



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SECD2523-05 Database

PHASE 1

Project Proposal & Database Requirement

ECOHarmony Solution

Team - Data Architects

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1.0 INTRODUCTION

1.1 Overview

Global warming has become a big issue for the world today, one of the biggest causes is high carbon emissions. All the daily human activities actually have an impact on the emissions themselves. The example of consuming animal-based meat, transportation, and agriculture, which is actually a necessity of human life, but has actually had a big impact on carbon emissions. High carbon emissions can result in a lot of changes in the earth, such as rising sea levels, various extreme weather, and ocean acidification.

Malaysia has a target of 45% in reducing its carbon emissions by 2023 compared to 2005. One of the biggest contributors to Malaysia's gas emissions is transportation which is taking third place. Electricity and heat production took the first place, followed by manufacturing industries. Malaysia has taken several steps to reduce its carbon emissions, as transportation takes one of the highest ranks, the government has been promoting and investing a lot in public transportation. They have also targeted their electricity generator to be 20% from renewable resources by 2025.

1.2 Organisation Background

The Iskandar Puteri City Council (MBIP) is targeting students, teachers, and families in Iskandar Malaysia to raise their awareness towards the importance of low carbon emission through its Iskandar Puteri Low Carbon (IPRK) initiative to promote the Low Carbon Society (LCS). In order to achieve their goal, MBIP plans to develop a data collection which targets residents in multi-story and landed houses, institutions, MBIP divisions, and MBIP staff. The goal is to make a community monitoring system that works like the e-Lestari, which focuses on integrating sustainability elements into the curriculum and extracurricular activities and is capable of assessing district performance, electricity and energy savings, and categorising schools as Showcase Schools or Transition Schools.

2.0 BACKGROUND STUDY

2.1 Global and National Context

The mounting concern of global warming, spurred by the excessive release of carbon from human actions, has become a crucial matter with a substantial impact on our surroundings. In response, Malaysia has set a goal to slash carbon emissions by 45% by 2023, with the transportation sector being a key perpetrator. As a countermeasure, the nation has devised initiatives that prioritize sustainability, including the promotion of public transportation and the increased utilization of renewable energy.

2.2 Iskandar Puteri City Council (MBIP) Initiatives

MBIP's Iskandar Puteri Low Carbon (IPRK) initiative seeks to engage Iskandar Malaysia residents in an effort to promote low carbon emissions. The goal aligns with national priorities, as MBIP intends to establish a data collection platform that enables effective community monitoring.

2.3 Low Carbon Cities Framework (LCCF)

Malaysian cities are guided by the Low Carbon Cities Framework, which supports policies and programs that support sustainable development. The Local Council Climate Fund (LCCF) encourages local governments to cut carbon emissions and build resilient urban environments by using a comprehensive strategy that takes into account social, environmental, and economic factors. MBIP has played a significant role in raising awareness of and encouraging involvement in low-carbon practices under the auspices of the Iskandar Puteri Low Carbon program. Launched in 2019, the Iskandar Puteri Low Carbon Calendar Competition is a prime example of the community's dedication to carbon reduction efforts. However, the difficulties encountered throughout the competition highlighted the need for a more simplified and approachable method of gathering and analyzing data.

3.0 PROBLEM STATEMENT

3.1 Identified Problem

In order to improve the system, we need to overcome several problems,

1. IStreamlined process of data collection.
2. Manual carbon reduction calculation and reporting.
3. Lack of data analysis skills.
4. Varied user profiles.
5. Participants are unfamiliar with Google Form usage.

3.2 Opportunities for Improvement

To solve the problems effectively, there should be some improvements, including

1. By making the data collection more efficient, straightforward and less complex.
2. Make the calculation and report for carbon reduction automatically.
3. Making the system user-friendly.
4. Facilitate the identification of higher carbon emissions.
5. Provide a mapping to record the carbon emissions.
6. Allow thorough data analysis for deeper understanding and decision-making.
7. Widen the range of users by making the interface more accessible.

3.3 Objectives

1. To make sure all the interface is working well, we need to have continuous improvement with a regular update of the interface.
2. In order to enhance the ability to analyse, a visual representation of reducing carbon footprint material is the best way for the community to understand better.
3. Having multiple language options is one way to accommodate a diverse community.
4. Offering interactive workshops, seminars, and extracurriculars in school which focus on carbon footprint will have an impact on the youth for their realisation of global warming.
5. Provide a poster or an interactive learning session for those who are unfamiliar with the usage of Google Forms.
6. Make a feedback rate for users to fill in after the usage of the interface.

4.0 PROPOSED SOLUTION

The proposed solution for the problem stated above is mainly to develop and provide an integrated and user-friendly interface for data collection and analysis. This platform seeks to address the problems stated in order to enhance the current system's effectiveness and functionality. The following are essential aspects of the suggested solutions:

Streamlined Data Collection Process

- Create a user-friendly data entry interface to facilitate the process.
- Create clear instructions with step-by-step instructions to ease the process of filling in the Google Form and also keep the layout simple, and straightforward, and avoid using technical terms that may cause confusion.
- Provide multilingual support

User Profile Management

- For the data security of the users, the system must ensure that users can only see and interact with the information relevant to their role.
- Providing a written, poster, or video guideline that can be accessed anytime to familiarise the user with the platform.

Dashboard for Self-Monitoring

- Creating a dashboard that is able to present the data from the database like displaying real-time carbon emissions in the surrounding areas.

Automated Carbon Reduction Calculating and Reporting System

- Design a program that can automatically calculate the carbon reduction for water, electricity, and recycled oil consumption.
- Develop a program that can create a reporting module for the participants and MBIP that emphasises the contributions to carbon reduction.

5.0 FEASIBILITY STUDY

Technical Feasibility

ECOHarmony Solution technical feasibility revolves around several key objectives. First, it necessitates a commitment to continually enhancing the interface, ensuring its smooth operation through regular updates. Second, it involves the implementation of visual tools that simplify the understanding and analysis of carbon footprint reduction materials, enabling the community to grasp this complex information more effectively. Third, the project seeks to accommodate a diverse user base by offering multiple language options. Additionally, it aims to educate the youth on global warming through workshops, seminars, and extracurricular activities focused on understanding carbon footprints. Moreover, it plans to provide guidance to users unfamiliar with Google Forms through interactive learning sessions or posters. Finally, the project includes a feedback mechanism that allows users to evaluate their experience with the interface, providing valuable insights for ongoing improvements. These objectives collectively form a technically viable framework that encompasses interface updates, data visualisation tools, multilingual support, educational content creation, user guidance features, and feedback systems.

Operational Feasibility

This application requires Information System (IS) support due to its array of features, including a database system, online payment system, and GPS system, necessitating supervision and maintenance to prevent any bugs or glitches.

Economic Feasibility

Below is the cost-benefit analysis (CBA):

Estimated Cost	
Hardware	RM 10,000
Software	RM 25,000
Consultant	RM 8,000
Maintenance	RM 4,000 per year
IS Support	RM 15,000 per year
Assumption	
Discount rate	10%
Sensitivity factor (cost)	1.1
Sensitivity factor (benefit)	0.9
Annual change in production cost	7%
Annual change in benefits	5%
Estimated Benefits	
Increases sales	RM 500 per month
Saving	RM 4,000 per month

Cost	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost						
Hardware	11000					
Software	27500					
Consultant	8800					
Total	47300					

Production Costs						
Maintenance		4400	4708	5038	5391	5768
IS Support		16500	17655	18891	20213	21628
Annual Production Costs		20900	22363	23929	25604	27396
(Present value)		19000	18482	17978	17488	17011
Accumulated costs		66300	84782	102760	120248	137259

Benefits	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Increases sales		5400	5670	5954	6252	6565
Saving		43200	45360	47628	50009	52509
Annual Inventory costs		48600	51030	53582	56261	59074
(Present Value)		44182	42174	40257	38427	36680
Accumulated benefits		44182	86356	126613	165040	201720
(Present Value)						
Gain or Loss		(22118)	1574	23853	44792	64461
Profitability Index	1.36					

From the table above, the profitability index is 1.36. This shows that it is a good investment knowing that the profitability index is greater than 1. The loss that we lose from the table above is around RM 22,118 in the first year. However, starting from Year 2, we will gain RM 1,574 and it will increase year by year. Lastly, in Year 5, we will earn around RM 64,461. Thus, this project will give a huge profit.

6.0 OBJECTIVES

The following are the main objectives of the stated solutions:

- Improved data collection effectiveness.
- Automated carbon reduction calculation and report.
- Improved decision-making through data analysis ability.
- Improve the users' familiarity towards the interface.
- Ensuring the users' data profiles.

7.0 SCOPE

This project's scope involves the design, development and implementation of a database system for the Iskandar Puteri Low Carbon Initiative. This includes data collection, carbon reduction calculations, data analysis, and user training for the system. The system itself will be customised and adjusted to the specific needs of the institutions, residents in multi-story houses as well and the MBIP staff.

8.0 SYSTEM BOUNDARIES

What Will be Included

- GoogleForm to gather thorough information for various community groups.
- User-friendly interface with many languages that can be selected.
- Automated carbon reduction calculation.
- Software for data analysis to produce reports and insights.

What Will Not be Included

- Direct supervision of the actual community energy-saving actions, which means the implementations will remain external to the system.
- Physical devices for data collection, since users will input the data by themselves.

Database Application Boundaries

The system will concentrate on carbon-related data and analysis within the designated zone only, which means it will not handle wider sustainability projects outside that region.

Major User View:

- *Residents:* Access and view details on their personal carbon emissions, track their progress and know the impact of their actions. Also able to receive tips on reducing carbon footprints based on their consumption pattern.
- *Institutions:* Monitor and report, access real-time data on all the consumptions to make decision making. Institutions can also receive the performance report to identify the region which needs more spotlight and improvement.
- *MBIP Divisions:* Monitor the overall carbon emission and analyse the overall data.
- *MBIP Staff:* Access both personal and department carbon emissions data to analyse collective contributions for carbon reduction.

9.0 PROJECT PLANNING

9.1 Introduction to Project Planning for Iskandar Puteri Low Carbon (IPRK) Initiative

The Iskandar Puteri City Council (MBIP) embarked on a significant initiative, the Iskandar Puteri Low Carbon (IPRK) project, aiming to raise awareness about low carbon emissions in Iskandar Malaysia. As we delve into the development of a community monitoring system aligned with the e-Lestari framework, meticulous project planning becomes paramount.

9.1.1 Project Context

Given the global concern about rising carbon emissions and Malaysia's commitment to reducing emissions by 45% by 2023, the focus on transportation as a major contributor necessitates innovative solutions. MBIP targets residents, institutions, and staff to create a comprehensive community monitoring system fostering a Low Carbon Society (LCS).

9.1.2 Importance of Project Planning

- ***Alignment with Goals:***

Project planning ensures that every aspect of the development process aligns seamlessly with the overarching goals of the IPRK initiative.

- ***Resource Optimization:***

By strategically allocating resources, including time and human capital, we can maximize efficiency in achieving project objectives.

- ***Risk Mitigation:***

Identifying potential challenges, particularly in a project with technological and societal implications, allows for proactive risk mitigation strategies.

- ***Timeline and Milestones:***

A well-structured plan, including a detailed Work Breakdown Structure (WBS) and Gantt Chart, provides a visual roadmap with defined milestones, ensuring progress tracking and timely delivery.

9.2 Human Resources and Task Allocation

The EcoHarmony Solution project boasts a cohesive and dynamic team of specialized individuals who work together seamlessly. With the Project Manager providing meticulous oversight and the technical prowess of Database Administrators, Software Developers, UX Designers, and Support, each plays a crucial role in ensuring smooth database management, interface development, and user experience design. Their combined efforts resulted in the overall success of the project.

Week 1: Project Initiation

- **Project Manager [1 Person]**

- **Responsibilities:** Oversee the entire project, including task delegation, resource allocation, and timeline adherence.
- **Weekly Task:** Supervise and coordinate project initiation, research, system design, development, testing, deployment, and training stages.
- **Milestone:** Approval of Project Scope Document, Project Charter, Deployment Plan, User Manuals, and Documentation

Week 2-3: Research and Requirements Gathering

- **Database Administrator [2 Person]**

- **Responsibilities:** Manage database operations, data collection, analysis, and ensure system integrity.
- **Weekly Task:** Collaborate in research, gather technical requirements, and oversee the implementation and testing of the data collection module.
- **Milestone:** Approval of Data Collection Design, Successful Unit Testing, and System Integration.

Week 4-5: System Design

- **Software Developers/Engineers [5 Person]**

- **Responsibilities:** Develop the user interface, and monitoring dashboard, and ensure integration with the e-Lestari framework.
- **Weekly Task:** Actively participate in system design, development, testing, and deployment stages.
- **Milestone:** Finalization of User Interface Prototypes, Completion of Monitoring Dashboard, and Successful Integration with e-Lestari Framework.

Week 6-7: Development Phase

- **User Experience (UX) Designer [7 Person]**

- **Responsibilities:** Design intuitive and user-friendly interfaces for seamless user interactions.
- **Weekly Task:** Engage in system design, prototype development, and user acceptance testing phases.
- **Milestone:** Finalization of User Interface Prototypes and Approval of User-Accepted System.

Week 8: Testing Phase

- **Technical Support and Trainers [5 Person]**

- **Responsibilities:** Provide ongoing technical support and conduct training sessions for end-users.
- **Weekly Task:** Engage in training and documentation phases, conducting sessions, and preparing user manuals.
- **Milestone:** Completion of Training Sessions and Approval of User Manuals and Documentation.

Week 9: Deployment and Finalization

- **Coordination and Communication Team [5 Person]**

- **Responsibilities:** Ensure effective communication and coordination among team members and stakeholders.
- **Weekly Task:** Facilitate communication channels, and stakeholder engagement, and maintain project documentation.
- **Milestone:** The stakeholder list finalized, Communication channels established, and Project documentation completed.

Week 10: Training and Documentation

- **Technical Support and Trainers [5 Person]**

- **Responsibilities:** Conduct ongoing training sessions for users and ensure system maintenance.
- **Weekly Task:** Conduct additional training as needed and provide ongoing technical assistance.
- **Milestone:** Continued user training and Seamless system maintenance.

To conclude the project '*ECOHarmony Solution*' with a proper execution we need a team of 30 who will do their assigned duties according to the following plan and task allocation.

9.3 WBS (Work Breakdown Structure)

In the following sections based on our *Human Resources and Task Allocation* , we will meticulously outline the project's intricacies using a **Work Breakdown Structure (WBS)**. This hierarchical decomposition will systematically organize tasks, starting from defining the project scope to the final deployment of the community monitoring system. By breaking down the project into manageable components(we divided the all projects into weekly parts), we ensure a focused and organized approach, aligning each step with the specific needs of MBIP and the challenges presented by the IPRK initiative.

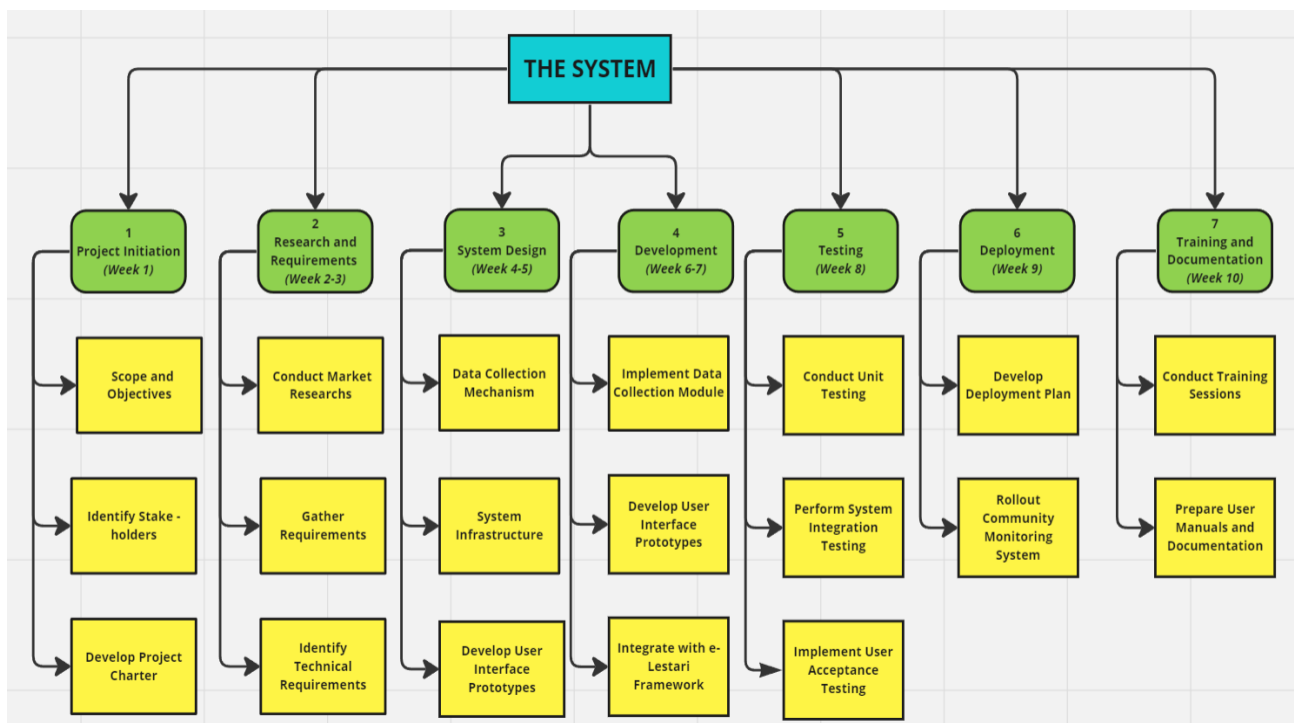


Figure 9.3: WBS structure

9.4 The Gantt Chart

As we embark on this project planning journey based on the *Human Resources and Task Allocation* and *WBS chart*, our focus shifts to visualising the project timeline and dependencies through a Gantt Chart. This visual representation will span from research and requirements gathering to system deployment, providing a clear roadmap for our 10-week duration. Navigating through this chart, we'll maintain a keen eye on the unique challenges posed by the IPRK initiative, ensuring that every milestone is achieved with precision and meets the specific needs outlined by MBIP

Here's the Gantt chart is shown below(which is divided by the weekly responsibilities and tasks of the 30 members team)-

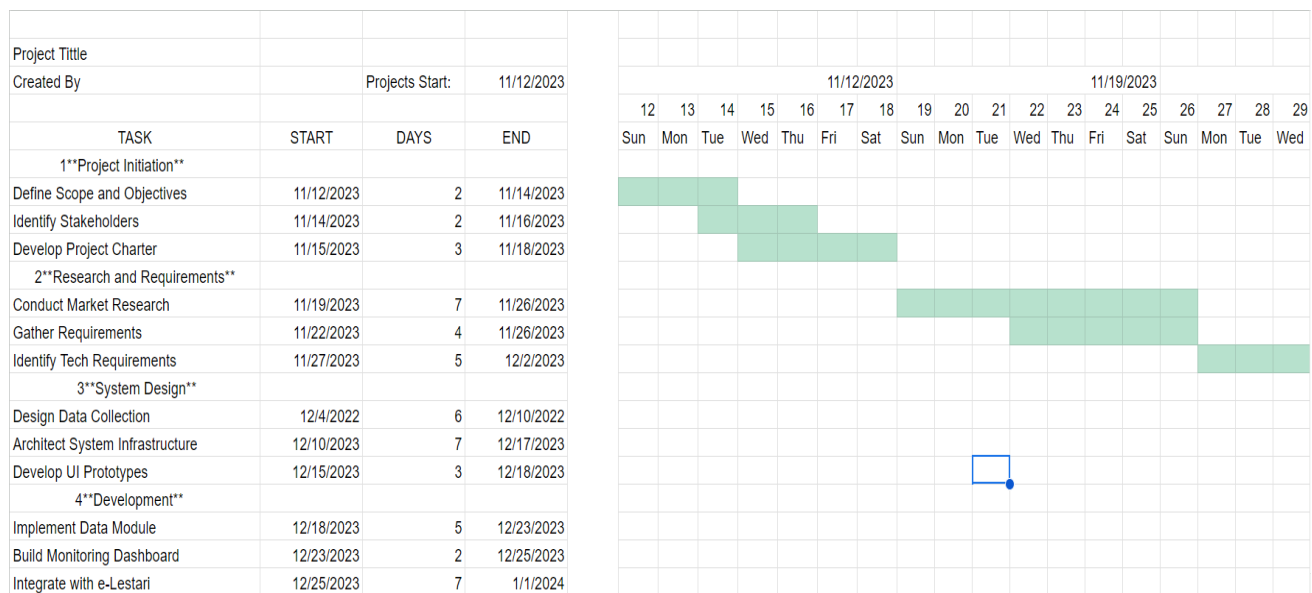


Figure 9.4: The Gantt Chart

Gantt Chart Work Link:

<https://docs.google.com/spreadsheets/d/1as20xAX0Wp8PYDw8wD8vvRqN93fc2d42ZWVUbWldI8s/edit?usp=sharing>

10.0 TRANSACTION REQUIREMENT

The ECOHarmony Solution project requires a variety of transactional features in order to effectively operate the community monitoring system. These transactional needs include the following aspects:

10.1 User Data Collection:

- **Objective:** Collect extensive data from diverse user demographics, ranging from residents in multi-level buildings and single-family homes to institutions, MBIP departments, and MBIP personnel.
- **Transactions:**
 - Creation and management of user profiles for distinct user categories.
 - Collection of carbon-related data via user-friendly interfaces.
 - Multilingual support for diverse user groups to input data seamlessly.
 - Implement secure data access, ensuring users only interact with information pertinent to their role.

10.2 Automated Data Analysis and Reporting:

- **Objective:** Enhance your decision-making and carbon footprint management by automating data analysis processes and generating insightful reports.
- **Transactions:**
 - Design algorithms to calculate carbon reduction based on inputs for water, electricity, and recycled oil consumption.
 - Develop a reporting module highlighting participants' contributions to carbon reduction efforts.
 - Implement dashboard functionalities presenting real-time carbon emissions data for immediate monitoring.

10.3 User Engagement and Training:

- **Objective:** Empower and captivate users to optimize system utilization and drive ongoing progress in reducing carbon emissions.
- **Transactions:**
 - Conduct interactive workshops, seminars, and extracurricular activities in schools focused on understanding carbon footprints.
 - Provide accessible guidelines such as posters, videos, or interactive learning sessions for users unfamiliar with Google Forms.
 - Enable a feedback mechanism to gather user experience insights, aiding in ongoing system enhancements.

10.4 System Maintenance and Updates:

- **Objective:** To guarantee the system's lasting effectiveness, it is vital to regularly maintain and update it.
- **Transactions:**
 - Conduct regular system maintenance to address any technical issues or bugs that may arise.
 - Provide continuous updates to the interface based on user feedback and technological advancements.
 - Ensure the database system's operational integrity for seamless functioning.

10.5 Stakeholder Communication and Coordination:

- **Objective:** Promote seamless communication and coordination between team members and stakeholders.
- **Transactions:**
 - Regularly update stakeholders about project progress and system enhancements.
 - Maintain comprehensive project documentation for transparent communication and future reference.

- Establish communication channels that foster engagement and feedback from all involved parties.

The ECOHarmony Solution relies on these transactional requirements to provide a strong framework for the success of the Iskandar Puteri Low Carbon project. From data collection and analysis to user engagement, system maintenance, and stakeholder coordination, each aspect is crucial for its accomplishment.

11.0 BENEFIT OF PROPOSED SYSTEM

This proposal for the Iskandar Puteri Low Carbon project focuses on the development of a community's monitoring system for their daily carbon emissions. This project, which is also known as ECOHarmony Solution, offers many advantages to the MBIP and also the community. First, by developing this system to control and monitor carbon footprints, it actually aligns seamlessly with the world's current problem of global warming, and as Malaysia has targeted to reduce their carbon emission by 45% by 2023, this system has exactly the same goal. Offering a monitoring system, this will surely improve people's awareness. This can also make Iskandar Malaysia as one of the examples of sustainable practices.

Additionally, the project planning, as what the Work Description Structure and Gantt Chart show, ensures that the development process is in sync with the IPRK initiative's major purpose. By separation of tasks of a project from the beginning allows risk reduction and improvement of the management. All the proposed system does not only help the project to succeed but also contributes to the Low Carbon Society development.

12.0 SUMMARY

The ECOHarmony Solution project is a thoughtfully crafted initiative, driven by strategic planning and operational efficiency - much like a well-orchestrated playbook for

a championship team. Picture a team of 30 seasoned professionals, including project managers, technical experts, creative minds, and support specialists, coming together for a 10-week period to cover every aspect of the project, from brainstorming to execution. This process is meticulously organized through a Work Breakdown Structure (WBS) and Gantt Chart, ensuring systematic progress in line with the objectives set by MBIP. All necessary details, similar to the key ingredients of a secret recipe, have been thoroughly addressed to ensure the smooth functioning of our community monitoring.