.a      | Perform UAT and Integration Testing of the entire App                       | QA Tester          | 3                | 2.f, 3.f, 4.e | Testing frameworks (e.g., Appium, Rest API)     | 2               |
| 5.b      | <b>Milestone 4: App Testing Completed</b>                                   |                    |                  |               |   |                 |
| 5.c      | Deploy NUWorld App to App Stores  | DevOps Engineer    | 2                | 5.b           | App store developer accounts                    | 1               |
| 5.d      | <b>Milestone 5: App Launched</b>  |                    |                  |               |   |                 |

Table 1. Work Breakdown Structure

### b. Resource Plan and Responsibilities (RACI)

The Responsibility Matrix will identify who is responsible for each task that makes up the WBS. For each task listed in the WBS, people from both inside and outside of the project team are assigned to either be responsible, accountable, consulted, or informed (RACI) with regards to the task. The RACI matrix for this project is shown in Table 2.

| Modules  | Task IDs | FE Tech Lead | BE Tech Lead | QA Lead | Chief Architect | System Administrator | UI/UX Designer | Frontend Developer | Backend Developer | DevOps Engineer | System Architect | Database Architect | Security Analyst | Chatbot Developer | NLP Expert | Support Team | QA Tester | Project Manager |
|--|----------|--------------|--------------|---------|-----------------|----------------------|----------------|--------------------|-------------------|-----------------|------------------|--------------------|------------------|-------------------|------------|--------------|-----------|-----------------|
| NUWorld App Design and Architecture                                  | 1.a      | A            |              |         |                 |                      | R              | C                  |                   |                 |                  |                    |                  |                   |            |              |           | I               |
|  | 1.b      | A            |              |         |                 |                      | R              | C                  |                   |                 |                  |                    |                  |                   |            |              |           |                 |
|  | 1.c      |              |              |         | A               |                      |                |                    | C                 |                 | R                |                    |                  |                   |            |              |           |                 |
|  | 1.d      |              |              |         | A               |                      |                |                    | C                 |                 |                  | R                  |                  |                   |            |              |           |                 |
| Frontend Development for User-Friendly Interface and Personalization | 2.a      | A            |              |         |                 | C                    |                |                    |                   | R               |                  |                    |                  |                   |            |              |           |                 |
|  | 2.b      | A            |              |         |                 |                      | C              | R                  | C                 |                 |                  |                    |                  |                   |            |              |           | I               |
|  | 2.c      | A            |              |         |                 |                      | C              | R                  | C                 |                 |                  |                    |                  |                   |            |              |           |                 |
|  | 2.d      | A            |              |         |                 |                      | C              | R                  |                   |                 |                  |                    |                  |                   |            |              |           |                 |
| Backend System Development for Real-Time Information Updates         | 3.a      |              | A            |         |                 | C                    |                |                    | R                 | C               |                  |                    |                  |                   |            |              |           |                 |
|  | 3.b      |              | A            |         |                 |                      |                | C                  |                   | C               |                  | R                  |                  |                   |            |              |           |                 |
|  | 3.c      |              | A            |         |                 |                      |                | C                  | R                 |                 |                  |                    |                  |                   |            |              |           | I               |
|  | 3.d      |              | A            |         |                 |                      |                | C                  | R                 | C               |                  |                    |                  |                   |            |              |           | I               |
|  | 3.e      |              | A            |         |                 |                      |                | C                  | C                 | C               |                  |                    | R                |                   |            |              |           |                 |
| ChatBot Integration and NLP  | 4.a      |              |              |         |                 |                      |                |                    |                   |                 |                  |                    |                  | R                 | A          |              |           |                 |
|  | 4.b      |              |              |         |                 |                      |                |                    |                   |                 |                  |                    |                  | R                 | A          | C            |           | I               |
|  | 4.c      |              |              |         |                 |                      |                | C                  | C                 |                 |                  |                    |                  | R                 | A          |              |           |                 |
|  | 4.d      |              |              |         |                 |                      |                | C                  | C                 |                 |                  |                    |                  | A                 | R          |              |           | I               |
| App Testing and Deployment   | 5.a      |              |              | A       |                 |                      |                | C                  | C                 |                 |                  |                    |                  | C                 |            |              | R         | I               |
|  | 5.c      |              |              |         |                 |                      |                | C                  | C                 | R               |                  |                    |                  |                   |            |              | C         |                 |

R - Responsible  
A - Accountable  
C - Consulted  
I - Informed

Table 2. RACI Matrix

### c. Financial Plan

The Financial Plan of the project consists of a monthly budget based on the flow of tasks. In the figure below, we have the budget split every month. Hence, the monthly costs can be calculated by summing up the cost estimates for every month.

| Task ID  | Project Tasks   | Estimate    | Monthly Budget |           |           |           |           |           |
|----------|---|-------------|----------------|-----------|-----------|-----------|-----------|-----------|
|          |   |             | 1              | 2         | 3         | 4         | 5         | 6         |
| <b>1</b> | <b>NUWorld App Design and Architecture</b>                                  |             |                |           |           |           |           |           |
| 1.a      | Design UI/UX  | \$100,000   | \$100,000      |           |           |           |           |           |
| 1.b      | Develop Wireframes and Prototypes   | \$80,000    | \$80,000       |           |           |           |           |           |
| 1.c      | Define System Architecture  | \$120,000   | \$120,000      |           |           |           |           |           |
| 1.d      | Design Database Schema  | \$60,000    | \$60,000       |           |           |           |           |           |
| <b>2</b> | <b>Frontend Development for User-Friendly Interface and Personalization</b> |             |                |           |           |           |           |           |
| 2.a      | Set Up Development Environment  | \$50,000    | \$50,000       |           |           |           |           |           |
| 2.b      | Develop User Friendly Interface using React Native                          | \$200,000   | \$180,000      | \$20,000  |           |           |           |           |
| 2.c      | Incorporate Personalization Features  | \$80,000    |                | \$80,000  |           |           |           |           |
| 2.d      | Integrate Responsive Design   | \$60,000    |                | \$60,000  |           |           |           |           |
| 2.e      | Implement Navigation and User Authentication                                | \$80,000    |                | \$80,000  |           |           |           |           |
| <b>3</b> | <b>Backend System Development for Real-Time Information Updates</b>         |             |                |           |           |           |           |           |
| 3.a      | Set Up Backend Infrastructure (Node.js with Express.js)                     | \$150,000   | \$150,000      |           |           |           |           |           |
| 3.b      | Design and Implement Database (MongoDB)                                     | \$100,000   | \$100,000      |           |           |           |           |           |
| 3.c      | Develop API Endpoints for Data Retrieval and Updates                        | \$180,000   |                | \$180,000 |           |           |           |           |
| 3.d      | Implement WebSocket's for Real-time Updates                                 | \$120,000   |                | \$90,000  | \$30,000  |           |           |           |
| 3.e      | Ensure Backend Security Measures  | \$80,000    |                | \$80,000  |           |           |           |           |
| <b>4</b> | <b>Chatbot Integration and NLP</b>  |             |                |           |           |           |           |           |
| 4.a      | Select and Integrate Chatbot Platform                                       | \$70,000    |                |           | \$70,000  |           |           |           |
| 4.b      | Train Chatbot with University-specific Information                          | \$150,000   |                |           |           | \$150,000 |           |           |
| 4.c      | Implement NLP and Machine Learning Algorithms                               | \$210,000   |                |           |           | \$180,000 | \$30,000  |           |
| 4.d      | Test and Refine Chatbot Interactions  | \$140,000   |                |           |           |           | \$140,000 |           |
| <b>5</b> | <b>App Testing and Deployment</b>   |             |                |           |           |           |           |           |
| 5.a      | Perform UAT and Integration Testing of the entire App                       | \$130,000   |                |           |           |           | \$90,000  | \$40,000  |
| 5.c      | Deploy NUWorld App to App Stores  | \$90,000    |                |           |           |           |           | \$90,000  |
| Total    |   | \$2,250,000 | \$840,000      | \$590,000 | \$100,000 | \$330,000 | \$260,000 | \$130,000 |

Table 3. Financial Budget (Monthly)



## d. PERT Chart

PERT chart below is derived from the Gantt Chart which visualizes the timeline, dependencies, and the critical path of a project, helping us to plan, schedule, and coordinate activities effectively.

**Critical Path:** START – 3.a – 3.b – 3.c – 3.d – 3.f – 4.a – 4.b – 4.c – 4.d – 4.e – 5.a – 5.b – 5.c – 5.d – END

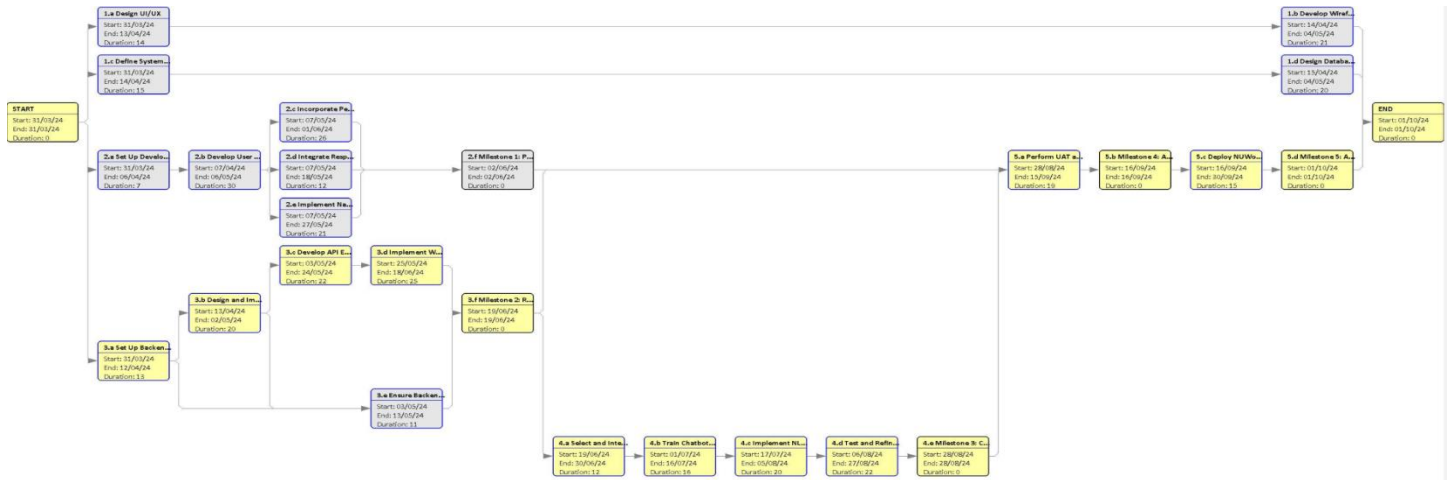


Figure 2.a PERT Chart

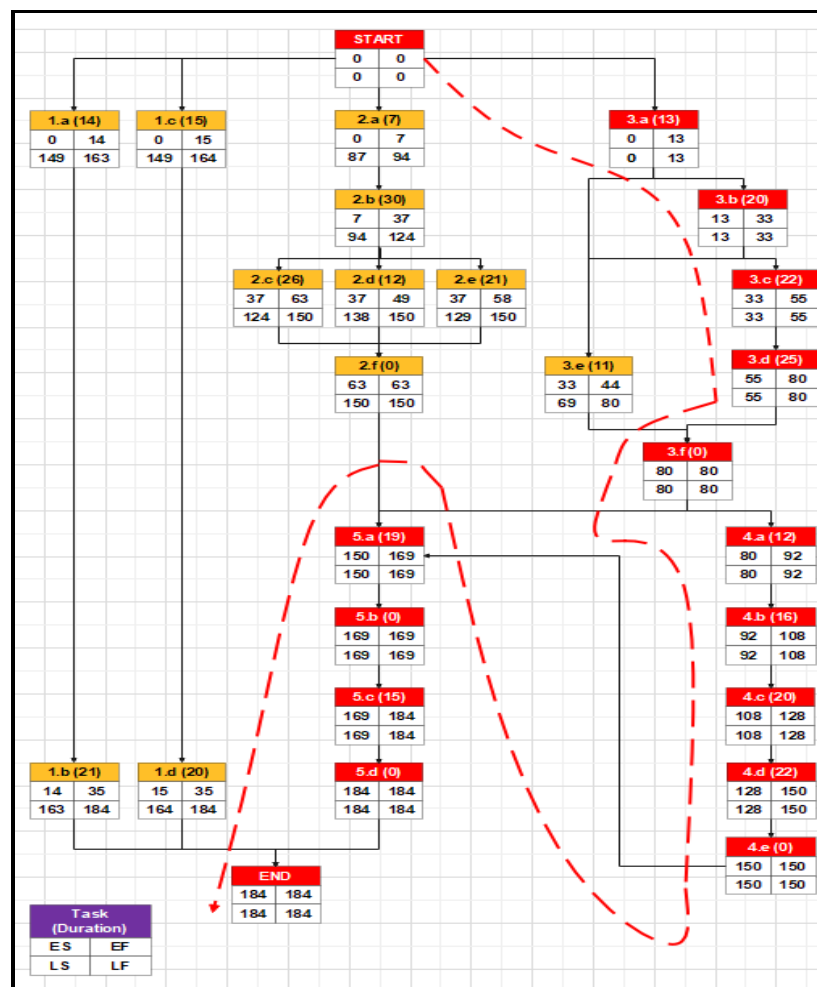


Figure 2.b Solved PERT Chart

## e. Gantt Chart

The meticulously designed Gantt chart using GanttProject, derived from the Work Breakdown Structure (WBS) and Responsibility Assignment Matrix (RACI), offers a concise overview of project timelines and resource allocation. Spanning from the end of March to October, the six-month duration facilitates strategic budget planning and resource optimization. This visual tool empowers stakeholders to track progress, identify potential bottlenecks, and make informed decisions for successful project delivery.

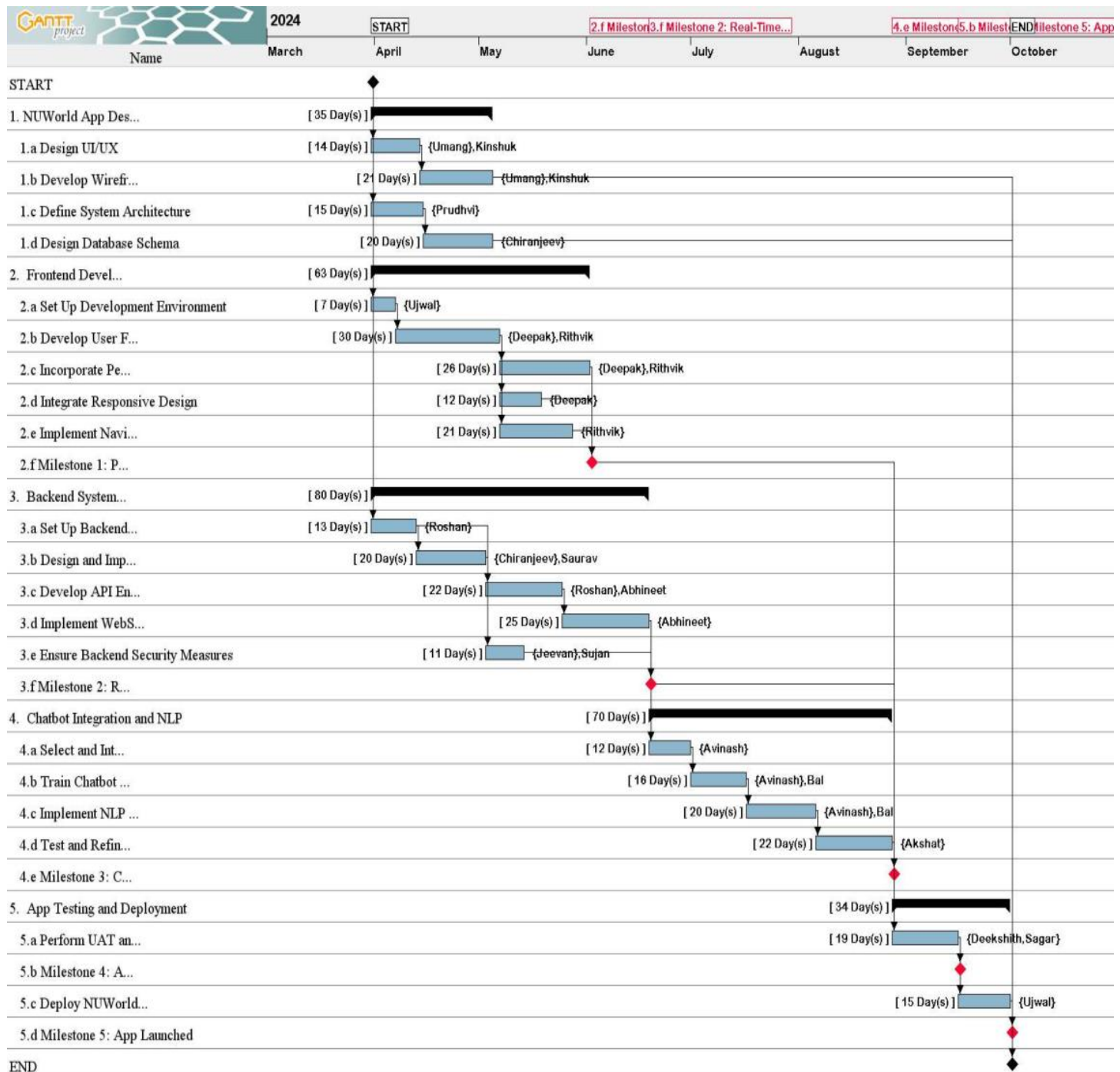


Figure 3. Gantt Chart

## Resource Allocation

The Resource Chart serves as a crucial tool for identifying resource allocation to each task within a project, offering insights into task distribution and the status of resources, whether they are overloaded or underloaded. By visually representing this data, the chart facilitates effective task distribution among available resources, ensuring equitable workload distribution and preventing resource overload. In the chart below, resource loading is depicted, with overloaded tasks highlighted in red and underloaded tasks in green, providing a clear indication of resource utilization status for informed decision-making and resource management.

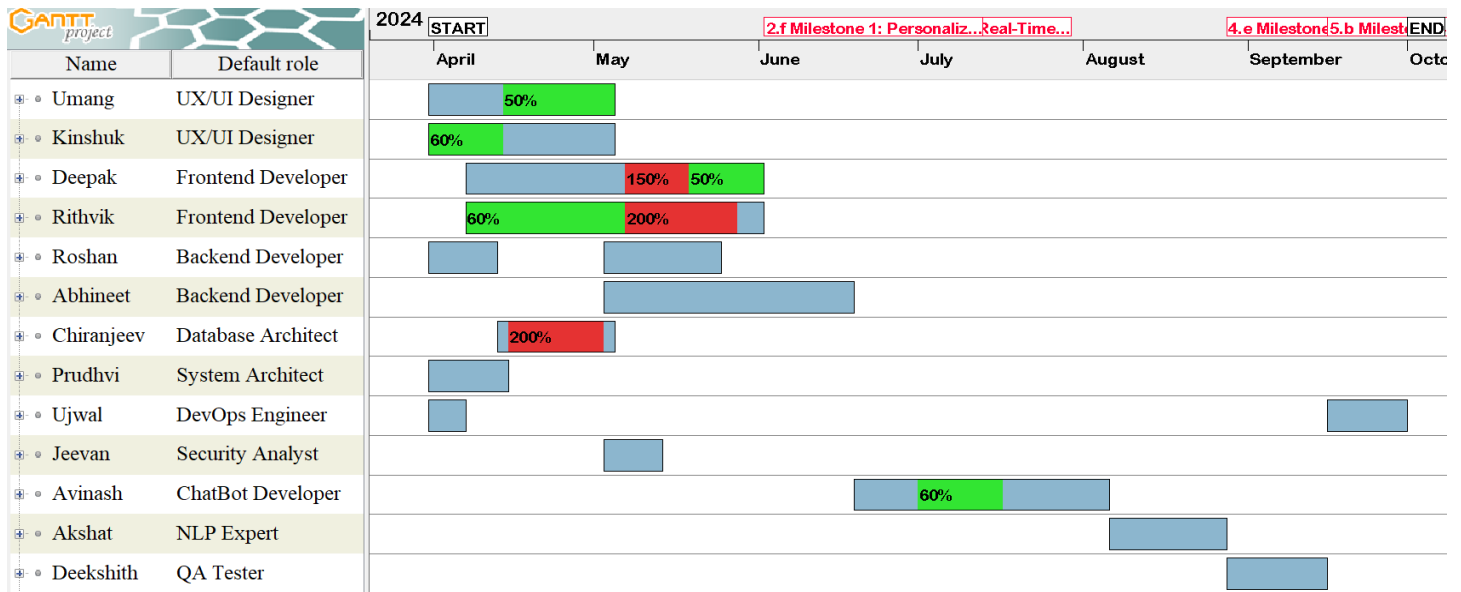


Figure 4.a Resource loading without balancing

The resource chart above illuminates instances where specific team members are burdened with an excessive number of concurrent tasks, potentially leading to overload. In response, the chart below illustrates a refined approach: resource balancing without overloading. By strategically reallocating tasks, we ensure an equitable distribution of workload among available resources, mitigating the risk of burnout and optimizing productivity.

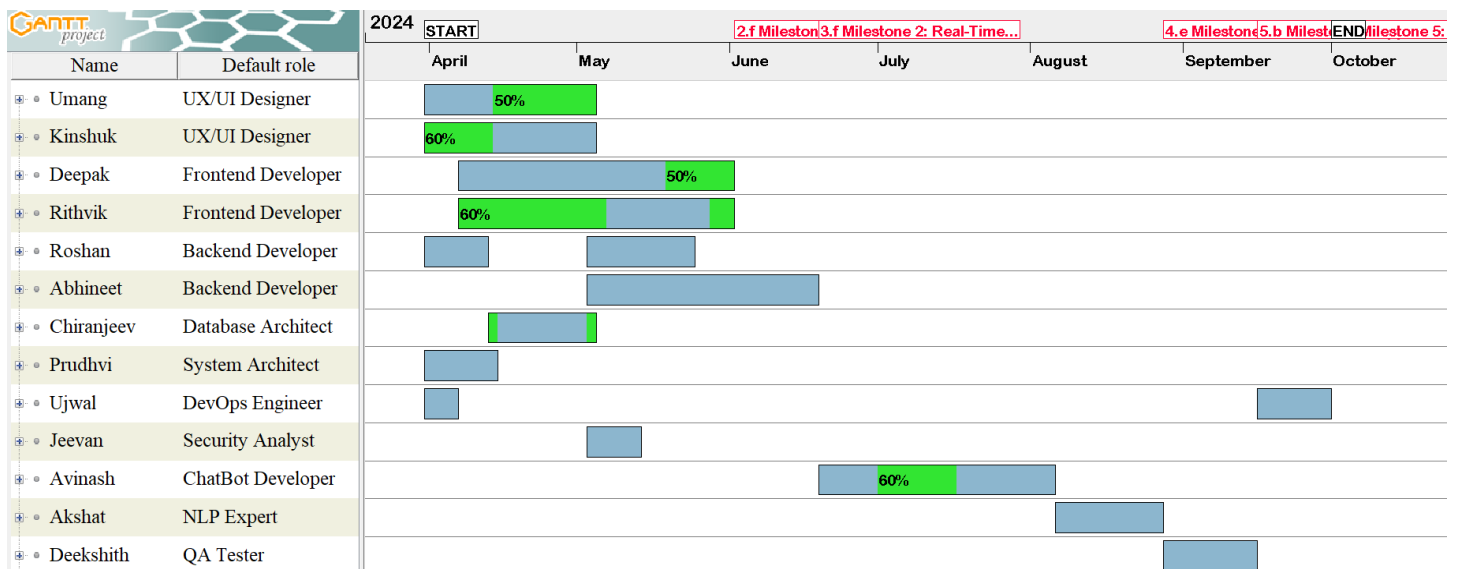


Figure 4.b Resource Loading with Resource balancing

## 10.Risk Assessment

### a. SWOT Analysis

A SWOT analysis is a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats related to an organization. It involves identifying internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats) that may impact the success or performance of the organization.

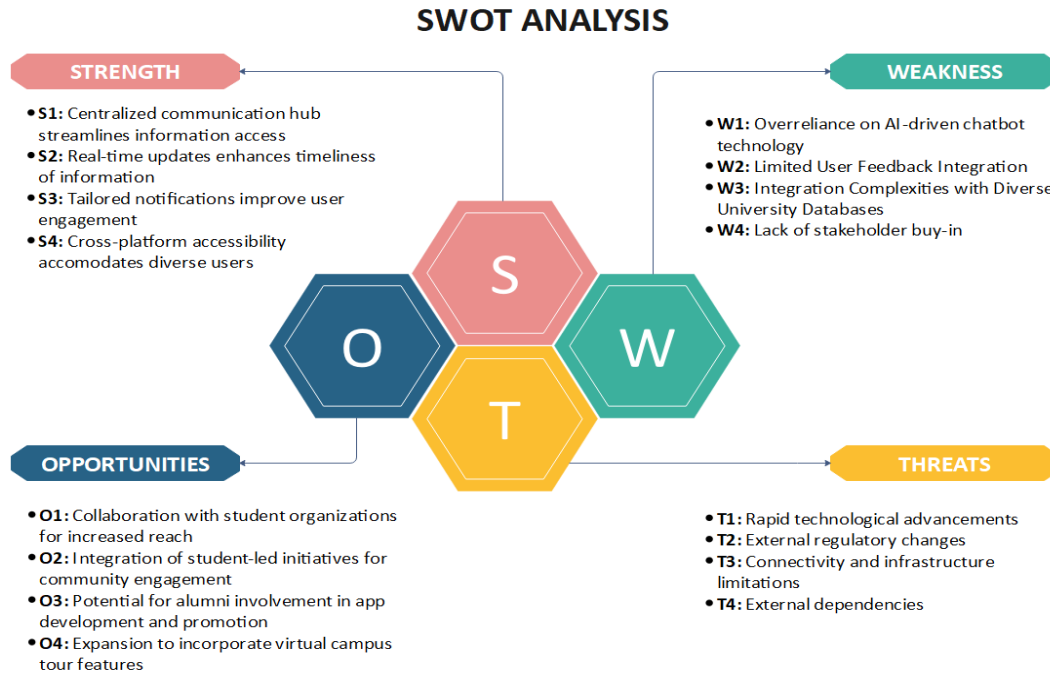


Figure 5. SWOT Analysis

### b. Risk Priority Number (RPN)

Risk Priority Number (RPN) is a numerical assessment used in risk management to prioritize risks based on their potential impact and likelihood of occurrence. It is calculated by multiplying three factors: Severity (the potential impact or consequence of the risk), Probability (the likelihood of the risk occurring), and Detectability (the ability to detect or identify the risk). The resulting RPN helps prioritize which risks to address first by focusing on those with the highest scores, indicating the greatest potential impact and likelihood.

We find out the RPN for the weakness and threats identified in the SWOT Analysis, by assessing their severity, likelihood and inability to detect on a scale of 1-5.

| Weakness and Threats   | Severity, S | Likelihood, L | Inability to Detect, D | RPN |
|--|-------------|---------------|------------------------|-----|
| W1: Overreliance on AI-driven chatbot technology               | 5           | 5             | 3                      | 75  |
| W2: Limited User Feedback Integration                          | 2           | 2             | 2                      | 8   |
| W3: Integration Complexities with Diverse University Databases | 3           | 3             | 2                      | 18  |
| W4: Lack of stakeholder buy-in                                 | 2           | 1             | 1                      | 2   |
| T1: Rapid technological advancements                           | 5           | 5             | 2                      | 50  |
| T2: External regulatory changes                                | 3           | 3             | 1                      | 9   |
| T3: Connectivity and infrastructure limitations                | 3           | 3             | 2                      | 18  |
| T4: External dependencies                                      | 4           | 4             | 2                      | 32  |

Figure 6. Risk Priority Number (RPN)

### c. Risk Assessment Matrix

A risk matrix is a visual tool used in risk management to assess and prioritize risks based on their likelihood and impact. It typically consists of a grid with the likelihood of occurrence on one axis and the potential impact or severity on the other axis. Risks (Weakness and Threats) are plotted on this matrix according to their estimated likelihood and impact we calculated from RPN, resulting in a visual representation of their relative importance. The risk matrix helps to quickly identify high-priority risks that require immediate attention, as well as low-priority risks that may be monitored or accepted without significant intervention. By using a risk matrix, we can make informed decisions about risk mitigation strategies, resource allocation, and project prioritization.

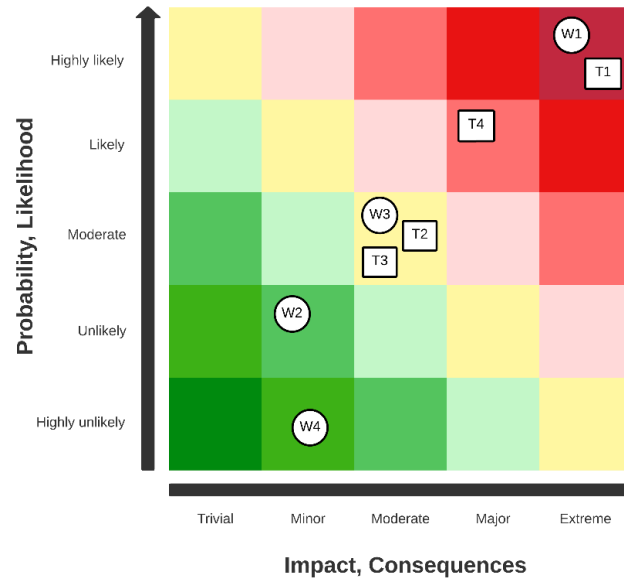


Figure 7. Risk Assessment Matrix

### d. Mitigation Plan

**(W1):** Incorporate human support options alongside AI-driven chatbots to provide users with alternative avenues for assistance and ensure a balanced approach to communication.

**(W2):** Establish robust feedback mechanisms within the NUWorld app to actively solicit user input and suggestions, enabling continuous improvement based on user needs and preferences.

**(W3):** Streamline integration efforts by establishing clear communication channels with university departments and conducting thorough compatibility testing to ensure seamless integration with diverse databases.

**(W4):** Engage stakeholders early and consistently throughout the project lifecycle, soliciting their input and addressing concerns to gain their buy-in and support for the NUWorld project.

**(T1):** Maintain flexibility in the NUWorld app's design and architecture to adapt to emerging technologies and trends, ensuring it remains competitive and up to date.

**(T2):** Stay informed about regulatory developments and proactively adjust NUWorld's design and functionality to ensure compliance with relevant laws and standards.

**(T3):** Invest in robust infrastructure and network solutions to minimize connectivity issues and provide a seamless user experience, especially in areas with poor network coverage.

**(T4):** Identify critical external dependencies and establish contingency plans to mitigate risks associated with their failure or unavailability, ensuring NUWorld's reliability and resilience.

By addressing these mitigation points, the NUWorld project can effectively manage its weaknesses and threats, maximizing its chances of success and adoption within the Northeastern University community.

## 11. Summary

NUWorld is a pioneering project by Northeastern University designed to revolutionize campus communication through a comprehensive mobile application integrated with AI-driven chatbot technology. The app serves as a centralized platform, offering real-time responses to inquiries across diverse university domains, personalized features, event calendars, service directories, and intelligent notifications. With a six-month development timeline and a strategic focus on user engagement, technological reliability, and stakeholder support, NUWorld aims to enhance the overall student experience, reduce confusion, and increase efficiency within the campus community.

## 12. Appendix

### a. Mind Map

A mind map is a visual representation of interconnected ideas and concepts, facilitating brainstorming and organizing thoughts. Its branching structure captures relationships and fosters creative thinking.

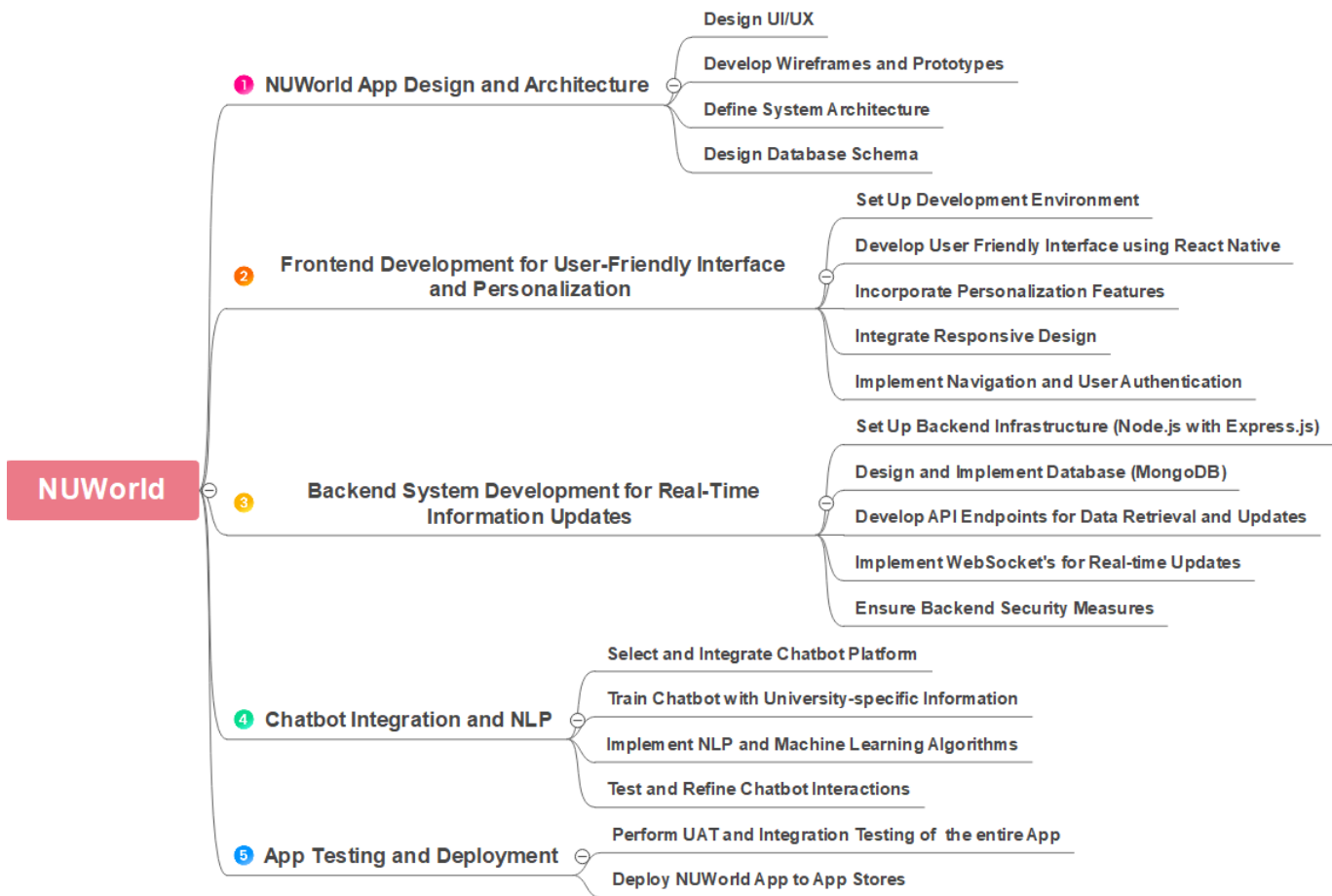


Figure 8. Mind Map

## 13. References

- [1] Kontopidis, Prof. George. EMGT 5220 Course Slides, Northeastern University. Spring 2024
- [2] Jack R. Meredith, Samuel J. Mantel Jr, Scott M. Shafer, Project Management, A Strategic Managerial Approach
- [3] [https://lucid.app/documents#/documents?folder\\_id=home&browser=icon](https://lucid.app/documents#/documents?folder_id=home&browser=icon)