



# Capstone Project 2

CMU-SE 451

## Project Proposal Document

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### Craft Village Pollution Monitor System

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## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	21/02/2023	<b>End Date</b>	15/05/2023
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## 1. Introduction

According to the newest statistics from JICA, in collaboration with the Ministry of Agriculture and Rural Development, there are currently 1450 craft villages distributed nationwide in 58 provinces and cities. The Red River Delta is the most crowded area with about 800 craft villages. Most of them are concentrated in all major provinces such as Ha Tay with 280 villages, Thai Binh with 187 villages, Bac Ninh with 59 villages, ...etc. The types of craft villages are very diverse from silk and leather goods to construction materials, ceramics, and porcelain. The craft villages are the place to attract the local labor force, create jobs for laborers in society, and contribute to improving the lives of people.<sup>[1]</sup>



**Figure 1.** Bat Trang pottery village

However, the disadvantage/bad side of the development is that most of Vietnam's craft villages were and are now being polluted in three forms: water pollution; waste pollution, and air (emissions) pollution. According to the 2009 National Environment Report of the Ministry of Natural Resources and Environment, the survey results in 52 craft villages showed that 46% of craft villages were seriously polluted, 27% were in medium pollution, and 27% were mild pollution. Currently, the environmental

quality in most craft villages does not meet the standards, causing laborers to be exposed to health harmful risks, including 95% from dust, 85.9% from heat, and 59.6% from chemicals.<sup>[11]</sup> One of the main reasons for this happening is the lack of overseeing the pollution from the craft village and the tools that are necessary for people of all ages to take part in protecting the environment. Based on the urgent requirements to have an effective way to monitor the pollution of the craft villages, we would like to do the topic "Building an application that allows everyone to monitoring pollution from craft villages".

## 1.1. Purpose

❖ Easy to use:

- Any person who knows how to use a smartphone can use the application to conduct a pollution survey easily.
- Support a wide range of ages (from 12 to 65).

❖ Quick and effective:

- Automate operations that previously had to be done manually.
- Perform tasks quickly and accurately by using AI.

❖ Accurate and complete:

- Capable of controlling, synthesizing fully accurately, and promptly reflecting the craft village's information and its pollution status.
- Ability to store data for a long time.
- Provide statistics - reports quickly and accurately.

❖ Load reduction:

- As a result of solving the above problems, people will not have to go through the cumbersome process to make a pollution survey as before. Making monitoring and collecting the pollution data from a craft village is much more effective and faster. To achieve a goal, the group will apply the knowledge from the studied subjects such as:

- ❖ Requirement Engineering: Collect, analyze current needs to form the idea. From there, find out what the user wants in that idea.
- ❖ Project Manager: Split work to calculate the schedule of the team to help the project perform on schedule.

- ❖ Information System Application: Analysis objects related to the project, data, information related to the topic.
- ❖ Software Testing: Learn an important role to ensure that when the project is completed, the product works exactly as set out without causing errors.

## 1.2. Scope

There are three main roles for this system:

- ❖ Personal user: The personal user will use the phone application to take picture of the pollution of the craft village and submit it to the server.
- ❖ Household user: The household user will use the phone application to submit their production information.
- ❖ Local Authority user: The local authority user will use the system to monitor the pollution status of the craft village.

The project's application is all the craft villages that are present in Vietnam.

## 2. Problem Definition

### 2.1. Project Requirement

- ❖ Due to the achievement obsession or a bureaucratic system, some systems that get the data from a certain group or government will be not accurate or already outdated. As a result, people's health will be affected if they trust these inaccurate data.
- ❖ Some systems only have records of the big cities and only support the big cities. In Vietnam, only big cities such as Hanoi, Ho Chi Minh city, or Da Nang have accurate pollution data that people can trust and use. In other places, the data would probably be inaccurate or already outdated.
- ❖ Many systems do not have a function that allows the user to make a report quickly and effectively. Even if they do, it would be still a very hard and cumbersome process that will not be very friendly for younger people or elderly people to use.
- ❖ Some systems or applications only support a certain type of pollution. Most of the reports or data focus in Vietnam on air pollution instead of other pollution such as dirt pollution, water pollution, or even light pollution. This leads to the

lack of data when the people want to know the pollution levels or what kind of pollutions exists around that craft village.

## 2.2. Proposed Solutions

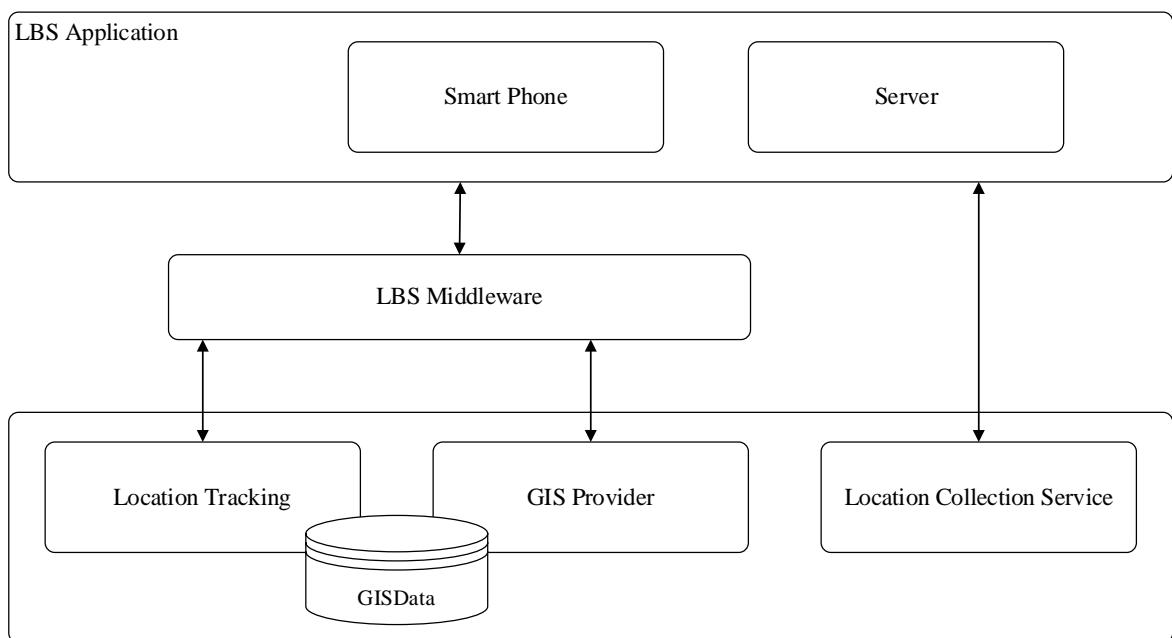
Our team will wrap around the above problems and help everyone monitor and resolve the pollution problems from their craft village area more effectively. Some aspects that will make our system that the people will find much more effective:

- ❖ Our system will help everyone to monitor your local craft village despite where your location. This means whether you stay in a big city or a small village at the top of the mountain our system will still function.
- ❖ Our system will provide a function that lets people make an instant report to the local environment department.
- ❖ Our system will detect all kinds of pollution instead of focusing on some specific kinds. This will help to collect a variety of data that could help people to a bigger picture about their pollution levels in the area.
- ❖ Our system will have an AI that will take images from people then analyzes the image to know what kind of pollution the user is facing and the result will be automatically filled into the form which will be sent directly to the local environment department to resolve the problem. This is so easy to use that even an elementary school child can do and it also reduces a massive amount of the cumbersome and bureaucratic process that people have to go through.
- ❖ Our system is also integrated with location-based technology to detect the location of the pollution and layout the data on the map for the user to monitor.

## 2.3. Core Technology

### 2.3.1. Location-based Service

A location-based service (LBS) is a general term denoting software services which use geographic data and information to provide services or information to users. LBS can be used in a variety of contexts, such as health, indoor object search, entertainment, work, personal life, etc. Commonly used examples of location-based services include navigation software, social networking services, location-based advertising, and tracking systems.



**Figure 2. Architecture of the Location Based Services**

LBS can also include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. LBS also includes personalized weather services and even location-based games.<sup>[6]</sup>

Location-based services may be employed in a number of applications, including:<sup>[6]</sup>

- recommending social events in a city
- requesting the nearest business or service, such as an ATM, restaurant or a retail store
- turn-by-turn navigation to any address
- assistive healthcare systems
- locating people on a map displayed on the mobile phone
- receiving alerts, such as notification of a sale on gas or warning of a traffic jam
- location-based mobile advertising
- asset recovery combined with active RF to find, for example, stolen assets in containers where GPS would not work
- contextualizing learning and research
- games where your location is part of the game play, for example your movements during your day make your avatar move in the game or your position unlocks content.

- real-time Q&A revolving around restaurants, services, and other venues.
- tracking a NASA lunar lander.
- sending a mobile caller's location during an emergency call using Advanced Mobile Location

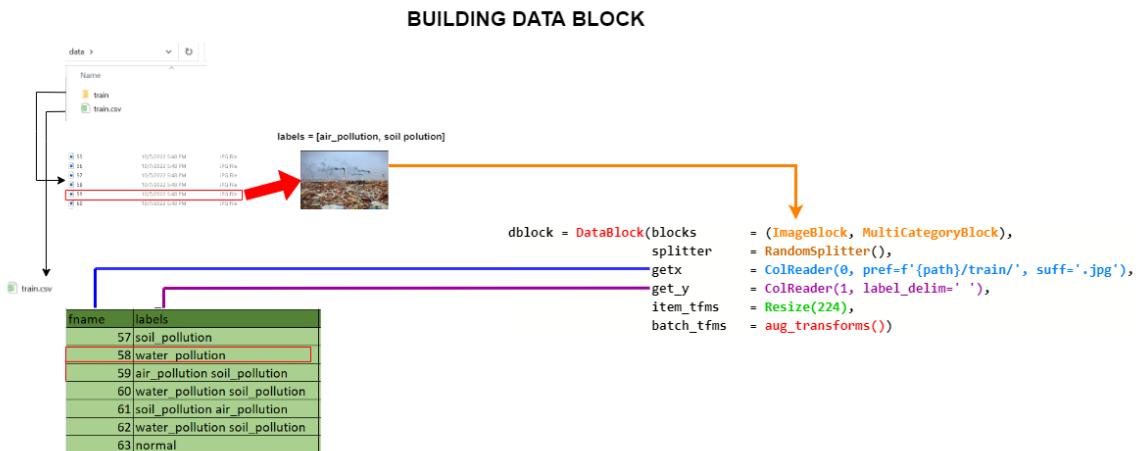
For the carrier, location-based services provide added value by enabling services such as: [\[6\]](#)

- Resource tracking with dynamic distribution. Taxis, service people, rental equipment, doctors, fleet scheduling.
- Resource tracking. Objects without privacy controls, using passive sensors or RF tags, such as packages and train boxcars.
- Finding someone or something. Person by skill (doctor), business directory, navigation, weather, traffic, room schedules, stolen phone, emergency calls.
- Proximity-based notification (push or pull). Targeted advertising, buddy list, common profile matching (dating).
- Proximity-based actuation (push or pull). Payment based upon proximity (EZ pass, toll watch), automatic airport check-in.

### **2.3.2. Image Classification**

In machine learning, a neuron is a mathematical function that takes an input value and outputs an output value. Many neurons connected together will form a neural network. The name "convolutional neural network" indicates that the network employs a mathematical operation called convolution. [\[8\]](#)

Convolutional networks are a specialized type of neural networks that use convolution in place of general matrix multiplication in at least one of their layers or, in other words, "A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data." This characteristic that makes convolutional neural network so robust for computer vision. [\[8\]](#)

**Figure 3. Building Data Block**

A residual neural network (ResNet) is a convolutional neural network (CNN).

Residual neural networks utilize skip connections, or shortcuts to jump over some layers. Typical ResNet models are implemented with double- or triple- layer skips that contain nonlinearities (ReLU) and batch normalization in between.[\[7\]](#)

There are two main reasons to add skip connections: to avoid the problem of vanishing gradients, or to mitigate the Degradation (accuracy saturation) problem; where adding more layers to a suitably deep model leads to higher training error.[\[7\]](#)

With the problem of image classification of which type of environmental pollution, choose the direction of Image Classification to solve. It is divided into 4 classes: soil pollution, water pollution, air pollution, and no pollution. Then prepare image data for each class and train the recognition model.

```

O_Nhiem_Khong_Khi
tensor([6.5105e-07, 3.6927e-03, 9.9630e-01, 8.1420e-06])
Không ô nhiễm: 6.510521780001e-05 %
Ô nhiễm đất: 0.36926692724227905 %
Ô nhiễm không khí: 99.62985229492188 %
Ô nhiễm nước: 0.0008141990401782095 %

```

**Figure 4. Detect Pollution Using Multi-Class Classification**

```

1 result = {'air_pollution':float(outputs[0]), 'normal':float(outputs[1]),'soil_pollution':float(outputs[2]), 'water_pollution':float(outputs[3])}
2 result
{'air_pollution': 0.9998756647109985,
 'normal': 0.013222821988165379,
 'soil_pollution': 0.9442797303199768,
 'water_pollution': 0.005980329588055611}

```

**Figure 5. Detect Pollution Using Multi-Label Classification**

The difference between Multi-Class Classification and Multi-Label Classification is that in multi-class problems, the classes are mutually exclusive. In contrast, for multi-label problems, each label represents a different classification task, but the tasks are related to each other. Here, we choose to handle the problem of Multi-Label Classification to be suitable for predicting many types of pollution in the same image.

## 2.4. Technical Constraints

### ❖ Technical to develop

- Language: Java (Spring Boot), Dart (Flutter), Python (Flask, FastAI)
- Develop tool: Visual Studio Code, SpringToolSuite4
- Version Control System: Git/GitHub
- Database Management System: Oracle SQL Developer

### ❖ Environment

- Operation systems: Microsoft Windows, MacOS, Android, iOS

### ❖ Other Constraints

- Resource: 5 people.
- Budget: Limited.
- Time: The project must be completed within 03 months.
- Area: Duy Tan University

## 3. Current Status of Art

### 3.1. Advantages

- ❖ No cumbersome and complex process: The application is very friendly for users to make a fast and effective pollution survey.

- ❖ No need to understand the complex environmental terms: The main focus of this system is for anyone who knows how to use the smartphone without a specialty in the environment area. Thus, no need to learn about complex environmental terms or you have to be an expert to use this system.
- ❖ Can detect multiple pollution types: With the application of AI, the system can discover multiple pollution types just by analyzing the submitted image by the user.
- ❖ Can automatically detect the location of pollution: Using location-based technology, there is no need for the user to specify the location where the pollution happens, everything will be automatic resolve.

### **3.2. Disadvantages**

- ❖ Image quality: One potential challenge that may arise in the system is related to image quality. Since the system relies on images to detect pollution types in the craft village, users with low-quality cameras on their phones may encounter difficulties when the AI attempts to accurately identify the pollution types. This issue can be addressed by encouraging users to use devices with better camera quality or implementing image enhancement techniques in the system's algorithms.
- ❖ Internet connection issues: The system will use the internet connection to communicate with the database and other services. Thus, the area with no internet connection or an unstable internet connection could cause the system to stop functioning. This will problem can be fixed in the later phase of the project.
- ❖ Data validation: Sometime people will intend to input false informations, thus, it causes the system to contain false information. This will problem can be fixed in the later phase of the project.

These challenges will be taken into account during the later phases of the project to implement appropriate solutions and enhancements. By addressing these potential issues, we aim to optimize the system's performance and reliability, providing users with a more seamless and accurate monitoring experience.

## 4. Engineering Approach

### 4.1. System Context Overview

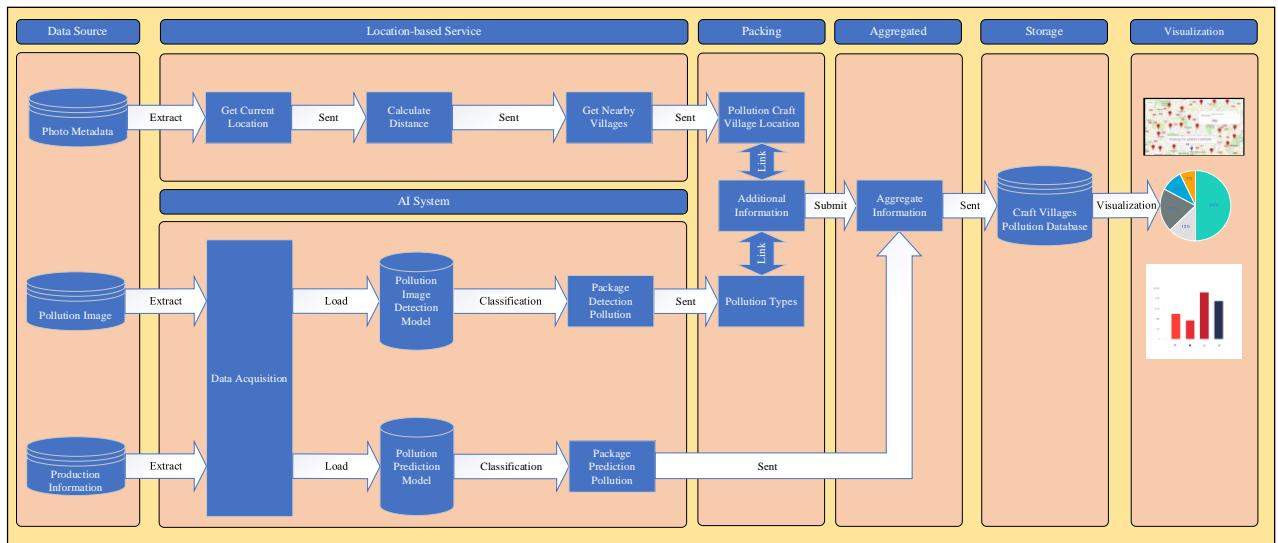


Figure 6. System Context Diagram

### 4.2. System Context Description

❖ As personal user, they can:

- Create, update account from system.
- Create, view the pollution survey.

❖ As a household user, they can:

- Create, update account from system.
- Create, view production information survey.

❖ As an authority user, they can:

- View craft village data.
- Give approval for household new village request.

## 5. Tasks and Deliverables

### 5.1. Tasks and Scope

1. Proposal Document + Requirement Description Document
2. Project Plan Document
3. Product Backlog-User Story-Sprint Backlog Documents
4. Architecture Document
5. Database Design Document
6. Interface Design Document

7. Code Standard
8. Test Plan Document
9. Test Case Document
10. Meeting
11. Reflection

## 5.2. Deliverables

1. Engineering report
2. Proposal
3. Design drawings
4. Design documents
5. Completed product (building, etc.)
6. Technical interpretation
7. Design review
8. Progress report
9. Improved process efficiency
10. Better customer service
11. Faster response time
12. Product prototype
13. User manual

# 6. Project Management

## 6.1. Scrum definition

Scrum is a subset of Agile and one of the most popular process frameworks for implementing Agile. It is an iterative software development model used to manage complex software and product development. Fixed-length iterations, called sprints lasting one to two weeks long, allow the team to ship software on a regular cadence. At the end of each sprint, stakeholders and team members meet to plan next steps.[\[2\]](#)

### 6.1.1. Scrum description

- ❖ There are three specific roles in Scrum:
- ❖ **Product Owner:** The Product Owner focuses on business and market requirements, prioritizing all the work that needs to be done. He or she builds

and manages the backlog, provides guidance on which features to ship next, and interacts with the team and other stakeholders to make sure everyone understands the items in the product backlog. The Product Owner is not a project manager. Instead of managing the status and progress, his or her job is to motivate the team with a goal and vision. [2]

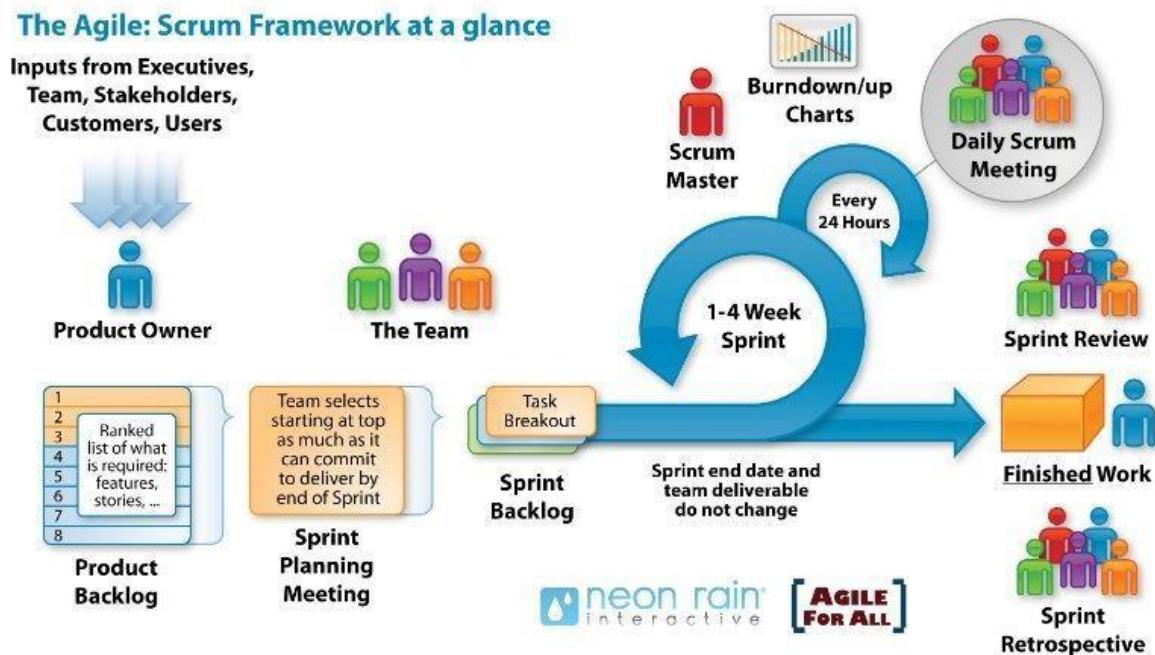
- ❖ **Scrum Master:** Often considered the coach for the team, the Scrum Master helps the team do their best possible work. This means organizing meetings, dealing with roadblocks and challenges, and working with the Product Owner to ensure the product backlog is ready for the next sprint. The Scrum Master also makes sure the team follows the Scrum process. He or she doesn't have authority over the team members, but he or she does have authority over the process. For example, the Scrum Master can't tell someone what to do, but could propose a new sprint cadence. [2]
- ❖ **Teams working at scrum:** The Scrum Team is composed of five to seven members. Everyone on the project works together, helps each other, and shares a deep sense of camaraderie. Unlike traditional development teams, there are not distinct roles like programmer, designer, or tester. Everyone completes the set of work together. The Scrum Team owns the plan for each sprint; they anticipate how much work they can complete in each iteration. [2]

### 6.1.2. The artifacts

- ❖ **Product Backlog:** The Product Owner and Scrum Team meet to prioritize the items on the product backlog (the work on the product backlog comes from user stories and requirements). The product backlog is not a list of things to be completed, but rather it is a list of all the desired features for the product. The development team then pulls work from the product backlog to complete during each sprint. [2]
- ❖ **Sprint Backlog:** is a list of functions developed for Sprint; it is determined by a Sprint Planning meeting. Sprint Backlog is the functionality selected from the Product Backlog based on priority levels and the ability of the team to develop. [2]

- ❖ **Estimation:** In SCRUM, members of the Task Team will be chosen by themselves and estimate the expected development time and be responsible for this estimate. After completing the table will update Sprint Backlog. [2]

### 6.1.3. Process



**Figure 7. Scrum Framework at a glance**

- ❖ **Sprint Planning meeting (planning meetings for each Sprint):** At the Planning meetings, the Team and Product Owner negotiate which items will be committed to the sprint. The team pulls the top items from the Product Backlog, commits them to the Sprint Backlog, breaks them into smaller tasks typically, and decides whether it's the right amount of work for them to do and if they're clear about what they are going to do. They plan one sprint. [2]
- ❖ **Daily Scrum Meeting (also called Stand-up Meeting):** Daily Scrum Meeting is meeting the recommended daily and no more than 15 minutes and standing meeting to ensure the meeting time is not extended at the beginning of each day. [2]
- ❖ If members are having problems, it should work individually to address and not take long for the members. Scrum Master to ensure this meeting is to comply with regulations.
- ❖ **Sprint Review:** A meeting to:

- Evaluate the results of the past Sprint and determine the Release function. [\[2\]](#)
- The function continues to modify or develop. Identify and discuss issues arising plan award decisions, additional Product Backlog. [\[2\]](#)

## 6.2. Masterplan

**Table 1.** *Master Plan*

No.	Task Name	Start	Finish	Effort
<b>1</b>	<b>Initial</b>	<b>21/02/2023</b>	<b>26/02/2023</b>	<b>28 hrs</b>
1.1	Gathering Requirement Meeting			
1.2	Analyze Requirement			
<b>2</b>	<b>Create Document</b>	<b>27/02/2023</b>	<b>01/03/2023</b>	<b>18 hrs</b>
2.1	Create Project Plan			
2.2	Create User Stories			
2.3	Create Product Backlog			
<b>3</b>	<b>Development</b>	<b>02/03/2023</b>	<b>16/05/2023</b>	<b>2140 hrs</b>
<b>3.1</b>	<b>Sprint 1</b>	<b>02/03/2023</b>	<b>16/03/2023</b>	<b>428 hrs</b>
<b>3.2</b>	<b>Sprint 2</b>	<b>18/03/2023</b>	<b>01/04/2023</b>	<b>428 hrs</b>
<b>3.3</b>	<b>Sprint 3</b>	<b>02/04/2023</b>	<b>16/04/2023</b>	<b>428 hrs</b>
<b>3.4</b>	<b>Sprint 4</b>	<b>17/04/2023</b>	<b>01/05/2023</b>	<b>428 hrs</b>
<b>3.5</b>	<b>Sprint 5</b>	<b>02/05/2023</b>	<b>16/05/2023</b>	<b>428 hrs</b>
<b>3.8</b>	<b>Review Project</b>	<b>17/05/2023</b>	<b>17/05/2023</b>	<b>2 hrs</b>

### 6.3. Cost/Budget For Project

**Table 2.** Total cost estimate

No	Criteria	Price	Amount	Total (USD)
1	Working hours	\$ 2	1360	\$ 2720
2	Online server and services	\$ 50	2	\$ 100
3	Party	\$ 10	5	\$ 50
<b>Total cost</b>				<b>\$ 2870</b>

**Table 3.** Cost detail

Description	Amount	Unit
Number of members	5	Person
Number of working hours per day	2 (During workday) 8 (During weekend)	Hour
Number of workdays / weeks	7	Day
The duration of the project	3.5	Month
Party cost per time	10	USD
The number of working days	76	Day

### 7. Project Constraints

**Table 4.** Project constraints

Constraint	Constraints Description	Guidelines for Acceptance
<b>Economic</b>		Elements for consideration are design costs, production costs, maintenance costs, operating costs, and sales price
<b>Environmental</b>	Our project makes the people (more precisely the craft villages) change the	The impact of the design on the environment as well as the impact of the

	<p>way their use material or energy to be eco-friendly, and sustainable. Thus, the living environment will be improved and reduce pollution.</p>	<p>environment (e.g. temperature range, humidity, vibration, electromagnetic interference immunity, and shock) on the design should be considered. Design for recycling and design to use recycled materials should also be considered</p>
<b>Ethical</b>		<p>Ethical considerations can be broad. Areas that are typically addressed include intellectual property, reverse-engineering, privacy, security, and the conflict between cost and safety</p>
<b>Public health, safety, and welfare</b>		<p>Includes safety standards as well as the impact of the design on users (for example, electrical or physical hazards)</p>
<b>Social and Global</b>		<p>Addresses aspects such as benefits, risks, the man-machine interface, the acceptance of products by the intended user or by society at large, and global</p>

		and socially responsible engineering.
<b>Cultural</b>	Our project will change the way people produce their product. They will aim to be more green and protect environment.	Which cultural characteristics could influence the approach? How do the design from different cultures differ?
<b>Sustainability</b>	Our project makes the people (more precisely the craft villages) aim to use more sustainable resources and save energy. Moreover, they could change the traditional way of manufacturing or the infrastructure into more eco-friendly ones.	Refers to the sustainability of resources, including material, energy, supplies, manufacturing techniques, personnel, operation, and the need for additional infrastructure, as well as the sustainability of the design including reliability, lifetime, durability, reusability, maintainability.

## 8. Conclusion

The pollution of the craft village is at an alarming rate, affecting the environment and people's lives. One of the main reasons for this happening is the lack of overseeing or the tools that help people to take part in the problem. Thus, with the urge to protect the environment and improve people's lives, our team would like to build a system that helps everyone to monitor the pollution from craft village quickly and effectively.

Our approach:

- ❖ We will build a phone application using Flutter that allows the user to make a pollution survey very quickly by taking a picture of pollution.
- ❖ The application will automatically attach the GPS location to the picture.
- ❖ The picture then will be sent to an AI that will analyze the picture to detect the pollution types.

- ❖ The result will automatically fill into the form for the user to check and submit.
- ❖ The local authority can use the system to monitor the data and know the pollution status of the craft village.

The project will be finished after the course of 3 months with a limited budget of 3000 USD.

## 9. References

1. Nguyen Thi Loi, “[Environmental pollution in Vietnam's craft villages](#)”, National Economics University;
2. Kate Eby, “[What's the Difference? Agile vs Scrum vs Waterfall vs Kanban](#)”, February 15, 2017;
3. Office of Water Prediction (U.S.), “[General Software Standards](#)”
4. IEEE SA, “[Standard 12208-2017](#)”
5. NASA, “[LaRC Software Engineering \(SWE\) Process Improvement Initiative \(SPII\)](#)”
6. Wikipedia, “[Location-based service](#)”
7. Kaiming He, Xiangyu Zhang, Shaoqing Ren, Jian Sun, “[Deep Residual Learning for Image Recognition](#)”
8. Wikipedia, “[Convolutional neural network](#)”

## 10. Attachment

1. C2SE.01\_CVPMS\_ReqDescription-Document\_v2.2.docx

# **DESCRIPTION OF PRODUCT REQUIREMENTS**

Group: C2SE.01

Project: CVPMS

Date: 22/02/2022

## **I. Short description of product ideas (less than 7 statements)**

With the aim to help everyone monitor and resolve the pollution problems from their craft village area more effectively. Some aspects that will make our system that the people will find much more effective:

- ❖ Our system will help everyone to monitor their local craft village despite where the location. This means whether the user stay in a big city or a small village at the top of the mountain our system will still function.
- ❖ Our system will provide a function that lets people make an instant survey to the system.
- ❖ Our system will detect all kinds of pollution instead of focusing on some specific kinds. This will help to collect a variety of data that could help people to a bigger picture about their pollution levels in the area.
- ❖ Our system will have an AI that will take images from people then analyse the image to know what kind of pollution the user is facing and the result will be automatically filled into the form which will be sent directly to the local environment department to resolve the problem. This is so easy to use that even an elementary school child can do and it also reduces a massive amount of the cumbersome and bureaucratic process that people have to go through.
- ❖ Our system is also integrated with location-based technology to detect the location of the pollution and layout the data on the map for the user to monitor.

## II. Requirements

High-level Functional Requirements	<ol style="list-style-type: none"><li>1. Detect pollution types using input photo (AI detection)</li><li>2. Auto detect user location</li><li>3. Auto fill the form with detected information</li><li>4. Map pollution craft villages to the map</li><li>5. Add new unknown craft village</li></ol>
Quality Attributes Requirements  (Example related to issues: Ease Use, Easy to Like, Easy to Learn, Easy to Understand, Easy to Buy / Yes, ...)	<ol style="list-style-type: none"><li>1. Tasks handle no more than 10 seconds.</li><li>2. Account can be protected with authentication and encryption with high security</li><li>3. User can use easily app without taking much time</li><li>4. The processing features are logical and easy to understand</li><li>5. Extending a new feature is easy and doesn't redesign the architecture</li></ol>
Operation Requirements  (Related to issues: Speed, Accuracy, Performance, Stability, Load Resistance, Scalability, Safety, ...)	<ol style="list-style-type: none"><li>1. Process quick tasks for no more than 10 seconds per task</li><li>2. Handling traffic to applications that are more than 500 concurrently accessed.</li><li>3. Ensure the number of transactions is processed correctly at the rate of 99.9%</li><li>4. Completely load the application in no more than 10 seconds</li></ol>
Environment & Operation Requirements  (Related to issues: physical impacts on the environment, interact with relevant or existing systems, conditions for product commercialization, ...)	<ol style="list-style-type: none"><li>1. Web browsers: IE, Fire Fox, Google Chrome with latest version.</li><li>2. Mobile: Android 10 and more, IOS 13 and more</li><li>3. Operating systems: Microsoft Windows 10, Ubuntu 18.04 with SSD 120GB, RAM 2G, minimum 50Mbps</li><li>4. External Services: Google Cloud, Map API</li></ol>

Requirements for Maintenance & Support	1. Direct customer support consulting via email or phone number of our organization.

Security/ Safety Requirements  (Related to issues: conditions of use / access to products, personal freedom, inspection, ...)	1. Must login to use registered account
	2. 3-layer password encryption
	3. Clear authorization for each type of user and restrict access.

Culture Requirements	1. Vietnamese and English language support
	2. Culture according to international standards
	3. Does not contain harmful content, content level, toxic cultural content is specified in the law of Vietnam and international.

Evaluate the complexity of engineering problems	1. Involving wide-ranging or conflicting technical issues
	2. Having no obvious solution
	3. Addressing problems not encompassed by current standards and codes
	X 4. Involving diverse groups of stakeholders
	X 5. Including many component parts or sub-problems
	6. Involving multiple disciplines
	7. Having significant consequences in a range of contexts

Standard requirements	X	1. Code standard. (GNU, Oracle standard for Java, ...)
	X	2. Design standard. (Design patterns, object-oriented analysis and design, ...)
	X	3. IEEE (1058, 1540, 830, 1016, 829, 1012, 1008)
	X	4. ISO/IEC/IEEE 12207:2017 (TCVN 10539:2014); ISO/IEC 25051:2006(TCVN 10540:2014);
		5. Other standards. (Related to specific topics)



# Capstone Project 2

CMU-SE 451

## Project Plan Document

Version 2.1  
Date: 27/02/2023

### Craft Village Pollution Monitor System

Submitted by  
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Huy, Bui Duc  
Phuc, Hua Hoang  
Trung, Nguyen Thanh  
Nhan, Huynh Ba

Approved by  
Ph.D. Nguyen Thanh Binh

#### Proposal Review Panel Representative:

---

Name              Signature      Date

#### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyễn Thành Bình'.

---

Name              Signature      Date

## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
<b>Project Mentor</b>	Ph.D. Thanh Binh, Nguyen		
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<b>Partner Organization</b>			
<b>Project Web URL</b>	<a href="https://github.com/Casca113s2/craft-village-pollution-monitor-system">https://github.com/Casca113s2/craft-village-pollution-monitor-system</a>		
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## DOCUMENT NAME

<b>Document Title</b>	Project Plan Document		
<b>Author(s)</b>	All team members		
<b>Date</b>	27/02/2023	<b>File Name</b>	C2SE.01_CVPMS_Project-Plan-Document_v2.1.docx

## REVISION HISTORY

<b>Version</b>	<b>Date</b>	<b>Comments</b>	<b>Author</b>	<b>Approval</b>
2.0	25/02/2023	Create documents	All team members	
2.1	27/02/2023	Update after review	All team members	

**Approve Document:** Sign in to approve the document

<b>Mentor</b>	Binh, Nguyen Thanh	Date	27/02/2023
		Sign	
<b>Scrum Master</b>	Ca, Van Cong Le	Date	27/02/2023
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<b>Scrum Member</b>	Huy, Bui Duc	Date	27/02/2023
		Sign	
<b>Scrum Member</b>	Phuc, Hua Hoang	Date	27/02/2023
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<b>Scrum Member</b>	Trung, Nguyen Thanh	Date	27/02/2023
		Sign	
<b>Scrum Member</b>	Nhan, Huynh Ba	Date	27/02/2023
		Sign	

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# 1. Project Overview

## 1.1. Project Description

**Table 1. Project Description**

Project code	CVPMS	Contract type	Internal Project
Customer	Duy Tan University	End-User	Private Person Household Local authority Admin
Project Type	Internal	Project Manager/ Scrum master	Van Cong Le Ca
Project Category	Development and Maintenance	Business domain	Environment
Application type	Mobile application, Web application		

## 1.2. Scope and Purpose

### 1.2.1. Scope

The system runs on mobile platforms and website platform, the windows operating system includes:

- Deploy on an Android/iOS device.
- Deploy on a PC or Laptop.
- During: 93 days.

### 1.2.2. Purpose

The project name is “Craft Village Pollution Monitor System”. With the goal of building a software system to help automate the process of collecting and managing the pollution data from craft villages in Vietnam, in order to overcome the limitations and weaknesses of the current exist systems. The system is designed so that everyone from a wide range of ages can help to collect the pollution data from craft villages and other stake holders can use the system to monitor and manage the collected data. The process of collecting data will be more quick, efficient and required no deep

understanding of environment science from the end user (private user to be more precisely). The project is developed in the form of a mobile application for collecting pollution data and a web application for data management, the work is handled automatically, saving effort and time for the users. Automate information storage and processing, and provide accurate and timely information at the request of the users. Synthesize, report statistics, get better results.

### 1.3. Assumptions and Constraints

**Table 2. Assumptions and Constraints**

No	Description	Note
<b>Assumptions</b>		
1	The mobile application can be run on both Android and iOS	Scope
2	The website can be run on Chrome, CocCoc, Edge	Scope
3	Customer reviewers will get seven days to approve a milestone document. If no comments are received within this time period, it will be considered as approved.	External Interfaces
<b>Constraints</b>		
1	All module must be completed and delivered to customer before 10 – December – 2022 because customer has to demo to its end user after 12 – December	Schedule
2	The project shall conform to security requirements specified by the customer in the NDA	Security
3	Network is available	Environment
4	Flutter, Spring Boot, Bootstrap, Dart, Java, HTML/CSS, JavaScript, Python, SQL	Programming languages and supporting libraries
5	Multi-Lable classification in machine learning, Location based services	Technology

## 1.4. Project Objectives

### 1.4.1. Standard Objectives

**Table 3. Standard Objectives**

Metrics	Unit	Committed	Note
Start Date	Date	21/02/2023	
End Date	Date	25/05/2023	
Duration	Date	93 days	
Team Size	Person	5 peoples	
Billable Effort	Person-day	2\$ * 5 * 5 * 67 (For workday) 2\$ * 8 * 5 * 26 (For weekend) (Working hours = Number of working hours per day * Number of members * Number of days. Cost = Working hours * The cost per member per hour = Working hours * 2)	
Number of work hours per day for one engineer	Person-hour	5 (For workday) 8 (For weekend)	

### 1.4.2. Specific Objectives

- ❖ No defect
- ❖ Done on time, completion of project early by December 10th
- ❖ Apply new technology to the project
- ❖ The system is easy to use and user friendly
- ❖ Complete the functions of the system

## 1.5. Critical Dependencies

**Table 4. Critical Dependencies**

No	Dependency	Expected delivery date	Note
1	Craft Village Mobile Application	25/05/2023	

No	Dependency	Expected delivery date	Note
2	Detection Pollution AI	25/05/2023	

## 1.6. Project Risk

**Table 5. Project Risk**

Risk	Description	Probability	Impact	Mitigation Strategy
Incorrect requirements	Developing the product which does not accord with the requirements	3	5	Discuss and communicate frequently with Stakeholders
Estimate working time	Actual working time is not enough to finish a task compared to the estimated previous time	2	4	Review old tasks and evaluations to estimate for the new task. Re-plan for each sprint.
People	Team member who is ill, has health problems, or busy	4	3	Notify the scrum master (or ask a colleague to help you) Complete the assigned tasks when possible
Lack of technical experiences	Detect harmful content in the video is a difficult technique that all members need to research and develop.	4	4	Spend a lot of time for learning and training
Team Communication	Team members can conflict with each other while discussing something related to the project	4	2	Conduct a meeting to share knowledge, experience and learning methods
External problems	It has power problems, laptop,	3	3	Find another workplace (library, coffee shop, ...)

Risk	Description	Probability	Impact	Mitigation Strategy
	personal computer, network system			Notify the scrum master to assign appropriate tasks
Market	Other products are deployed at the same time and compete with the project team's product	2	3	Develop newer features and organize promotional activities

## 2. Project Development Approach

### 2.1. Technical Process

#### 2.1.1. Reasons for selecting

To keep up with today's increasingly changing technology trends, we want a truly flexible and easy project development model to adapt to that change. Our project will develop more new features in the future. We will continuously update and apply new technologies that increase the attractiveness and intelligence of the application.

Currently, our team is a small team with little experience in project development. Therefore, we cannot avoid problems that arise in the software development stages and requirements can be changed to be more suitable. For the traditional model that requires managerial skills and high accuracy, it will not suit our team. Applying Agile Scrum model will help us to solve these problems, bring a lot of experience and best performance for project development.

#### 2.1.2. Agile Methodology

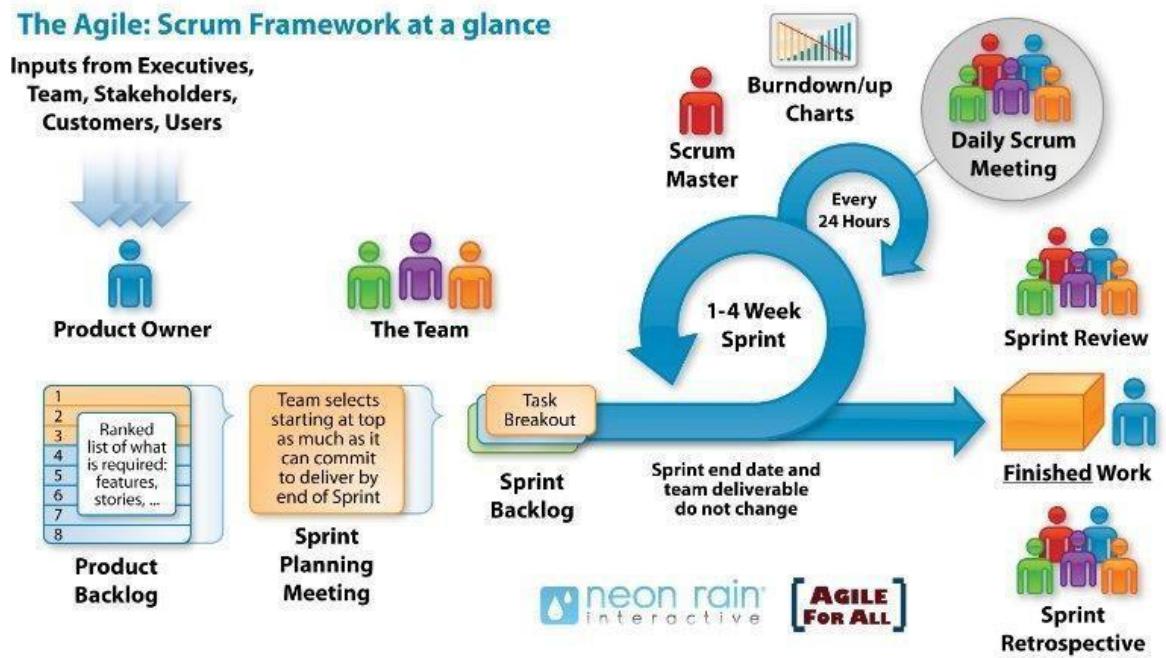
Agile software development refers to a group of software development methodologies based on iterative development, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams.

Agile software development is more than frameworks such as Scrum, Extreme Programming, or Feature-Driven Development (FDD).

Agile software development is more than practices such as pair programming, test-driven development, stand-ups, planning sessions, and sprints.

Agile software development is an umbrella term for a set of frameworks and practices based on the values and principles expressed in the Manifesto for Agile Software Development and the 12 Principles behind it. When you approach software development in a particular manner, it's generally good to live by these values and principles and use them to help figure out the right things to do given your particular context.

### 2.1.3. Scrum Process



**Figure 1. Principle and Different Stages**

- Scrum is an iterative and incremental agile software development framework for managing software projects and product or application development.
- Scrum focuses on project management institutions where it is difficult to plan ahead.
- Mechanisms of empirical process control, where feedback loops that constitute the core management technique are used as opposed to traditional command-and-control management.
- Its approach to planning and managing projects is by bringing decision-making authority to the level of operation properties and certainties.
- Scrum has three roles: product owner, scrum master and the development team members.

#### ❖ Benefit of the methodology:

- Project can respond easily to change.

- Problems are identified early.
- Customer gets most beneficial work first.
- Work done will better meet the customer's needs.
- Improved productivity.
- Ability to maintain a predictable schedule for delivery.

## 2.2. Quality Management

### 2.2.1. Estimates of Defects to be detected

**Table 6.** *Pre-release review defects*

Process	Planned found by review	Actual found by review
<b>Requirement</b>	10	7
<b>Design</b>	20	22
<b>Coding</b>	50	42
<b>Other</b>	10	3
<b>Total</b>	<b>90</b>	<b>74</b>

### 2.2.2. Quality Control

**Table 7.** *Quality Control*

Review Item	Type of Review	Reviewer	When
Project Plan Project schedule CM Plan	Group review One-person review	Mentor Team members	End of the Initiation stage
Business analysis and requirements specification document, Use Case Catalog	Group review	All members	End of 90% of requirements
Design document, object model	Group review	All members	End of 90% design
Stage plans	One-person review	Mentor	Beginning of each stage

Review Item				Type of Review	Reviewer	When
Complex/first specs incl. diagrams	time test	generated cases,	program interactive	Group review	Mentor Team members	End of detailed design
Code				Group review	All members	After coding for first few programs

### 2.2.3. Measurements Program

**Table 8. Measurements Program**

Data to be collected	Purpose	Responsible	When
Size: No. of KLOC// FP	Early estimate project cost	PM/SM	At the end of the stages
Effort: No. person-day	Calculate project effort for scheduling	Team members	Daily
Quality: No. defects detected	Early evaluate product quality and the feasibility of the project	Reviewer, Tester	Right after the review/test
Schedule	Divide work and allocate resources properly, ensure the project is completed on time and on budget	PM/SM	Weekly and at the end of stages

## 2.3. Unit Testing Strategy

**Completion criteria:** Completion criteria are stated to for two purposes:

- Identify acceptance criteria for product quality.
- Identify when the testing is successfully executed

A clear statement of completion criteria should include the following items:

- Function, behavior, or condition being measured
- Method of measurement

Criteria or degree of conformance to measurement Special considerations:

This section should identify any influences or dependencies, which may impact or influence the test effort described in the test strategy. Influences might include:

Human resources (such as availability or need for non-test resources to support/participate in test) Constraints, (such as equipment limitations or availability, or the need/lack of special equipment) Special requirements, such as test scheduling or access to systems

Testing may be stopped when

- It becomes unproductive
- It requires a certain coverage
- It requires a certain number of errors to be found
- Schedule time runs out

## 2.4. Manual Testing Strategy

Manual testing is a software testing process in which test cases are executed manually without using any automated tool. All test cases executed by the tester manually according to the end user's perspective. It ensures whether the application is working, as mentioned in the requirement document or not. Test cases are planned and implemented to complete almost 100 percent of the software application. Test case reports are also generated manually.

Manual Testing is one of the most fundamental testing processes as it can find both visible and hidden defects of the software. The difference between expected output and output, given by the software, is defined as a defect. The developer fixed the defects and handed it to the tester for retesting.

Manual testing is mandatory for every newly developed software before automated testing. This testing requires great efforts and time, but it gives the surety of bug-free software. Manual Testing requires knowledge of manual testing techniques but not of any automated testing tool.

Manual testing is essential because one of the software testing fundamentals is "100% automation is not possible". The advantages of Manual Testing:

- It does not require programming knowledge while using the Black box method.
- It is used to test dynamically changing GUI designs.
- Tester interacts with software as a real user so that they are able to discover usability and user interface issues.
- It ensures that the software is a hundred percent bug-free.
- It is cost-effective.
- Easy to learn for new testers.

### 3. Estimation

#### 3.1. Size

**Table 9. Software Scale Drivers**

Software Scale Drivers	
Precedentedness	<i>Nominal</i>
Development Flexibility	<i>High</i>
Architecture / Risk Resolution	<i>Nominal</i>
Team Cohesion	<i>High</i>
Process Maturity	<i>Nominal</i>

**Table 10. Software Cost Drivers**

Software Cost Drivers			
Product		Personnel	
Required Software Reliability	<i>High</i>	Analyst Capability	<i>Nominal</i>
Data Base Size	<i>Nominal</i>	Programmer Capability	<i>High</i>
Product Complexity	<i>High</i>	Personnel Continuity	<i>Nominal</i>
Developed for Reusability	<i>High</i>	Application Experience	<i>Nominal</i>

Documentation Match to Lifecycle Needs	<i>Nominal</i>	Platform Experience	<i>Low</i>
		Language and Toolset Experience	<i>High</i>
<b>Project</b>		<b>Platform</b>	
Use of Software Tools	<i>Nominal</i>	Time Constraint	<i>High</i>
Development	<i>Nominal</i>	Storage Constraint	<i>Nominal</i>
Required Development Schedule	<i>Nominal</i>	Platform Volatility	<i>Nominal</i>

### Software Development (Elaboration and Construction)

Effort = 14.6 Person-months

Schedule = 2.92 Months

Cost = \$5118

Total Equivalent Size = 3000 SLOC

Effort Adjustment Factor (EAF) = 1.52

### Acquisition Phase Distribution

**Table 11. Acquisition Phase Distribution**

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	0.9	1.1	0.8	\$307
Elaboration	3.5	3.2	1.1	\$1229
Construction	11.1	5.3	2.1	\$3890
Transition	1.8	1.1	1.6	\$614

## Software Effort Distribution for RUP/MBASE (Person-Months)

**Table 12.** Software Effort Distribution for RUP/MBASE

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.1	0.4	1.1	0.2
Environment/CM	0.1	0.3	0.6	0.1
Requirements	0.3	0.6	0.9	0.1
Design	0.2	1.3	1.8	0.1
Implementation	0.1	0.5	3.8	0.3
Assessment	0.1	0.4	2.7	0.4
Deployment	0.0	0.1	0.3	0.5

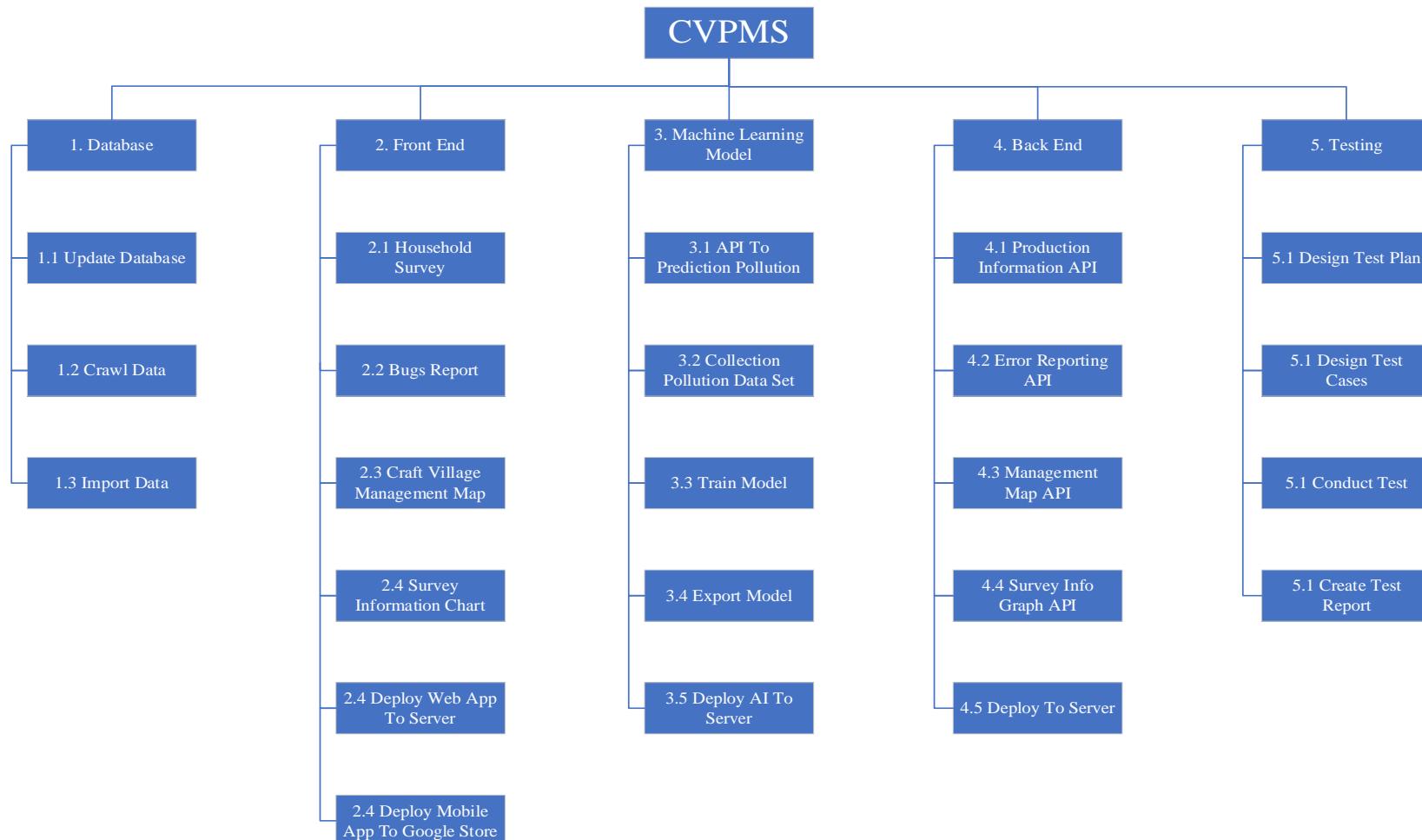
## 3.2. Estimated Effort

**Table 13.** The estimated effort

Activity/ Process	Total Budget Effort Usage (pd)	Total % Budget Effort Usage (%)	Sprint 1		Sprint 2		Sprint 3		Sprint 4		Sprint 5	
			No.	%	No.	%	No.	%	No.	%	No.	%
Requirement	55	12.6	25	23.8	7	6.8	7	8.1	12	15.2	4	6.5
Design	88	20.1	20	19	27	26.2	12	13.6	18	22.8	11	17.7
Coding	141	32.2	20	19	33	32	36	40.9	25	31.6	27	43.5
Unit Testing	18	4.1	3	2.9	4	3.9	5	5.7	3	3.8	3	4.8
Testing	35	8	6	5.7	8	7.8	8	9.1	7	8.9	6	9.7
Support for Acceptance Test	11	2.5	0	0	4	3.9	1	1.1	2	2.5	2	3.2
Project Planning	14	3.2	7	6.7	2	1.9	1	1.1	2	2.5	1	1.6
Project monitoring	22	5	6	5.7	4	3.9	4	4.5	4	5.1	4	6.5
Quality Assurance	22	5	3	2.9	5	4.9	6	6.8	4	5.1	4	6.5
Training	32	7.3	15	14.3	9	8.7	8	9.1	2	2.5	0	0
<b>Total</b>	<b>438</b>	<b>100</b>	<b>105</b>	<b>100</b>	<b>103</b>	<b>100</b>	<b>88</b>	<b>100</b>	<b>79</b>	<b>100</b>	<b>62</b>	<b>100</b>

### 3.3. Schedule

#### 3.3.1. Work Breakdown Structure



**Figure 2. Work Breakdown Structure**

### 3.3.2. Detailed Schedule

**Table 14. Detailed Schedule**

No.	Task Name	Start	Finish	Effort
<b>1</b>	<b>Initial</b>	<b>21/02/2023</b>	<b>25/08/2022</b>	<b>28 hrs</b>
1.1	Gathering Requirement Meeting			
1.2	Analyze Requirement			
<b>2</b>	<b>Create Document</b>	<b>26/02/2023</b>	<b>28/02/2023</b>	<b>18 hrs</b>
2.1	Create Project Plan			
2.2	Create User Stories			
2.3	Create Product Backlog			
<b>3</b>	<b>Development</b>	<b>01/03/2023</b>	<b>13/05/2023</b>	<b>2140 hrs</b>
<b>3.1</b>	<b>Sprint 1</b>	<b>01/03/2023</b>	<b>14/03/2023</b>	<b>428 hrs</b>
3.1.1	Sprint 1 Planning Meeting			
3.1.2	Create Sprint Backlog			
3.1.3	Create Test Plan document			
3.1.4	Update Database			
3.1.5	Change Oracle Database to MySQL Database			
3.1.6	Update Database Structure			
<b>3.1.7</b>	<b>Design user interface</b>			<b>80 hrs</b>
3.1.7.1	Design Household Survey			
3.1.7.2	Design Report Form for Web			
3.1.7.3	Design Report Form for App			
<b>3.1.8</b>	<b>Coding</b>			<b>120 hrs</b>

3.1.8.1	Code Household Survey Feature			
3.1.8.2	Code Report Form Feature			
<b>3.1.9</b>	<b>Testing &amp; Fix bug</b>			<b>120 hrs</b>
3.1.9.1	Design Test Case for Sprint 1			
3.1.9.2	Conduct test sprint 1			
3.1.9.3	Fix bug			
<b>3.1.10</b>	<b>Release Sprint 1</b>			
3.1.10.1	Sprint 1 Review Meeting			
3.1.10.2	Sprint 1 Retrospective			
<b>3.2</b>	<b>Sprint 2</b>	<b>15/03/2023</b>	<b>29/03/2023</b>	<b>428 hrs</b>
3.2.1	Sprint 2 Planning Meeting			
3.2.2	Create Sprint 2 Backlog			
3.2.3	Enhance Web UI			
3.2.4	Deploy Mobile Application To Google Play Store			
3.2.5	Deploy to Server			
3.2.6	Collect District Coordinate			
<b>3.2.7</b>	<b>Design user interface</b>			<b>80 hrs</b>
3.2.7.1	Design Dashboard Layout			
3.2.7.2	Re-design UI for Login, Register, Forget Password			
<b>3.2.8</b>	<b>Coding</b>			<b>120 hrs</b>
3.2.8.1	Code Dashboard Feature			
3.2.8.2	Implement Map			

3.2.8.2	Code Login, Register, Forget Password pages			
<b>3.2.9</b>	<b>Testing &amp; Fix Bug</b>			<b>120 hrs</b>
3.2.9.1	Design test case for Sprint 2			
3.2.9.2	Conduct test Sprint 2			
3.2.9.3	Fix Bug			
<b>3.2.10</b>	<b>Release Sprint 2</b>			
3.2.10.1	Sprint 2 Review Meeting			
3.2.10.2	Sprint 2 Retrospective			
<b>3.3</b>	<b>Sprint 3</b>	<b>30/03/2023</b>	<b>13/04/2023</b>	<b>428 hrs</b>
3.3.1	Sprint 3 Planning Meeting			
3.3.2	Create Sprint 3 Backlog			
3.3.3	Update New Version of Mobile Application to Store			
3.3.4	Research Method to develop AI (Combine Household Information With Image Results To Make Decision)			
3.3.5	Build Map Feature			
<b>3.3.6</b>	<b>Design user interface</b>			<b>80 hrs</b>
3.3.6.1	Design UX/UI Edit Village page			
<b>3.3.7</b>	<b>Coding</b>			<b>120 hrs</b>
3.3.7.1	Code Edit Village Feature			
3.3.7.2	Implement Map			
<b>3.3.8</b>	<b>Testing &amp; Fix Bug</b>			<b>120 hrs</b>
3.3.8.1	Design Test Case for Sprint 3			

3.3.8.2	Conduct test Sprint 3			
3.3.8.3	Fix Bug			
<b>3.3.9</b>	<b>Release Sprint 3</b>			
3.3.9.1	Sprint 3 Review Meeting			
3.3.9.2	Sprint 3 Retrospective			
<b>3.4</b>	<b>Sprint 4</b>	<b>14/04/2023</b>	<b>28/04/2023</b>	<b>428 hrs</b>
3.4.1	Sprint 4 Planning Meeting			
3.4.2	Create Sprint 4 Backlog			
3.4.3	Update Database			
3.4.5	Fake Training Data			
3.4.6	Process Training Data			
3.4.7	Change Workflow			
<b>3.4.7</b>	<b>Fake training data</b>			<b>80 hrs</b>
3.4.7.1	Generate Script			
3.4.7.2	Fake data			
3.4.7.3	Code API Export Data			
<b>3.4.8</b>	<b>Coding</b>			<b>120 hrs</b>
3.4.8.1	Update Detect Logic			
3.4.8.2	Code API Data Set			
<b>3.4.9</b>	<b>Testing &amp; Fix Bug</b>			<b>120 hrs</b>
3.4.9.1	Design Test Case for Sprint 4			
3.4.9.2	Conduct test Sprint 4			
3.4.9.3	Fix Bug			
<b>3.4.10</b>	<b>Release Sprint 4</b>			
3.4.10.1	Sprint 4 Review Meeting			

3.4.10.2	Sprint 4 Retrospective			
<b>3.5</b>	<b>Sprint 5</b>	<b>29/04/2023</b>	<b>13/04/2023</b>	<b>428 hrs</b>
3.5.1	Sprint 5 Planning Meeting			
3.5.2	Create Sprint 5 Backlog			
3.5.3	Auto Update/Enhance AI model			
3.5.4	Implement New Model			
3.5.5	Enhance Pollution Detection API			
3.5.6	Deploy New AI Version			
3.5.7	Update New Version of Mobile Application to Store			
<b>3.5.8</b>	<b>Design user interface</b>			<b>50 hrs</b>
3.5.8.1	Design Question Setting Page			
3.5.8.2	Design Notification Feature			
<b>3.5.9</b>	<b>Coding</b>			<b>120 hrs</b>
3.5.9.1	Code Question Setting Feature			
3.5.9.2	Code Notification Feature			
3.5.9.3	Code Update/Enhance AI model Feature			
<b>3.5.10</b>	<b>Testing &amp; Fix bug</b>			<b>120 hrs</b>
3.5.10.1	Design Test Case for machine learning Model			
3.5.10.2	Conduct test machine learning Model			
3.5.10.3	Design test case for Sprint 5			

3.5.10.4	Conduct test Sprint 5			
3.5.10.5	Fix Bug			
<b>3.5.11</b>	<b>Release Sprint 5</b>			
3.5.11.1	Sprint 5 Review Meeting			
3.5.11.2	Sprint 5 Retrospective			
<b>3.6</b>	<b>Review Project</b>	<b>15/05/2023</b>	<b>15/05/2023</b>	<b>2 hrs</b>

### 3.3.3. Project Schedule

**Table 15.** *Project Schedule*

No.	Activity	Start date	Responsible	Note
<b>Defect Prevention</b>				
	Sprint 1	01/03/2023	Team members	
	Sprint 2	15/03/2023	Team members	
	Sprint 3	30/03/2023	Team members	
	Sprint 4	14/04/2023	Team members	
	Sprint 5	29/04/2023	Team members	
<b>Quality Control</b>				
	Review: Work Product 1	14/03/2023	Mentor - Team members	
	Review: Work Product 2	29/03/2023	Mentor - Team members	
	Review: Work Product 3	13/04/2023	Mentor - Team members	
	Review: Work Product 4	28/04/2023	Mentor - Team members	
	Review: Work Product 5	13/05/2023	Mentor - Team members	

No.	Activity	Start date	Responsible	Note
<b>Project Tracking</b>				
	Project initiation meeting	21/02/2023	Team members	
	Sprint 1 Planning Meeting	01/03/2023	Team members	
	Sprint 1 Review Meeting	14/03/2023	Team members	
	Sprint 2 Planning Meeting	15/03/2023	Team members	
	Sprint 2 Review Meeting	29/03/2023	Team members	
	Sprint 3 Planning Meeting	30/03/2023	Team members	
	Sprint 3 Review Meeting	13/04/2023	Team members	
	Sprint 4 Planning Meeting	14/04/2023	Team members	
	Sprint 4 Review Meeting	28/04/2023	Team members	
	Sprint 5 Planning Meeting	29/04/2023	Team members	
	Sprint 5 Review Meeting	13/05/2023	Team members	
<b>QA</b>				
	Final Inspection: Deliverable 1	14/03/2023	Mentor - Team members	
	Final Inspection: Deliverable 2	29/03/2023	Mentor - Team members	
	Final Inspection: Deliverable 3	13/04/2023	Mentor - Team members	
	Final Inspection: Deliverable 4	28/04/2023	Mentor - Team members	

No.	Activity	Start date	Responsible	Note
	Final Inspection: Deliverable 5	13/05/2023	Mentor - Team members	
	Baseline audit: Startup	20/05/2023	Mentor - Team members	
	Baseline audit: Wrap-up	20/05/2023	Mentor - Team members	

### 3.4. Resource

Specified as in the section Project Team

### 3.5. Infrastructure

**Table 16. Infrastructure**

Work/Product	Purpose	Expected Availability by
<b>Development Environment</b>		
Flutter	Development framework	Construction stage
Spring Boot	Development framework	Construction stage
Oracle SQL	Database	Construction stage
Python	Development language	Construction stage
HTML/CSS/JavaScript	Development language for Web	Construction stage
Material UI	Supporting library for UI Web	Construction stage
Katalon	Testing	Construction stage

<b>Hardware &amp; Software</b>		
1GB space on server		Initiation stage
Browser		Construction stage
Emulator		Construction stage
<b>Other Tools</b>		
Github	Source version control	Initiation stage
Trello	Task management tool	Initiation stage

### 3.6. Training Plan

**Table 17. Training Plan**

Training Area	Participants	When, Duration	Waiver Criteria
Technical			
Flutter	Van Cong Le Ca	7 days	If already trained
Spring Boot	Hua Hoang Phuc	3 days	If already trained
Material UI	Nguyen Thanh Trung	5 days	If already trained
Python	Bui Duc Huy	7 days	If already trained
Spring Boot, AWS	Huynh Ba Nhan	7 days	If already trained
Process			
Task management	Van Cong Le Ca	8 hrs	If already trained
Human management	Van Cong Le Ca	8 hrs	If already trained
Defect prevention	Van Cong Le Ca	1 day	Mandatory

### 3.7. Budget for Project

**Table 18. Total Cost Estimate**

No	Criteria	Price	Amount	Total (USD)
1	Working hours	\$ 2	2188	\$ 4376

No	Criteria	Price	Amount	Total (USD)
2	Online server and services	\$ 100	5	\$ 500
3	Party	\$ 150	2	\$ 300
<b>Total cost</b>				<b>\$ 5176</b>

**Table 19.** Cost Description

Description	Amount	Unit
Number of members	5	Person
Number of working hours per weekdays	5	Hour
Number of working hours per two weekends	8	Hour
Number of working days per week	7	Day
The duration of the project	3	Month
The cost per member per week	82	USD
Party cost per time	10	USD
The number of working days	93	Day

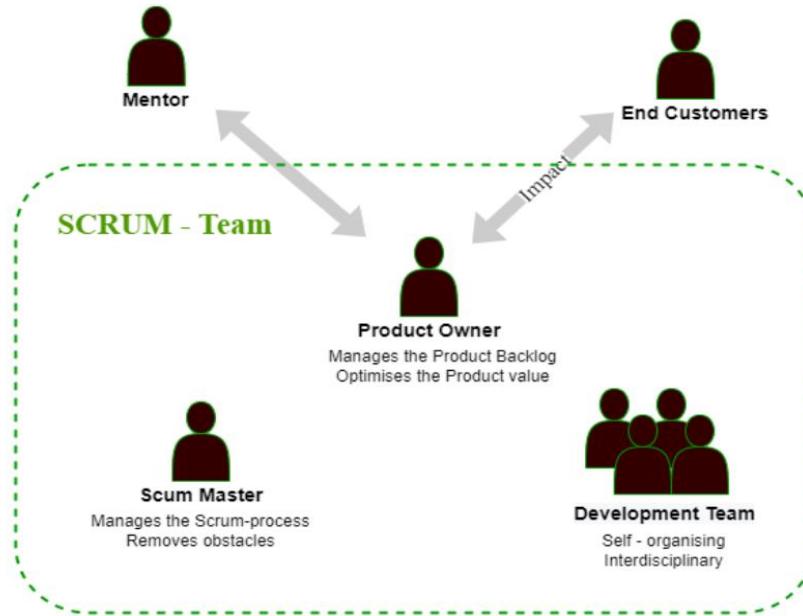
\*\* Explain: Amount of working hours = 5 members \* (5 hours \* 67 Days + 8 hours \* 26 days)

**Table 20.** Estimate Budget

Item	Total Budget	% Budget	Budget in Period					Note
			Sprint 1	Sprint 2	Sprint 3	Sprint 4	Sprint 5	
Purchases (COTS)	4376	84.5%	875.2	875.2	875.2	875.2	875.2	
Team Building	300	5.8%	150	0	0	0	150	
Tools	500	9.7%	100	100	100	100	100	
Travel Costs	0	0	0	0	0	0	0	
Training	0	0	0	0	0	0	0	
Review Activities	0	0	0	0	0	0	0	
Other	0	0	0	0	0	0	0	
<b>Total</b>	<b>5176</b>	<b>100%</b>	<b>1125.2</b>	<b>975.2</b>	<b>975.2</b>	<b>975.2</b>	<b>1125.2</b>	

## 4. Project Organization

### 4.1. Organization Structure



**Figure 3.** *Organization Structure*

### 4.2. Project Team

**Table 21.** *Project Team*

Role	Responsibility	Name
<b>Product Owner</b>	<ul style="list-style-type: none"> <li>- A spokesperson for the customer and needs to represent them</li> <li>- Gathers, manages, and prioritizes the product backlog.</li> <li>- Has technical product knowledge or specific domain expertise.</li> <li>- Tracks progress towards the release of a product.</li> </ul>	Mr. Nguyen Thanh Binh

Role	Responsibility	Name
<b>Scrum Master</b>	<ul style="list-style-type: none"> <li>- Communicate the value of Scrum</li> <li>- Teach the organization on Scrum to maximize business value</li> <li>- Attend all Scrum meetings</li> <li>- Preserve the integrity and spirit of the Scrum framework</li> <li>- Maintain the focus of the Team and facilitate efforts to resolve them</li> <li>- Serve as a coach and mentor to members of the Team</li> <li>- Respectfully hold the Team, Product Owner and Stakeholders accountable for their commitments</li> <li>- Continually work with the Team and business to find and implement improvements</li> <li>- As a timekeeper</li> <li>- Record team meeting</li> </ul> <p>Make the Team aware of impediments</p>	Van Cong Le Ca
<b>Developer</b>	<ul style="list-style-type: none"> <li>- Responsible for quality</li> <li>- Responsible for delivering the potentially shippable product of the Application each sprint</li> <li>- Report progress based on the remaining time</li> <li>- Self-organized</li> <li>- Owns the Sprint backlog</li> </ul>	All members

Role	Responsibility	Name
Tester	<ul style="list-style-type: none"> <li>- Do the Test plan</li> <li>- Creation of test designs, test processes, test cases and test data.</li> <li>- Carry out testing as per the defined procedures.</li> <li>- Graph the results and make sure people know when test results decline.</li> <li>- Prepare all reports related to software testing carried out.</li> <li>- Analysis and evaluate the Test result.</li> <li>- Ensure that all tested related work is carried out as per the defined standards and procedures.</li> </ul>	All Members
Mentor	<ul style="list-style-type: none"> <li>- Guide on the process.</li> <li>- Monitoring all activities of the Team.</li> <li>- Help with anything.</li> <li>- Reviews project documents</li> <li>- Reviews product</li> </ul>	Mr. Nguyen Thanh Binh

## 5. Communication & Reporting

**Table 22. Communication Methodology**

Audience/ Attendees	Topic/ Deliverable	Frequency	Method
<b>Mentor and Team member</b>	Project Progress Review	Weekly	Skype Meeting
<b>Team Member</b>	Project Progress Review and Daily Meeting	Daily	Remotely, Face to Face

## 6. Configuration Management

**Table 23.** Configuration Management

No	Tool	Content
1	Google Sheet	Track member activities. At the end of each day, team members will post on time log and scrum master will check.
2	Google Document	Track the changing of documents & manage versions of documents.
3	GitHub	Repositories for source code version management
4	Weekly Meeting	Hold a meeting every week to assign tasks to each member. If there are some emergencies but we cannot sit together then we can use Google Meet to discuss online.
5	Document	All meetings must be documented and pictured.
6	Google Drive	Store document resources and designed components
7	Google Meet	Discuss online, stream and share problems

## 7. Security Aspects

❖ **About copyright:**

Use images, logos, and information about the university to be allowed for use

❖ **About security:**

All documents, and software products must be authorized by team members before they can be obtained or referenced

❖ **About integrity:**

Software products run continuously 24 / except for external problems such as natural disasters, power outages ... and when upgrading the software

To meet the above criteria requires action:

**Copyright:** ask for the permission of the provider before using the resource

**About security:** Use 3rd party services of reputable providers and security notices for each team member

Integrity: software product data must be backed up continuously

## 8. References

**Table 24.** *Acronym*

Acronym	Definition	Note
CVPMS	Craft Village Pollution Monitoring System	
FDD	Feature-Driven Development	

### References:

- [WMS]Proposal
- What is Scrum: <https://www.scrum.org/resources/what-is-scrum>
- <https://www.javatpoint.com/manual-testing>



## Capstone Project 2

CMU-SE 451

### Product Backlog – User Story – Sprint Backlog

#### Craft Village Pollution Monitor System

Submitted by  
Ca, Van Cong Le  
Huy, Bui Duc  
Phuc, Hua Hoang  
Trung, Nguyen Thanh  
Nhan, Huynh Ba

Approved by  
Ph.D. Nguyen Thanh Binh

#### Proposal Review Panel Representative:

---

Name              Signature      Date

#### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyen Thanh Binh'.

---

Name              Signature      Date

## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
<b>Project Mentor</b>	Ph.D. Thanh Binh, Nguyen		
<b>Scrum master / Project Leader &amp; contact details</b>	Ca, Van Cong Le <i>Email:</i> <a href="mailto:cascabusiness@gmail.com">cascabusiness@gmail.com</a> <i>Tel:</i> 0352707895		
<b>Partner Organization</b>			
<b>Project Web URL</b>	<a href="https://github.com/Casca113s2/craft-village-pollution-monitor-system">https://github.com/Casca113s2/craft-village-pollution-monitor-system</a>		
<b>Team members</b>	<b>Name</b>	<b>Email</b>	<b>Tel</b>
25211207666	Ca, Van Cong Le	<a href="mailto:cascabusiness@gmail.com">cascabusiness@gmail.com</a>	0352707895
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25211204084	Phuc, Hua Hoang	<a href="mailto:phuchuho0402@gmail.com">phuchuho0402@gmail.com</a>	0905639682
25211215133	Trung, Nguyen Thanh	<a href="mailto:nguyenttrung2601@gmail.com">nguyenttrung2601@gmail.com</a>	0774496838
25211203702	Nhan, Huynh Ba	<a href="mailto:nhanhuynh1409@gmail.com">nhanhuynh1409@gmail.com</a>	0935430785

**Approve Document:** Sign in to approve the document

<b>Mentor</b>	Binh, Nguyen Thanh	Date	13/05/2023
		Sign	
<b>Scrum Master</b>	Ca, Van Cong Le	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Huy, Bui Duc	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Phuc, Hua Hoang	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Trung, Nguyen Thanh	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Nhan, Huynh Ba	Date	13/05/2023
		Sign	

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# 1. Product Backlog

**Table 1. Product Backlog**

<b>Id</b>	<b>Heading</b>	<b>As a ...</b>	<b>I want to ...</b>	<b>so that ...</b>	<b>Acceptance Criteria</b>	<b>Remarks</b>	<b>Priority</b>	<b>Sprint No</b>	<b>Estimate (Hours)</b>	<b>Status</b>	<b>Remarks</b>
PB01	Report Feature	Local Authority Household	Fill report form	I can inform problem to development team	- Allow user to report error to the development team		3	2	30	Done	
PB02	Household Survey Feature	Household	Fill my production situation form	Local authority can manage my production situation	- Allow user to provide craft village production information		3	1, 2, 5	100	Done	
PB03	Dashboard Feature	Local Authority	View villages production situation and personal user surveys	I can manage pollution situation	- Allow user to view craft village status and submitted survey		2	2	20	Done	
PB04	Pollution Prediction AI	Household Authority	Have an AI with the ability to predict the pollution types of a craft village from production information automatically and accurately	when combine with submitted pollution information we will know with craft village that have the conflict information about the production information	- Allow user to submit production information and the AI will give the prediction about the types of pollution that the craft village will be facing		3	3, 4	400	Done	
PB05	Edit Village Feature	Local Authority	Change village information	I can correct and update village			3	3	30	Done	
PB06	Fake Training Data	Admin	Generate new model using household data	System can detect pollution more correctly			3	4	200	Done	

<b>Id</b>	<b>Heading</b>	<b>As a ...</b>	<b>I want to ...</b>	<b>so that ...</b>	<b>Acceptance Criteria</b>	<b>Remarks</b>	<b>Priority</b>	<b>Sprint No</b>	<b>Estimate (Hours)</b>	<b>Status</b>	<b>Remarks</b>
PB07	Auto Update Village State	Admin	System updates village state	I can check conflicting data			3	5	30	Done	
PB08	Download Data Set	Admin	Download village data set	I can build enhanced model in future			3	5	30	Done	
PB09	Notification Feature	Local Authority	Know if data is conflicting	I can check what problem occurs			3	5	30	Done	
PB10	Register	Household	Create an account	I can login with my own account to access the mobile application/web application	- Username must not contain spaces and not be accented - Password must be >= 6 characters		3	1	30	Done	
PB11	Authenticate	Household Authority Admin	Login/Logout to web application	I can start to provide the information about the craft village/view craft village's status	- Login with registered account		3	1	100	Done	
PB12	Password Recovery	Household	Recover password when forgot	I can change my password into the new one and get my account back	- Use the code that sent to the account's email which is registered in the profile to change the new password		2	1	20	Done	
PB13	Create Local Authority Account	Admin	Create an local authority account	I can provide the account to the local authority user	- Allow the admin to create the a local authority account		2	2	30	Done	

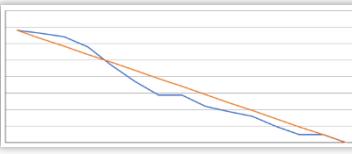
<b>Id</b>	<b>Heading</b>	<b>As a ...</b>	<b>I want to ...</b>	<b>so that ...</b>	<b>Acceptance Criteria</b>	<b>Remarks</b>	<b>Priority</b>	<b>Sprint No</b>	<b>Estimate (Hours)</b>	<b>Status</b>	<b>Remarks</b>
				to manage their local craft village	- Login with registered account						
PB14	Improve Pollution Detection AI	Personal User	Have an AI with the ability to detect the pollution types from an image automatically and accurately	The application can detect pollution types automatically with a quick and accurate response	- Allow user to submit pollution photo and the AI will detect pollution types then sent back to the application		3	1, 2	200	Done	
PB15	Pollution Filter	Local Authority	Have an Pollution Filter to sort out the pollution that I need	I can see specific pollution that I need to see	- Allow user to filter out the types of pollution that they want to see		2	5	30	Done	
PB16	Publish Application	Personal User	Have the application on Google Store	People can download and use it	- Application publish to store		3	1, 2, 5	30	Done	
PB17	Change Language	Personal User	Change the language of the mobile	The application language change from Vietnamese to English and vice versa	- Allow users to change the language of the application from Vietnamese to English and vice versa		1	1, 2	20	Done	
PB18	Deploy Web Application to Online Server	Household Authority Admin	Use the web application on a real server	I can access the web application and its functions anywhere	- Allow users to access the web application through ip or domain name (online server)		3	1, 3, 4, 5	30	Done	

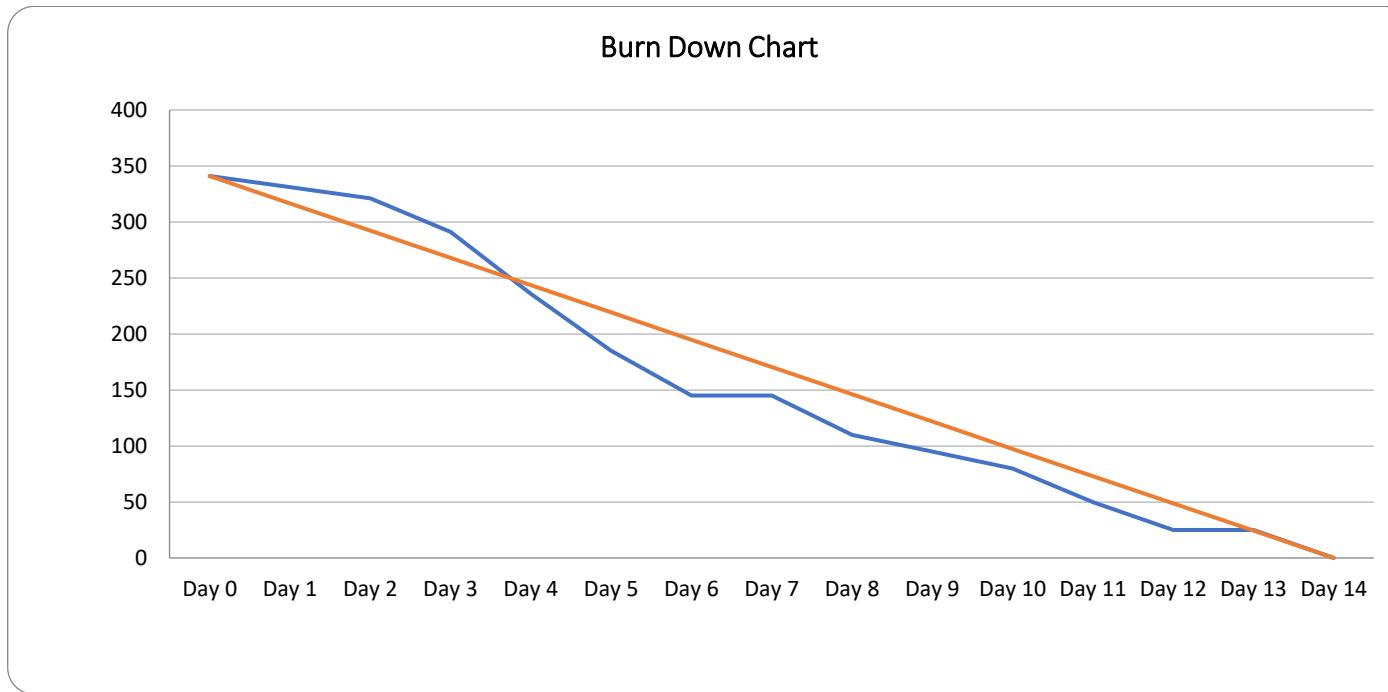
<b>Id</b>	<b>Heading</b>	<b>As a ...</b>	<b>I want to ...</b>	<b>so that ...</b>	<b>Acceptance Criteria</b>	<b>Remarks</b>	<b>Priority</b>	<b>Sprint No</b>	<b>Estimate (Hours)</b>	<b>Status</b>	<b>Remarks</b>
PB19	Change Password	Household Authority Admin	Change my old password into a new password	Next time I can login using my new password and protect my account in case of password leak	- Allow user to click "Thay đổi mật khẩu" and change their current password to a new password		3	1	30	Done	
PB20	GPS Tags to Image	Personal User	Attach GPS tags to image	The image can contain the GPS location of pollutions	- Attach GPS tags to image		3	2, 3, 4	30	Done	
PB21	Authorize	Personal User Household Authority Admin	Login/Logout according to the role that has been registered	I can perform the task correctly according to the role	- Login with registered account and perform task according to the registered role		3	2	100	Done	
PB22	Accept/Decline/Add New Village	Local Authority	Accept/Decline a new village that has been submitted by a personal user	I can protect the integrity of the craft village data from fault information	- Allow user to accept or decline the new village that submitted by a personal user and that village belongs to their management		3	2	20	Done	

## 2. Sprint Backlog

### 2.1. Sprint 1

**Table 2. Sprint 1**

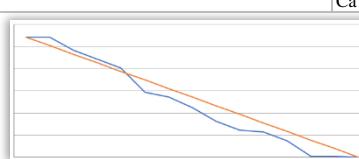
Sprint Id	Backlog Id	Description	Owner	Status	Estimate (Hours)	Completed	Pending	Total effort	Effort vs. Estimate	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14		
1.1	PB10	[FE] Design Web layout	Phuc	Done	25	25	0	20	-5				25												
1.2	PB10	[FE] Design UX/UI Login Page For Web Application	Trung	Done	15	15	0	15	0			15													
1.3	PB10	[FE] Design UX/UI Home Page For Web Application	Trung	Done	15	15	0	15	0						15										
1.4	PB10	[FE] Code UX/UI Login Page For Web Application	Nhan	Done	10	10	0	10	0		10														
1.5	PB10	[FE] Code UX/UI Home Page For Web Application	Nhan	Done	10	10	0	7	-3		10														
1.6	PB11	[FE] Code Login Function For Web Application	Phuc	Done	8	8	0	5	-3					8											
1.7	PB11	[FE] Code Logout Function For Web Application	Phuc	Done	3	3	0	2	-1					3											
1.8	PB10	[FE] Design UX/UI Register Page For Web Application	Trung	Done	15	15	0	13	-2				15												
1.9	PB10	[FE] Code UX/UI Register Page For Web Application	Nhan	Done	15	15	0	10	-5			15													
1.10	PB10	[FE] Code Register Function For Web Application	Phuc	Done	25	25	0	15	-10					25											
1.11	PB14	[AI] Research Method To Improve AI	Huy	Done	30	30	0	30	0				30												
1.12	PB14	[AI] Crawl Data For Improve AI	Huy	Done	30	30	0	30	0													30			
1.13	PB17	[FE] Code Change Language For Mobile Application	Ca	Done	25	25	0	30	5				25												
1.14	PB16	[FE] Research Method To Publish Application	Ca	Done	25	25	0	15	-10						25										
1.15	PB16	[FE] Config Application For Publish Application	Ca	Done	15	15	0	10	-5												15				
1.16	PB16	[FE] Publish Application To Google Play	Ca	Done	10	10	0	8	-2													10			
1.17	PB02	[BE + DB] Create Question, Question Answer, Household Survey Entity	Phuc	Done	10	10	0	8	-2								10								
1.18	PB19	[FE] Code & Design UX/UI Change Password For Web Application	Trung	Done	15	15	0	12	-3												15				
1.19	PB20	[FE] Code & Design UX/UI Forget Password For Web Application	Phuc	Done	15	15	0	9	-6													15			
1.20	PB18	[BD] Change Oracle Database to MySQL Database	Nhan	Done	25	25	0	27	2															25	
																									
		<b>Total</b>	341	341	0	291		-50		10	10	30	55	51	40	0	35	15	15	30	25	0	25		
		<b>Burn down</b>								331	321	291	236	185	145	145	110	95	80	50	25	25	0		
		<b>Ideal Burn down</b>								317	292	268	244	219	195	171	146	122	97	73	49	24	0		

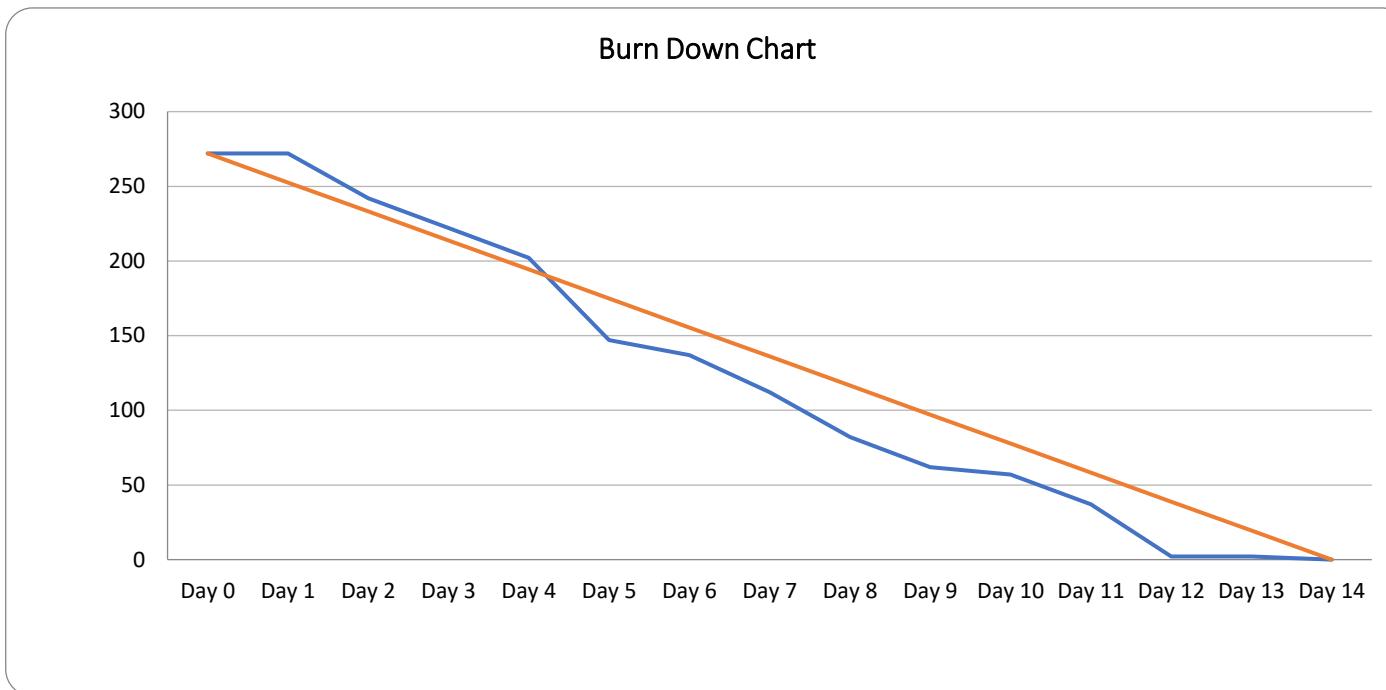


**Figure 1.** Sprint 1 Burn Down Chart

## 2.2. Sprint 2

**Table 3. Sprint 2**

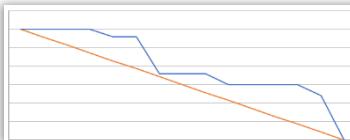
Sprint Id	Backlog Id	Description	Owner	Status	Estimate (Hours)	Completed	Pending	Total effort	Effort vs. Estimate	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	
2.1	PB03	[FE] Code & Design UX/UI Add New Local Authority For Web Application(Admin page)	Trung	Done	15	15	0	10	-5	15														
2.2	PB21	[FE] Design Web layout (Household, Local Authority, Admin)	Phuc	Done	20	20	0	18	-2		20													
2.3	PB01	[FE] Design UX/UI Report Form For Web Application	Phuc	Done	10	10	0	8	-2			10												
2.4	PB01	[FE] Code Report API	Phuc	Done	15	15	0	12	-3				15											
2.5	PB01	[FE] Code Report Logic For Web Application	Nhan	Done	15	15	0	17	2		15													
2.6	PB02	[BE] Code Question Api	Phuc	Done	20	20	0	22	2								20							
2.7	PB02	[BE] Code Question Answer Api	Phuc	Done	10	10	0	12	2									10						
2.8	PB02	[FE] Design Household Survey	Nhan	Done	5	5	0	4	-1			5												
2.9	PB02	[FE] Code Declare Household Survey	Nhan	Done	10	10	0	15	5				10											
2.10	PB22	[FE] Design UX/UI Accept/Decline New Village Page For Web Application	Trung	Done	5	5	0	6	1		10													
2.11	PB22	[FE] Code UX/UI Accept/Decline New Village Page For Web Application	Phuc	Done	10	10	0	8	-2									5						
2.12	PB03	[FE] Design UX/UI Dashboard Page For Web Application	Nhan	Done	5	5	0	6	1				5											
2.13	PB03	[FE] Code UX/UI Dashboard Page For Web Application	Nhan	Done	10	10	0	7	-3									10						
2.14	PB03	[FE] Design UX/UI Declare Page For Web Application (Household)	Trung	Done	5	5	0	6	1			5												
2.15	PB03	[FE] Code UX/UI Declare Page For Web Application (Household)	Phuc	Done	10	10	0	11	1												10			
2.16	PB14	[AI] Retrain AI Model	Huy	Done	30	30	0	35	5				30											
2.17	PB14	[AI] Research Deploy Model To Server	Huy	Done	20	20	0	17	-3											20				
2.18	PB14	[AI] Deploy Model To Server	Huy	Done	5	5	0	3	-2											5				
2.19	PB17	[FE] Update Change Language Function	Ca	Done	30	30	0	24	-6				30											
2.20	PB20	[FE] Update Craft Page	Ca	Done	20	20	0	15	-5											20				
2.21	PB16	[FE] Deploy New Version To Store	Ca	Done	2	2	0	3	1													2		
																								
<b>Total</b>		272	272	0	259	-13	0	30	20	20	55	10	25	30	20	5	20	35	0	2				
<b>Burn down</b>											272	242	222	202	147	137	112	82	62	57	37	2	2	0
<b>Ideal Burn down</b>											253	233	214	194	175	155	136	117	97	78	58	39	19	0

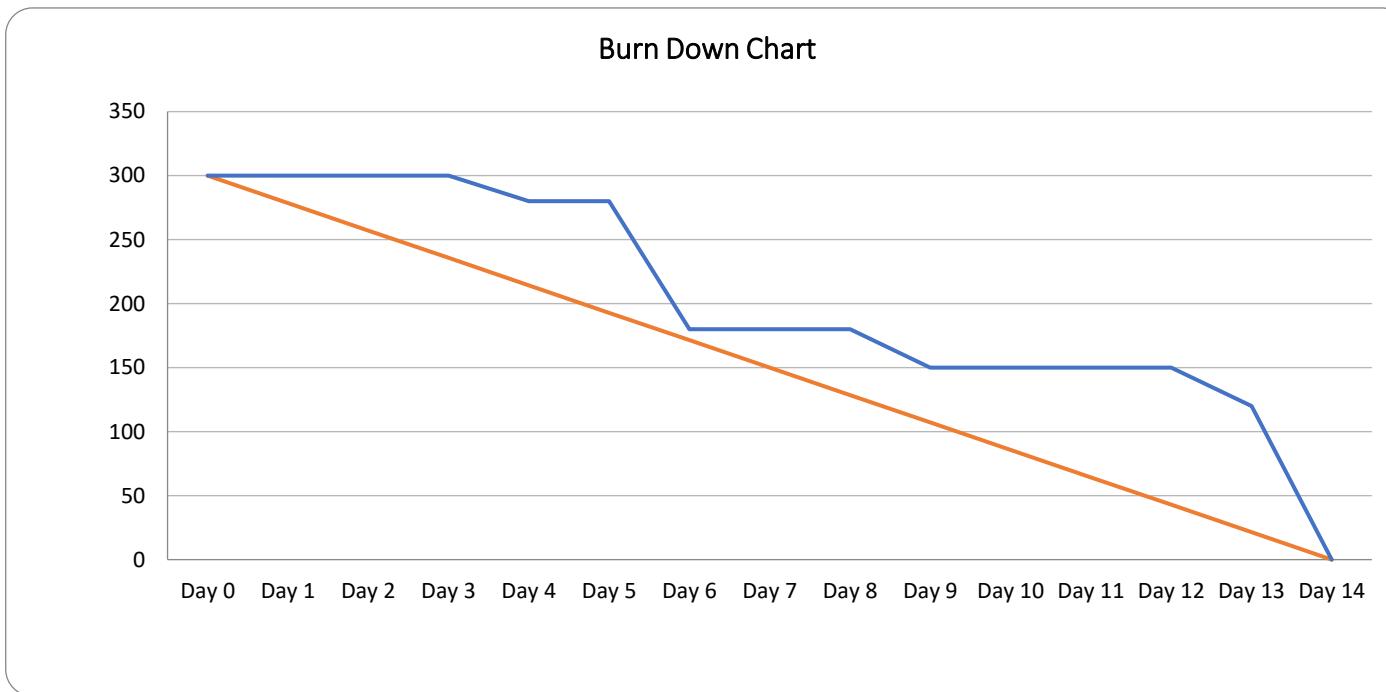


**Figure 2.** Sprint 2 Burn Down Chart

## 2.3. Sprint 3

**Table 4. Sprint 3**

Sprint Id	Backlog Id	Description	Owner	Status	Estimate (Hours)	Completed	Pending	Total effort	Effort vs. Estimate	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14		
3.1	PB05	[FE] Design Edit Village Page	Phuc	Done	20	20	0	18	-2				20												
3.2	PB05	[FE] Implement Map	Nhan	Done	30	30	0	40	10									30							
3.3	PB05	[FE] Code Edit Village Feature	Phuc	Done	20	20	0	25	5						20										
3.4	PB05	[BE] Code Update Village API	Phuc	Done	20	20	0	15	-5					20											
3.5	PB04	[AI] Research Prediction AI	Huy	Done	30	30	0	35	5						30									30	
3.6	PB04	[AI] Research API For Prediction AI	Huy	Done	30	30	0	32	2															30	
3.7	PB04	[AI] Create Data For Prediction AI	Trung	Done	60	60	0	70	10															60	
3.8	PB20	[FE] Research Image Standard And Tags	Ca	Done	30	30	0	32	2					30											
3.9	PB20	[FE] Attach GPS Tags For Image	Ca	Done	30	30	0	25	-5													30			
3.10	PB18	[BE] Deploy Backend To Server	Nhan	Done	30	30	0	35	5															30	
																									
<b>Total</b>		300	300	0	327	27	0	0	0	20	0	100	0	0	30	0	0	0	30	120					
<b>Burn down</b>												300	300	300	280	280	180	180	180	150	150	150	150	120	0
<b>Ideal Burn down</b>												279	257	236	214	193	171	150	129	107	86	64	43	21	0

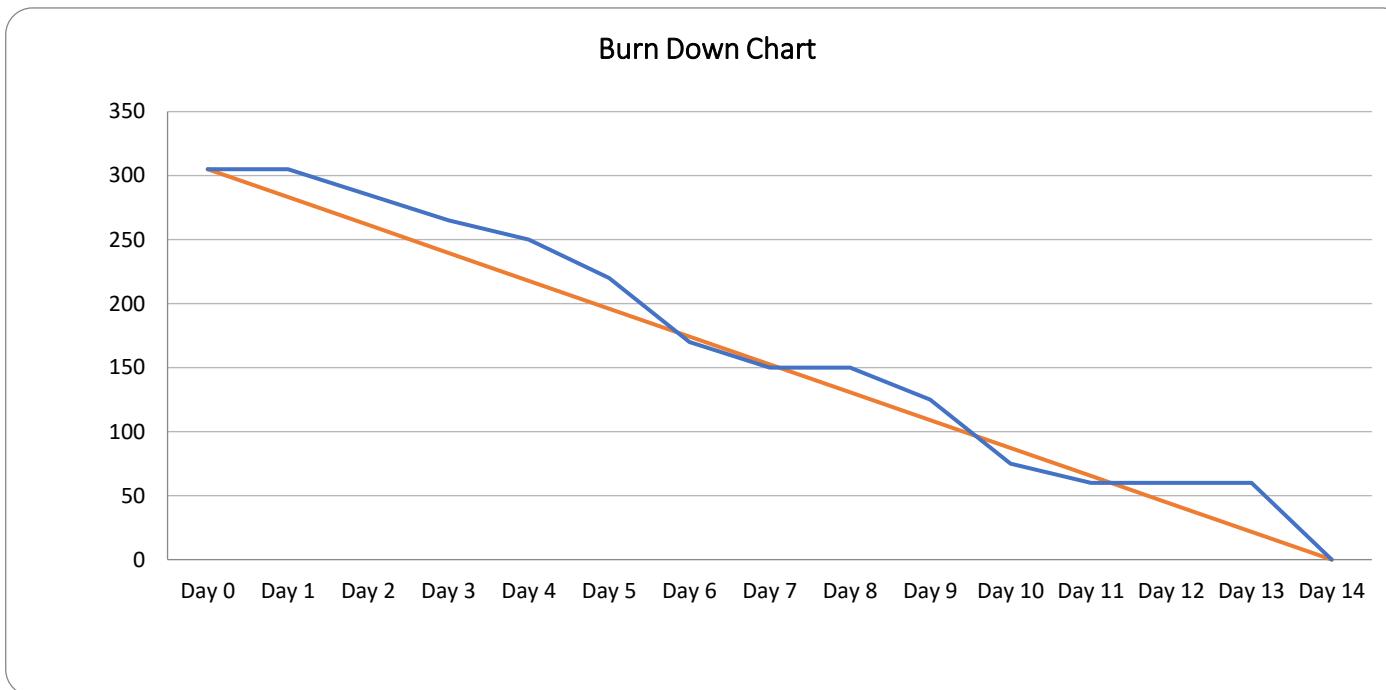


**Figure 3. Sprint 3 Burn Down Chart**

## 2.4. Sprint 4

**Table 5. Sprint 4**

Sprint Id	Backlog Id	Description	Owner	Status	Estimate (Hours)	Completed	Pending	Total effort	Effort vs. Estimate	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
4.1	PB06	[BE + DB] Code DataSet Entity	Phuc	Done	20	20	0	15	-5			20											
4.2	PB04	[AI] Create Data For Prediction AI	Trung	Done	60	60	0	80	20														60
4.3	PB06	[BE] Code DataSet API	Phuc	Done	20	20	0	16	-4								20						
4.4	PB06	[DB] Generate Store Procedure Update DataSet	Phuc	Done	30	30	0	25	-5													30	
4.5	PB06	[AI] Process Data For AI Trainning	Nhan	Done	20	20	0	23	3		20												
4.6	PB14	[AI] Train Prediction AI Model	Huy	Done	30	30	0	30	0							30							
4.7	PB14	[AI] Write API For Prediction AI	Huy	Done	25	25	0	20	-5									25					
4.8	PB14	[AI] Deploy Model To Server	Huy	Done	5	5	0	3	-2													5	
4.9	PB05	[BE] Layout Survey Marker on Map	Nhan	Done	15	15	0	13	-2			15											
4.10	PB20	[FE] Attach GPS Tags For Image Using EXIF Standard	Ca	Done	30	30	0	32	2							30							
4.11	PB20	[FE] Update Craft Page	Ca	Done	15	15	0	12	-3													15	
4.12	PB05	[FE] View Summited Survey	Nhan	Done	20	20	0	15	-5								20						
4.13	PB18	[BE] Deploy New Backend Version To Server	Nhan	Done	15	15	0	12	-3														15
<b>Total</b>		305	305	0	296		-9			0	20	20	15	30	50	20	0	25	50	15	0	0	60
<b>Burn down</b>										305	285	265	250	220	170	150	150	125	75	60	60	60	0
<b>Ideal Burn down</b>										283	261	240	218	196	174	153	131	109	87	65	44	22	0

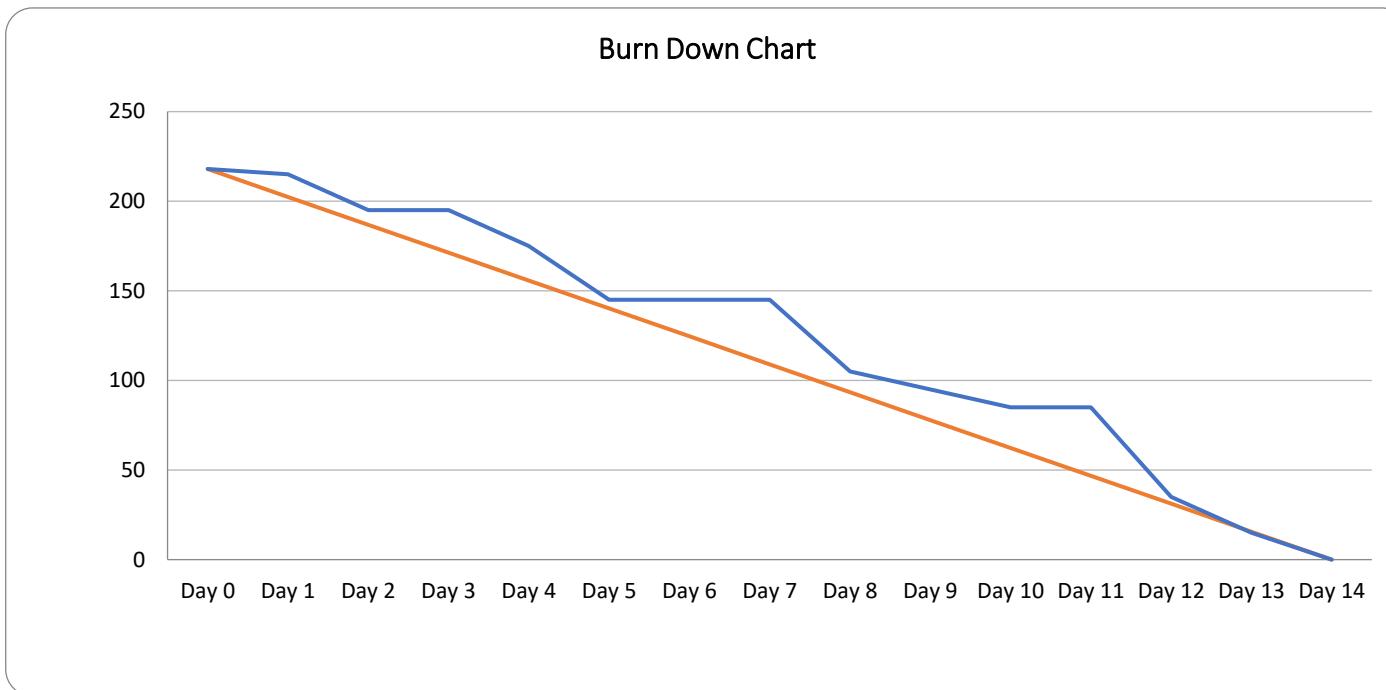


**Figure 4. Sprint 4 Burn Down Chart**

## 2.5. Sprint 5

**Table 6. Sprint 5**

Sprint Id	Backlog Id	Description	Owner	Status	Estimate (Hours)	Completed	Pending	Total effort	Effort vs. Estimate	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	
5.1	PB07	[AI] Generate Training Data From Json	Huy	Done	30	30	0	30	0					30										
5.2	PB07	[AI] Implement New Model	Huy	Done	30	30	0	30	0												30			
5.3	PB07	[FE] Code Update Required Question Feature	Nhan	Done	20	20	0	25	5				20											
5.4	PB08	[BE] Code Get Data Set API	Phuc	Done	20	20	0	15	-5	20														
5.5	PB08	[BE] Code Call Predict API With Data Set	Phuc	Done	20	20	0	12	-8					20										
5.6	PB02	[BE] Refactor Question and Question Answer and Household Survey	Phuc	Done	10	10	0	15	5												10			
5.7	PB08	[FE] Code Download Data Set Feature For Web Application	Nhan	Done	20	20	0	18	-2				20											
5.8	PB09	[BE] Code Notification API	Phuc	Done	10	10	0	12	2											10				
5.9	PB09	[FE] Code Notification Feature	Nhan	Done	20	20	0	25	5												20			
5.10	PB18	[AI] Deploy Model To Server	Huy	Done	5	5	0	6	1												5			
5.11	PB18	[BE] Deploy Backend To Server	Nhan	Done	15	15	0	10	-5													15		
5.12	PB16	[FE] Code Filter For Pollution Types	Phuc	Done	15	15	0	12	-3													15		
5.13	PB15	[FE] Deploy New Version To Store	Ca	Done	3	3	0	2	-1	3														
<b>Total</b>		218			218	0		212		-6	3	20	0	20	30	0	0	40	10	10	0	50	20	15
<b>Burn down</b>											215	195	195	175	145	145	145	105	95	85	85	35	15	0
<b>Ideal Burn down</b>											202	187	171	156	140	125	109	93	78	62	47	31	16	0



**Figure 5. Sprint 5 Burn Down Chart**

### 3. Impediments

**Table 7. Impediments**

<b>Id</b>	<b>Description</b>	<b>Raised By</b>	<b>Raised On</b>	<b>Owner</b>	<b>Status</b>	<b>Resolution</b>	<b>Resolved On</b>
1	Don't have Android phone to test application	Ca	01/Mar/23	Ca	Done	Buy a phone from the shop	03/Mar/23
2	Computer broke and I need three days for repair	Trung	09/Mar/23	Trung	Done	Bring the computer to the repair shop	11/Mar/23
3	I still haven't got the database software to work with	Trung	03/Sep/22	Phuc	Done	Use a remote software to help install the database software	03/Sep/22
4	I can't contact the group members immediately when I need to ask about problems in the project	Phuc	01/Apr/23	Ca	Done	Set up a meeting with the team and agree that we will have a daily meeting	01/Apr/23
5	I can't keep up with the daily meeting because I still have to go to school and the internship	Huy	01/Apr/23	Ca	Done	Set up a meeting with the team and agree that we will have a meeting every two or three days and the schedule will be set up in advance	03/Apr/23
6	I struggling to understand how to use the workflow and would like someone to help me out	Ca	18/Apr/23	Phuc	Done	The owner will set up a meeting with the member for support	19/Apr/23
7	I don't have an Android phone to test the mobile application	Nhan	01/May/23	Ca	Done	Lend him the Android phone	03/May/23
8	AWS server shutdown for no reason	Ca	04/Mar/23	Nhan	Done	Rent VPS server	06/Mar/23

## 4. Retrospective

**Table 8. Retrospective**

Sprint #	Sprint #	Owner	Start Doing (Improvement)	Continue Doing (What Went Well)	Stop Doing (Even better if)	Remarks
1	2	Huy			Let daily meeting become discussions. Keep them short.	
1	2	Ca			Having conversations via email and not in the task.	
1	2	Phuc		Attend meeting on time.		
2	3	Huy	We completed the user stories we set out to do.			
2	3	Ca			We didn't finish all the user stories.	
2	3	Trung	We should start doing individual code reviews as we go.			
2	3	Phuc		We should increase the amount we communicate as a team.		
3	4	Ca	We were able to demo a working product to the mentor.			
3	4	Phuc		We should continue having regular demos with the mentor.		

Sprint #	Sprint #	Owner	Start Doing (Improvement)	Continue Doing (What Went Well)	Stop Doing (Even better if)	Remarks
3	4	Trung	Collect mentor feedback on new features.			
3	4	Huy	Going through the entire Bug log.			
3	4	Trung		We should continue working as a team.		
3	4	Phuc	Review stories with mentor before implementation.			
4	5	Trung		Great teamwork.		



# Capstone Project 2

CMU-SE 451

**Architecture Document**  
**Version 2.4**  
**Date: 13/05/2023**

## Craft Village Pollution Monitor System

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**Ph.D. Nguyen Thanh Binh**

### Proposal Review Panel Representative:

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Name      Signature      Date

### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyễn Thành Bình'.

---

Name      Signature      Date

## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
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<b>Author(s)</b>	Bui Duc Huy		
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1.0	21/08/2022	Initial Release	Bui Duc Huy	
1.1	17/10/2022	Update C&C, Module View diagrams	Bui Duc Huy	
2.0	14/03/2023	Update Activity, Module View diagrams	Hua Hoang Phuc	
2.1	29/03/2023	Update Activity, Context Diagram	Hua Hoang Phuc	
2.2	13/04/2023	Update Activity, Module View diagrams,	Hua Hoang Phuc	
2.3	28/04/2023	Overview, Prediction AI	Bui Duc Huy Van Cong Le Ca	
2.4	13/05/2023	Allocation View, Prediction AI	Huynh Ba Nhan Bui Duc Huy	

**Approve Document:** Sign in to approve the document

<b>Mentor</b>	Binh, Nguyen Thanh	Date	13/05/2023
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<b>Scrum Master</b>	Ca, Van Cong Le	Date	13/05/2023
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<b>Scrum Member</b>	Phuc, Hua Hoang	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Trung, Nguyen Thanh	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Nhan, Huynh Ba	Date	13/05/2023
		Sign	

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# 1. Introduction

## 1.1. Purpose

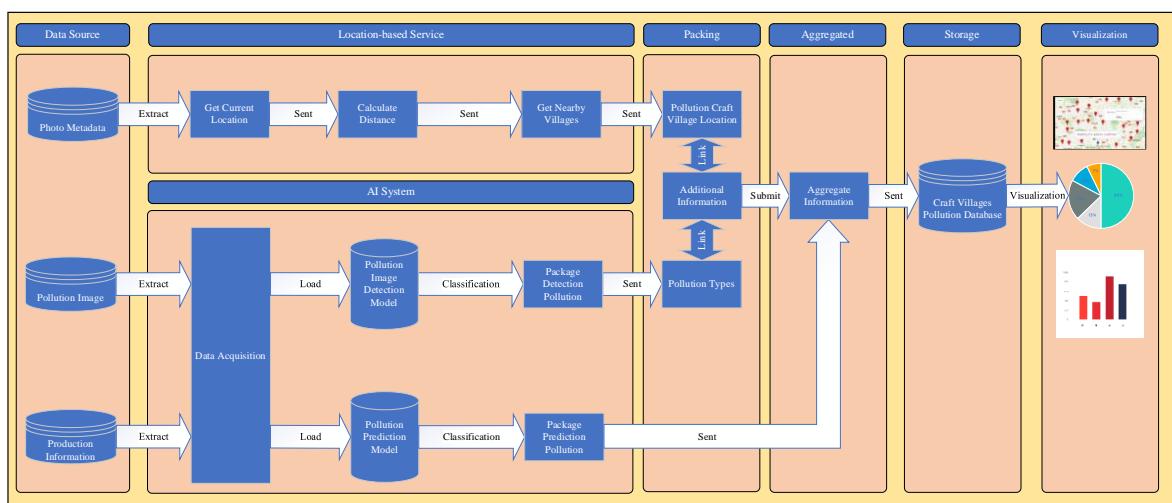
This document will cover the following information:

- Brief description of the project (project overview, business goals, general constraints about technical and business problems).
- Architectural drivers (functional requirements, quality attributes and constraints).
- Architectural design (C&C View type, Module View type, Allocation View type).

## 1.2. Business needs

- Desiring to help people have more awareness of pollution from craft villages, a system that will allow people to submit data of craft village and keep track its pollution status.
- A system that will provide the user the abilities such as take a survey, include the image of the pollution, view survey history, etc.
- An AI system will also provide the application to analyze the pollution based on the user's provided image.
- An AI takes the production information and then give the prediction of pollution types that the craft village will facing.
- The system should also give the administrator the ability to manage their user and data.

## 1.3. Proposed solution



**Figure 1. Craft Village Pollution Monitor System**

Our team will wrap around the above problems and help everyone monitor and resolve the pollution problems from their craft village area more effectively. Some aspects that will make our system that the people will find much more effective:

- ❖ Our system will help everyone to monitor your local craft village despite where your location. This means whether you stay in a big city or a small village at the top of the mountain our system will still function.
- ❖ Our system will provide a function that lets people make an instant report to the local environment department.
- ❖ Our system will detect all kinds of pollution instead of focusing on some specific kinds. This will help to collect a variety of data that could help people to a bigger picture about their pollution levels in the area.
- ❖ Our system will have an AI that will take images from people then analyzes the image to know what kind of pollution the user is facing and the result will be automatically filled into the form which will be sent directly to the local environment department to resolve the problem. This is so easy to use that even an elementary school child can do and it also reduces a massive amount of the cumbersome and bureaucratic process that people have to go through.
- ❖ Our system will have an AI that will take the production information and then give the prediction of pollution types that the craft village will facing. By combining the pollution from the image and the prediction then the result will be more accurate.
- ❖ Our system is also integrated with location-based technology to detect the location of the pollution and layout the data on the map for the user to monitor.

## 1.4. Business drivers

Based on the business needs and business solution our team decides to make a Craft Village Pollution Monitor System.

## 1.5. Project goal

The goal of the project is to build a Craft Village Pollution Monitor System (CVPMS) within the budget of \$3000 and deliver on time by the end of May of 2023.

## 2. Architectural drivers

### 2.1. Functional requirements

**Table 1.** *Functional requirements*

ID	Function	Description
FE01	Login	Use username/password to login into the system, can use the function of the system.
FE02	Register	Use to register a new account
FE03	Forgot Password	Use to recover password
FE04	Change Password	Use to change current password to new password
FE05	Send Mail	Use to sent verify code or new password to registered email
FE06	Edit User's Information	Use to change registered information
FE07	Change Language	Use to change application language from English to Vietnamese and vice versa
FE08	Take Pollution Photo	Use to take pollution photo
FE09	Detect Location	Use to detection location of user automatically
FE10	Auto Fill Information	Use to autofill necessary information after application detect pollution types from image and get location
FE11	Add New Village	Use to add new village to database
FE12	Detection Pollution Types	Use to auto detect pollution types from image
FE13	Add Additional Information	Use to add additional information for the survey
FE14	Submit Survey	Use to sent survey to database

FE15	View Finished Survey	Use to load the finished survey for user to review
FE16	View In Progress Survey	Use to load the in progress survey for user to review
FE17	Accept/Decline New Village	Use to give an accept/decline a new village
FE18	Create Local Authority Account	Use to create a new local authority account
FE19	Display Dashboard	Use to load necessary according to user role

## 2.2. Business constraints

- ❖ Project begins from Mar 1st, 2023 to May 15th, 2023. After delivery, the team will rectify defects in the deliverable (no additional functionalities or features).
- ❖ Resource availability is defined below: 01/03 – 15/05 with 5 members.
- ❖ Product follows Mentor's requirement.

## 2.3. Technical constraints

### ❖ Technical to develop

- Language: Java (Spring Boot), Dart (Flutter), Python (Flask, FastAI)
- Develop tool: Visual Studio Code, SpringToolSuite4
- Version Control System: Git/GitHub
- Database Management System: Oracle SQL Developer

### ❖ Environment

- Operation systems: Microsoft Windows, MacOS, Android, iOS

## 2.4. Quality Attribute

**Table 2. Quality Attributes: Availability**

<b>Scenario</b>	A1
<b>Attribute concern</b>	<b>Downtime of system</b>
<b>Description</b>	The operating time of the system should be 95% to have

	time for backup data, maintenance and repair.
<b>Source</b>	Internal to system
<b>Stimulus</b>	System pause
<b>Artifact</b>	System
<b>Environment</b>	The system works normally
<b>Response</b>	Be temporarily unavailable while backup data, maintenance and repair are being effected
<b>Response Measure</b>	Uptime of the system should be 95%, downtime is about 1.2 hours per day

**Table 3. Quality Attributes: Performance**

<b>Scenario</b>	P2
<b>Attribute concern</b>	<b>The latency of initiating transactions</b>
<b>Description</b>	Users initiate transactions under normal operations. The system processes the transactions with latency less than 5 seconds.
<b>Source</b>	Users
<b>Stimulus</b>	Initiate transactions
<b>Artifact</b>	System
<b>Environment</b>	Under normal operations
<b>Response</b>	Transactions are processed
<b>Response Measure</b>	With latency less than 5 seconds

**Table 4.** Quality Attributes: Performance

<b>Scenario</b>	P3
<b>Attribute concern</b>	<b>The throughput of the system</b>
<b>Description</b>	At peak load, the system is able to complete 100 normalized transactions per second.
<b>Source</b>	Internal to system
<b>Stimulus</b>	Multiple transactions at the same time
<b>Artifact</b>	System
<b>Environment</b>	Peak load
<b>Response</b>	Throughput
<b>Response Measure</b>	Throughput is 100 transactions per second

**Table 5.** Quality Attributes: Usability

<b>Scenario</b>	U4
<b>Attribute concern</b>	<b>Using effectively</b>
<b>Description</b>	Craft Village Pollution Monitor can be easy for end-users to create a report after 10 minutes using.
<b>Source</b>	End-users
<b>Stimulus</b>	Create a report
<b>Artifact</b>	System
<b>Environment</b>	The system work normally
<b>Response</b>	Easy to use
<b>Response Measure</b>	Easy to use after 10 minutes using

## 2.5. System Context Diagram

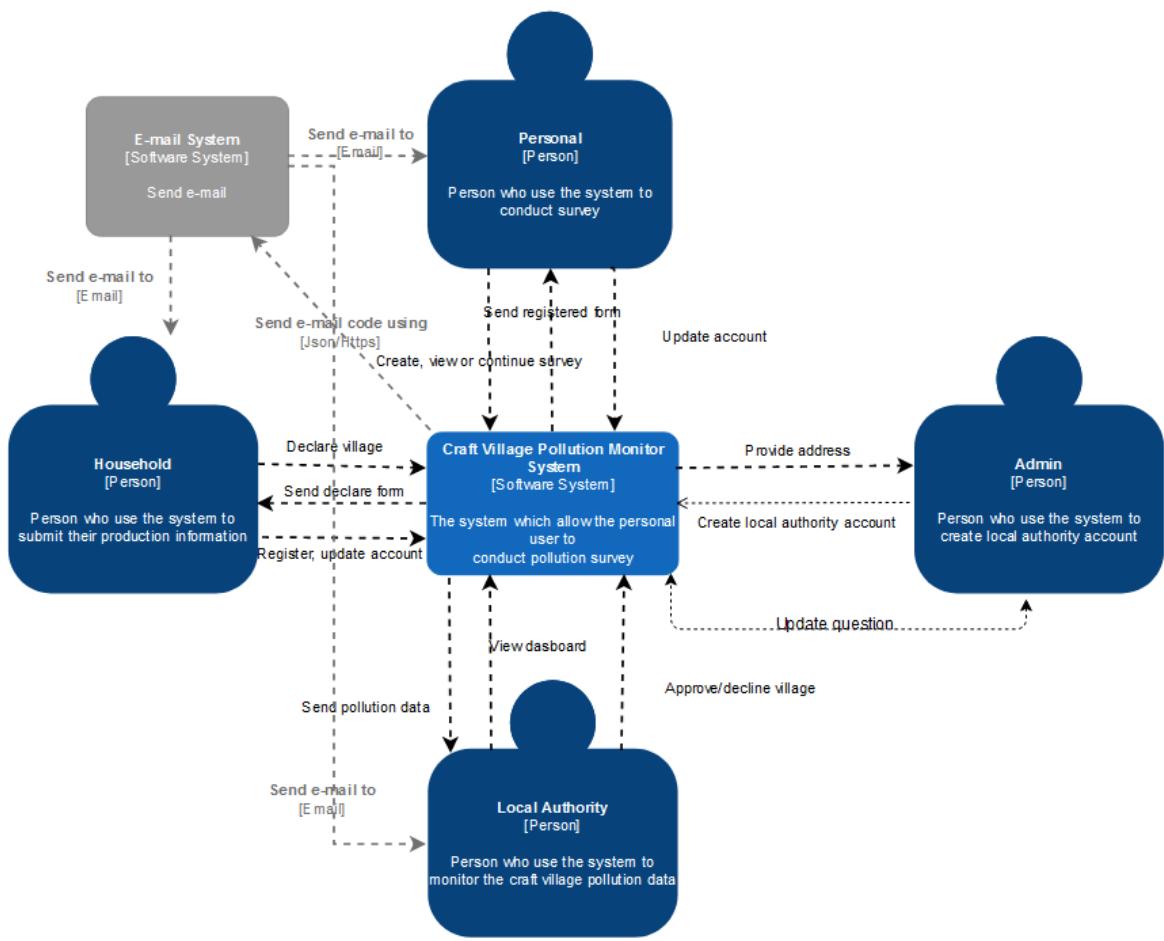


Figure 2. System Context Diagram Overview

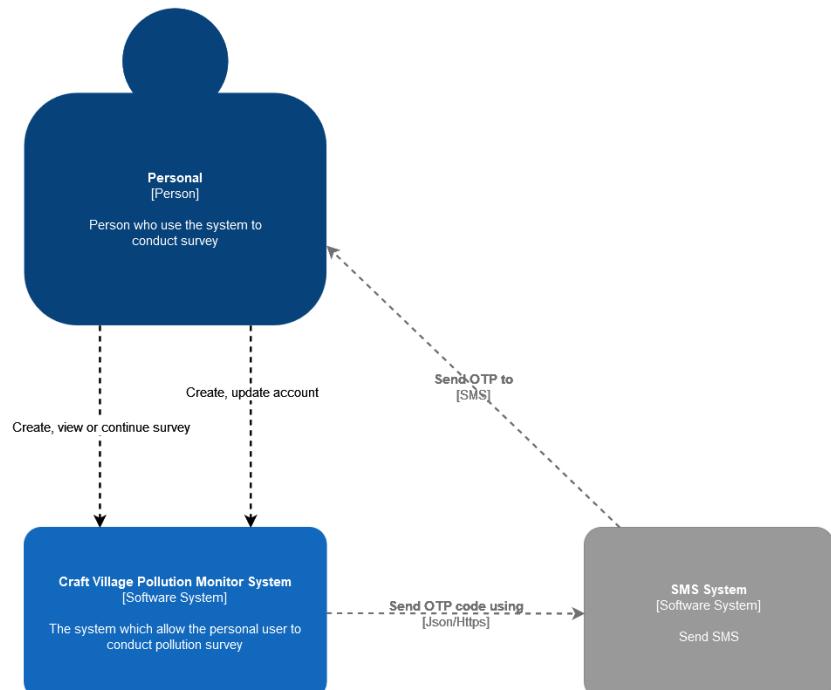
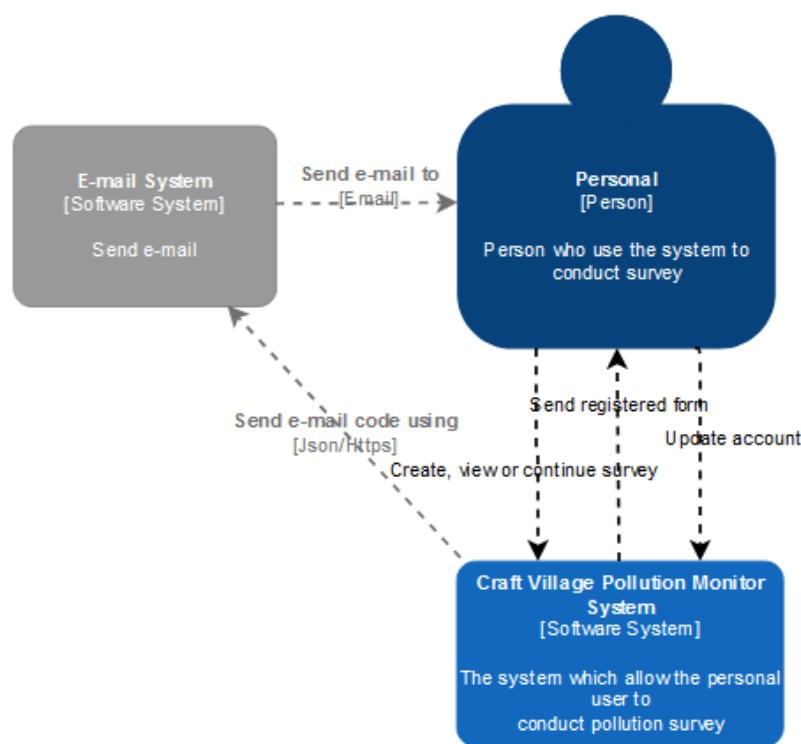
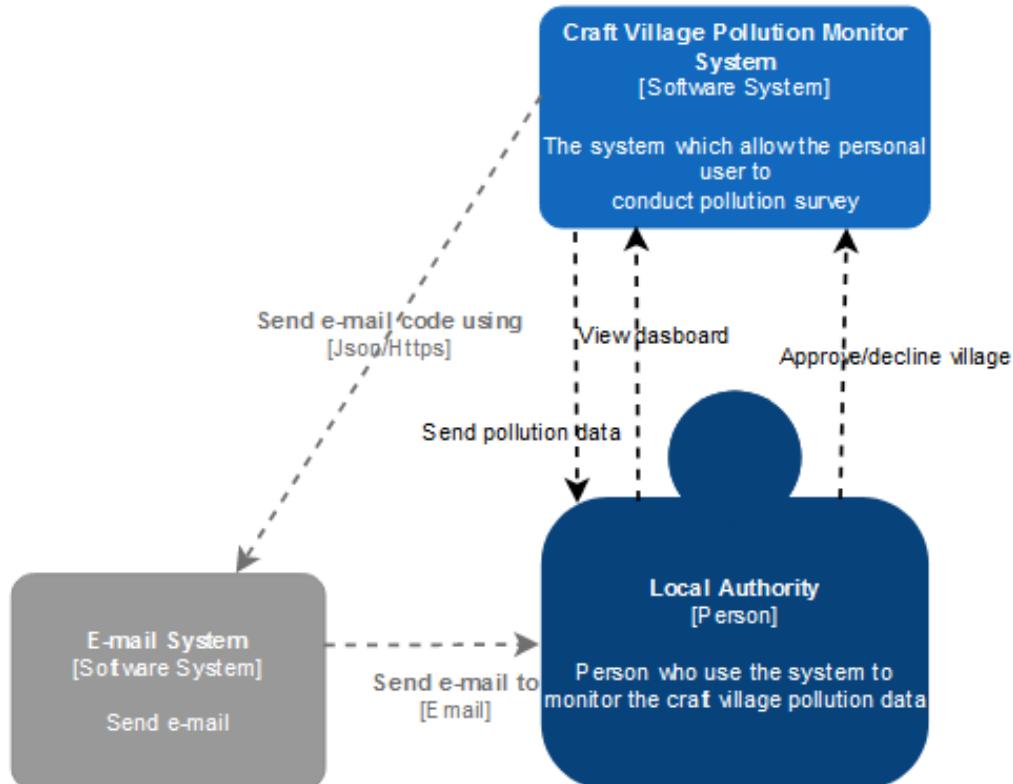
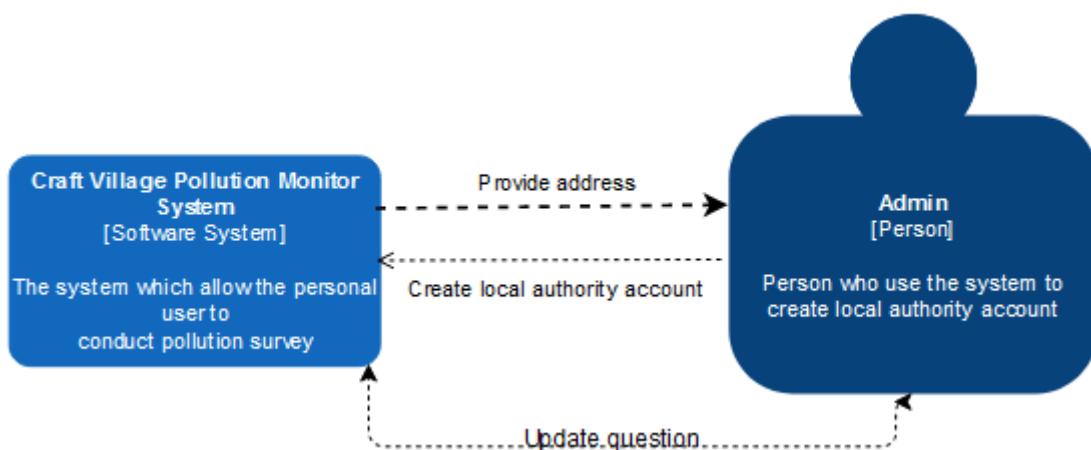


Figure 3. Personal System Context Diagram

**Figure 4.** Household System Context Diagram**Figure 5.** Authority System Context Diagram



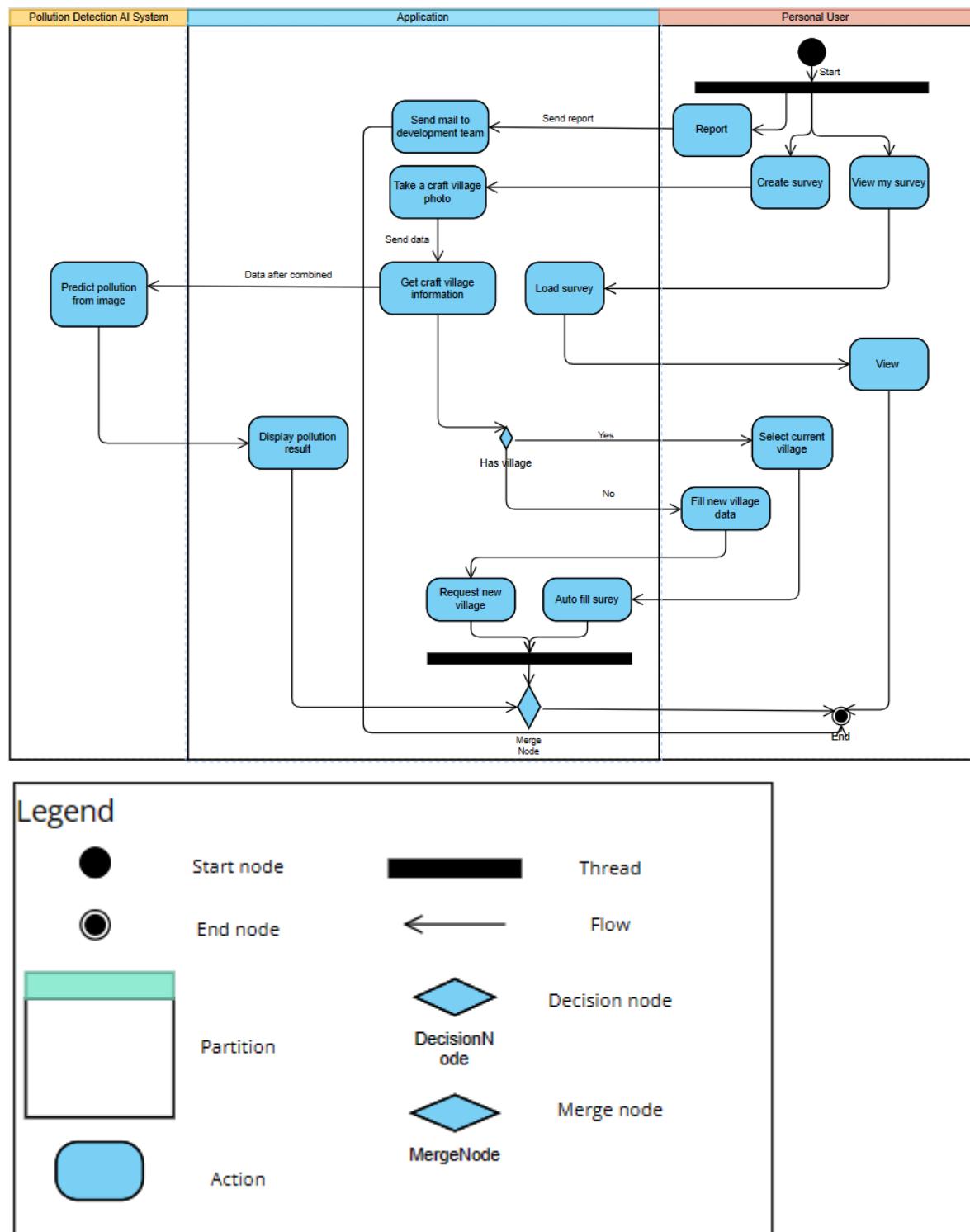
**Figure 6. Admin System Context Diagram**

**Prose:**

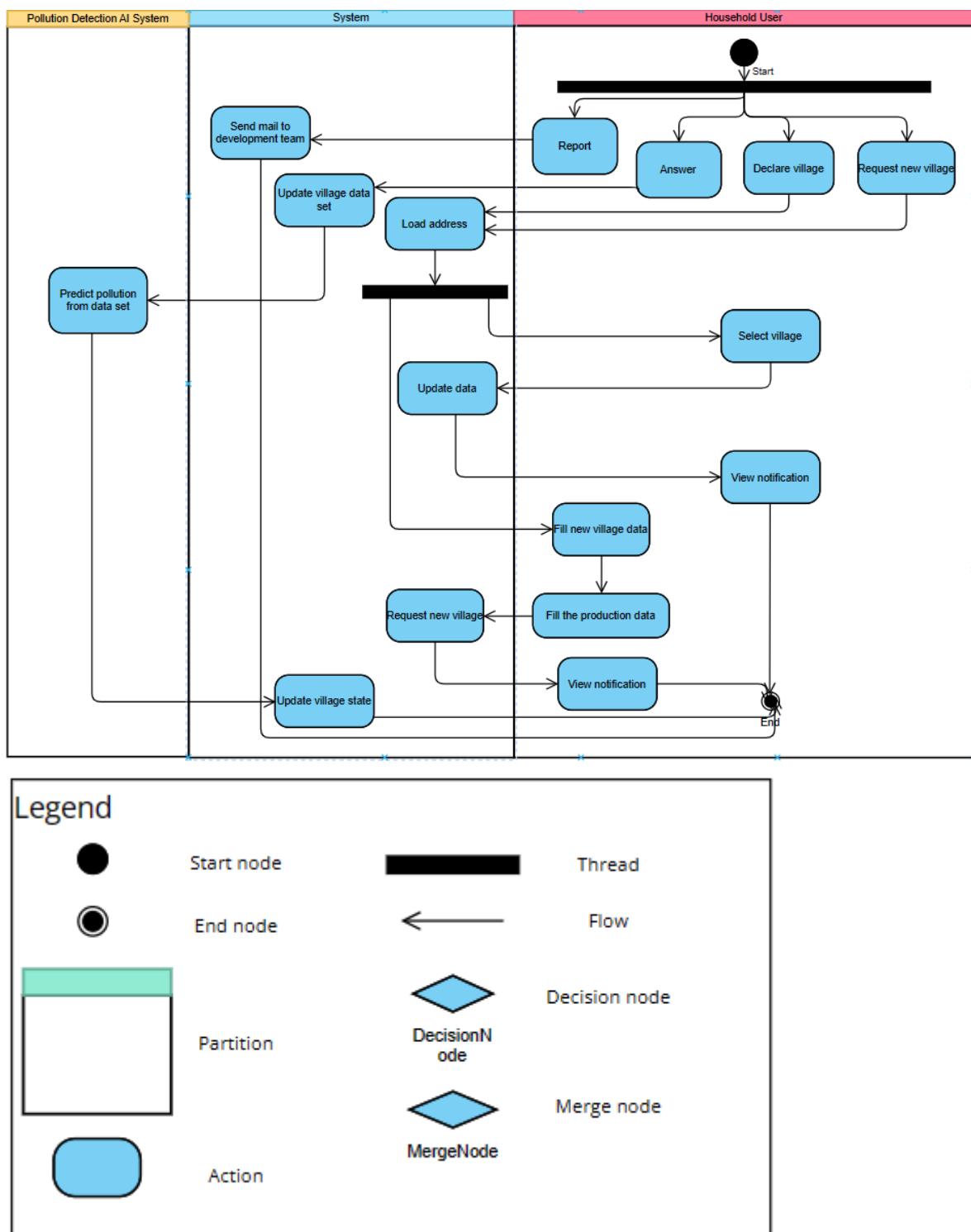
- ❖ The personal user, they can:
  - Create a new survey;
  - View previous survey;
  - Report;
- ❖ The household, they can:
  - Submit their production information;
  - Request add their village;
  - Declare their current village;
  - Report.
- ❖ The authority, they can:
  - View craft village's data (village production information, pollution status, etc);
  - Approve/decline a new village.
  - Update village.
  - Report.
- ❖ The admin, they can:
  - Create authority account.
  - Update question to training data.
  - Download data set.

### 3. Activity Diagram

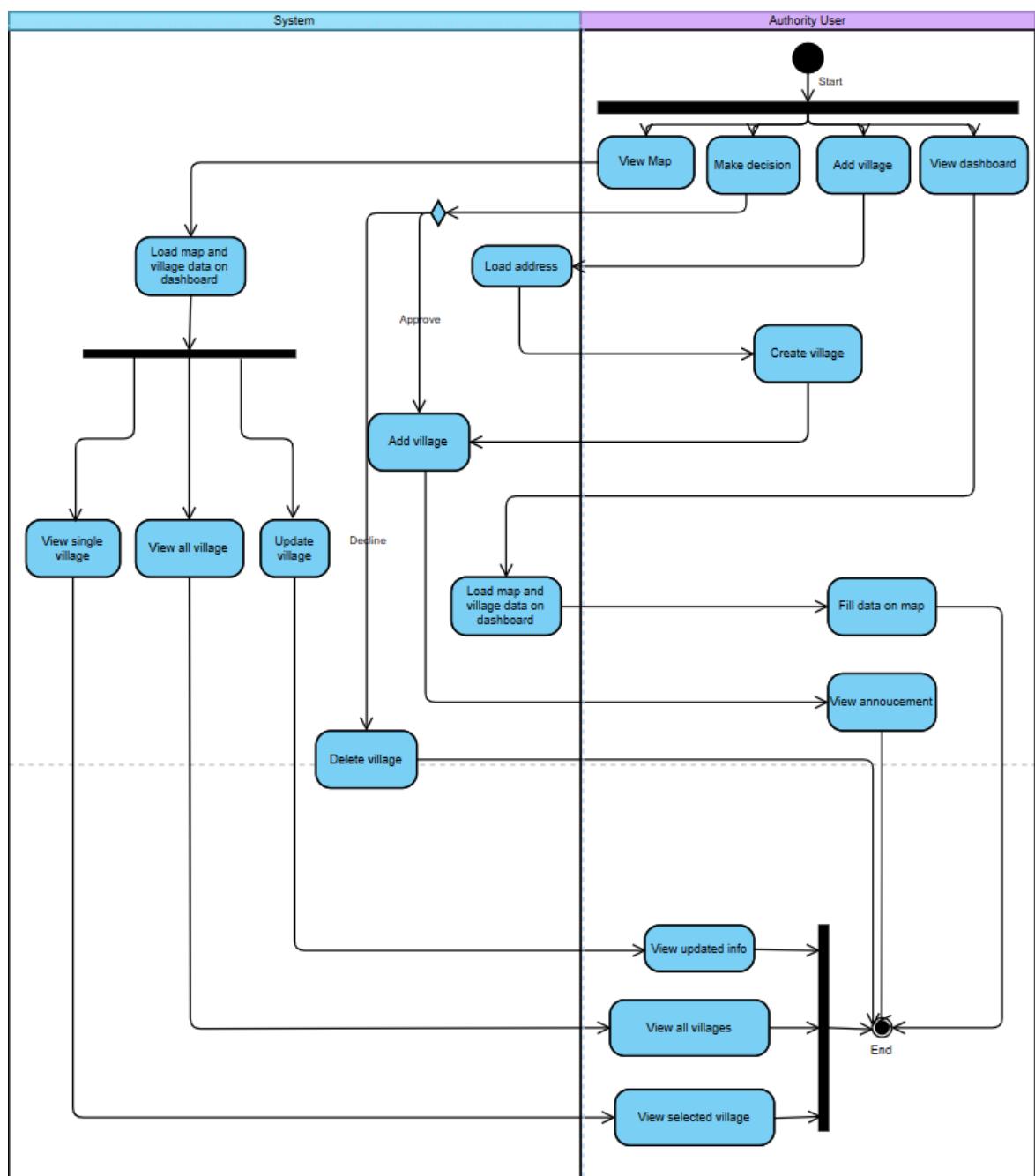
Activity diagram is a graphical representation of workflows of stepwise activities and actions with support for choice, iteration, and concurrency.



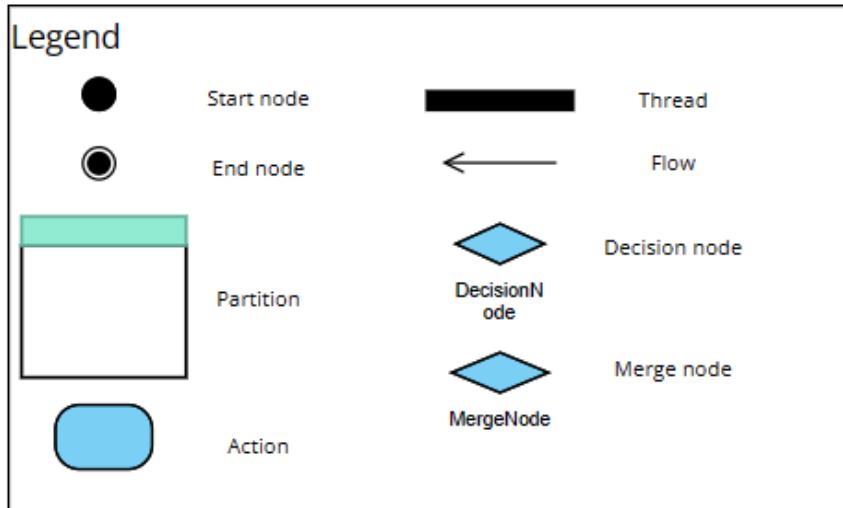
**Figure 7. Activity Diagram (Personal)**



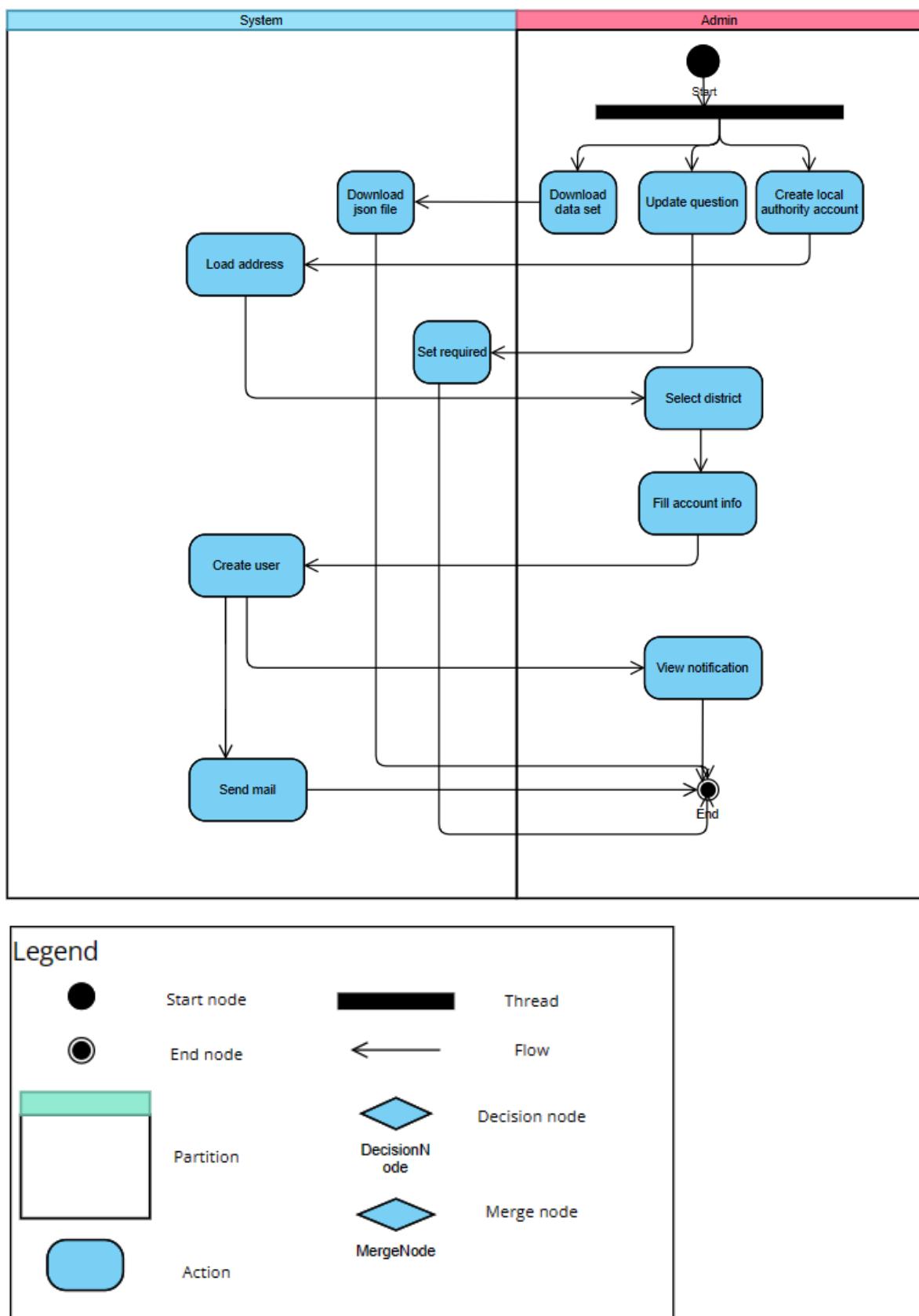
**Figure 8. Activity Diagram (Household)**



### Legend

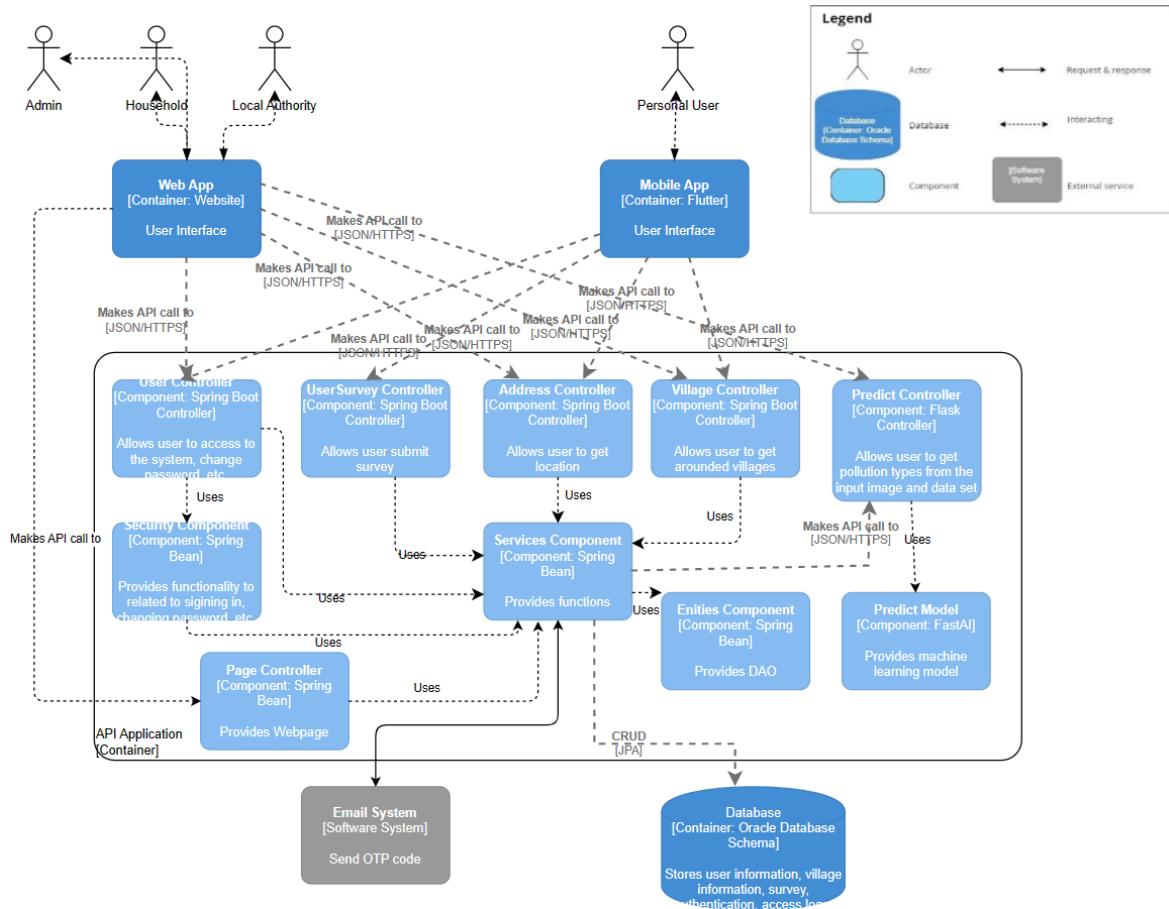


**Figure 9. Activity Diagram (Authority)**

**Figure 10. Activity Diagram (Admin)**

## 4. C&C view

The diagram below shows the overview architecture including components and other related components.



**Figure 11. Component & connector view**

## 5. Module View

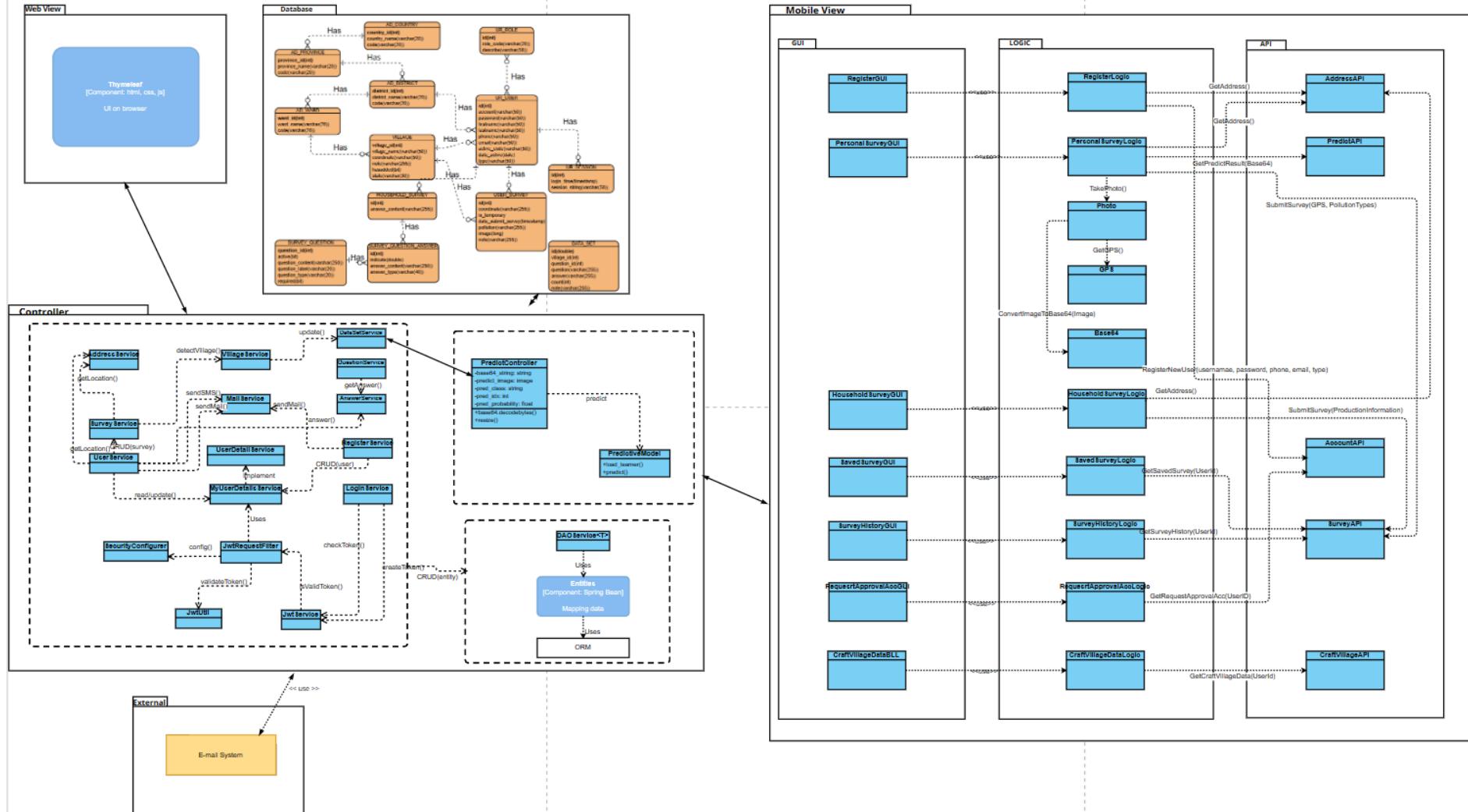
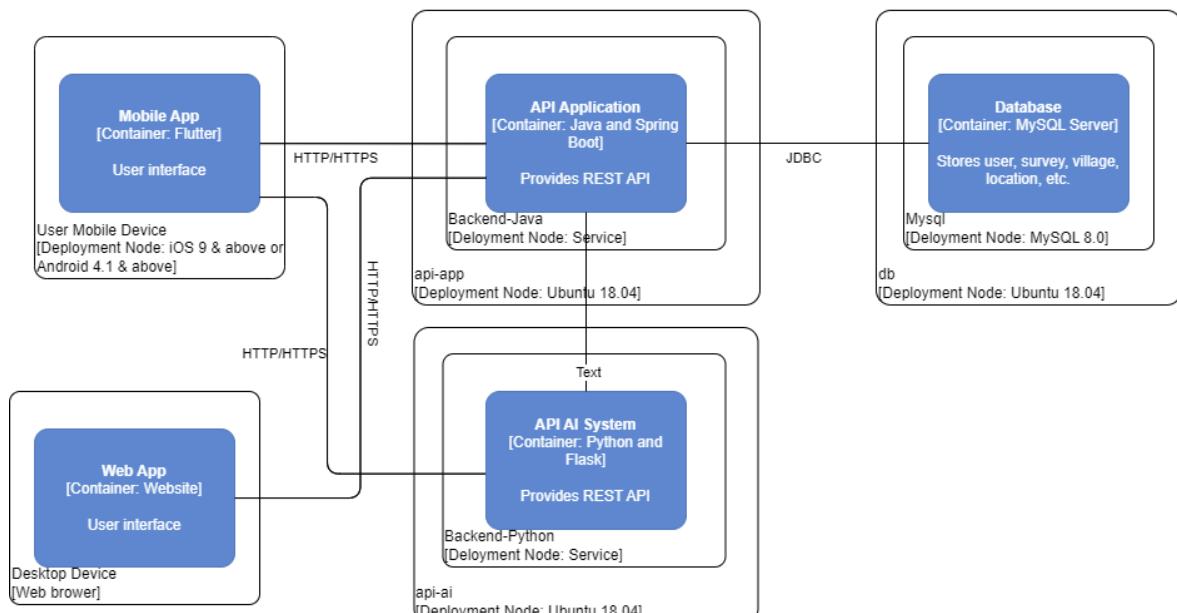


Figure 12. Module view

### **Prose:**

- The CVPMS includes 5 packages and a database that helps the app run effectively.
- In the Web View package, we use Thymeleaf (Java template engine) to process and generate HTML, Javascript, and CSS.
- The App View package which has 22 classes are often used and we customize it to fit our requirements.
- The Controller package contains 16 classes, the Entities component, and the ORM model. The PredictController and the PredictiveModel are used to predict and return the types of pollution. We build a "bridge" between the software and relational databases using the ORM model and the Entities component.
- The Module package contains 10 models and the relation between them.
- In the External package, we use the E-mail System and the SMS System.
- Finally, the app is connected to the Oracle Database.

## **6. Allocation view**

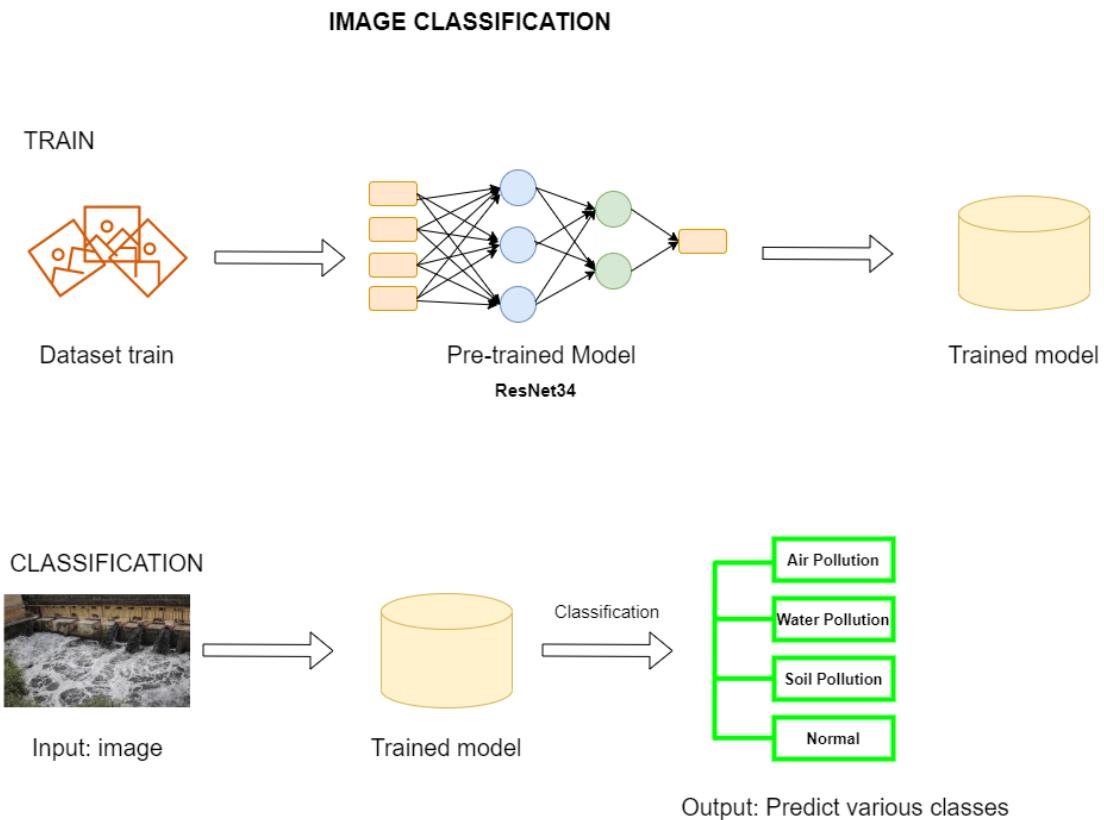


**Figure 13. Allocation view**

### **Prose:**

The user can access our system by using Web App (Household User and Authority User and Admin) and Mobile App (Personal User) via internet.

## 7. Proposed architecture for Image Classification

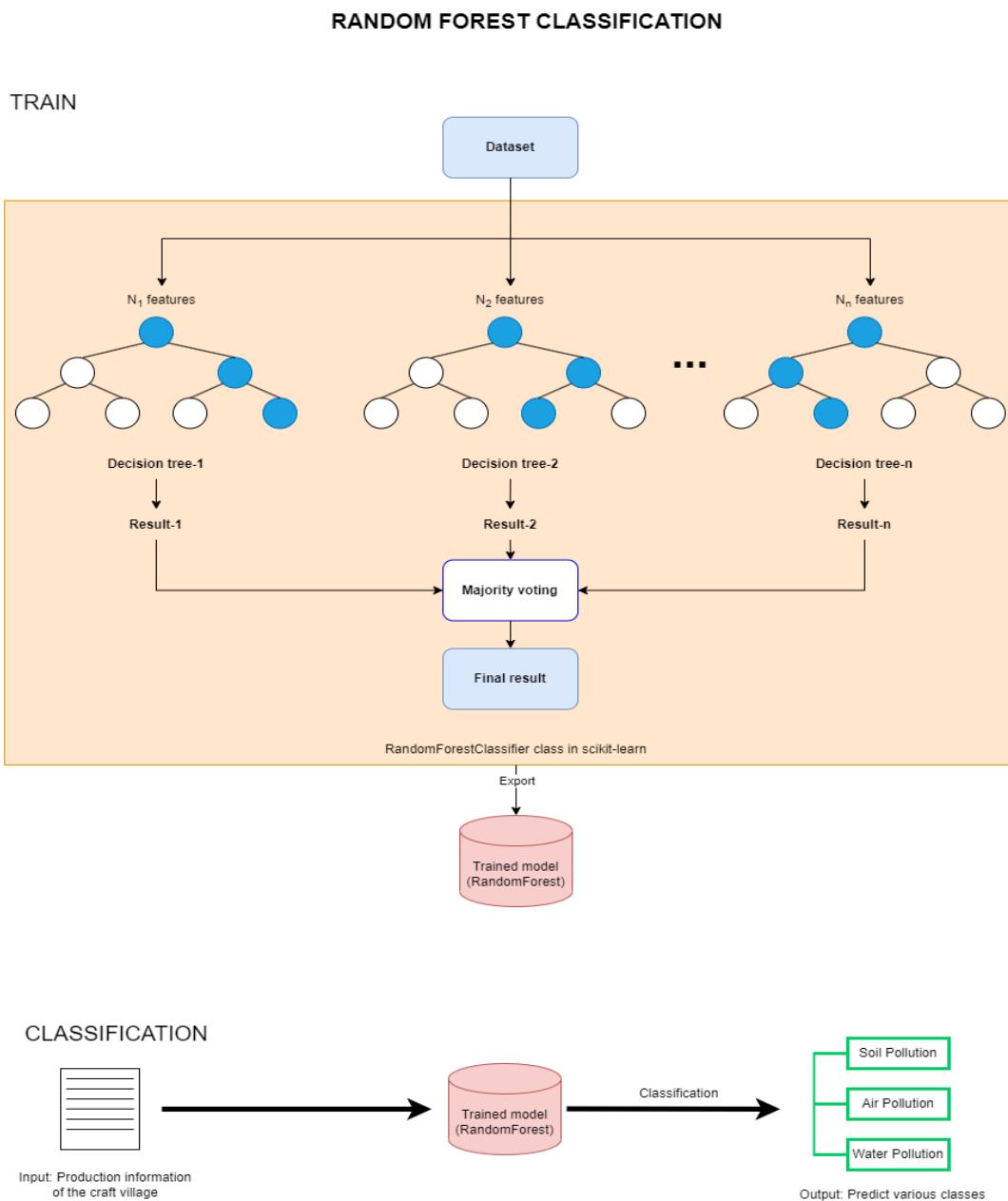


**Figure 14.** *Image Classification Architecture*

**Prose:**

To train a machine learning model, we use the dataset and the Pre-trained Model (ResNet34). From an input image, the trained model can predict various pollution classes.

## 8. Proposed architecture for Random Forest Classification



**Figure 15. Random Forest Classification**

### Prose:

To train a Random Forest classifier model, we use the dataset and the `RandomForestClassifier` class in scikit-learn. The trained model (`RandomForest`) can make predictions on the Production information of the craft village. The output of the prediction will be the predicted various classes.

## 9. References

No.	References	Document Information
1	Design standards, Document standards	<a href="https://www.softwarearchitecturebook.com/svn/main/slides/ppt/26_Standards.ppt">https://www.softwarearchitecturebook.com/svn/main/slides/ppt/26_Standards.ppt</a>
		<a href="https://standards.ieee.org/standard/1471-2000.html">https://standards.ieee.org/standard/1471-2000.html</a>
		<a href="https://c4model.com/">https://c4model.com/</a>
		<a href="https://machinelearningcoban.com/tabml_book/ch_model/random_forest.html">https://machinelearningcoban.com/tabml_book/ch_model/random_forest.html</a>
2	Patterns	<a href="https://en.wikipedia.org/wiki/Architectural_pattern">https://en.wikipedia.org/wiki/Architectural_pattern</a>
3	Evaluation standards	<a href="https://www.iso.org/obp/ui/#iso:std:iso-iec-ieee:42030:ed-1:v1:en">https://www.iso.org/obp/ui/#iso:std:iso-iec-ieee:42030:ed-1:v1:en</a>
		<a href="https://gabrielfs7.github.io/software-architecture/2019/10/18/atam-analyze-evaluate-architecture/">https://gabrielfs7.github.io/software-architecture/2019/10/18/atam-analyze-evaluate-architecture/</a>
4	Draw.io	<a href="https://www.draw.io">https://www.draw.io</a>
5	Visual Paradigm Online	<a href="https://online.visual-paradigm.com/">https://online.visual-paradigm.com/</a>



# Capstone Project 2

CMU-SE 451

## Database Design Document

Version 2.1  
Date: 14/04/2023

### Craft Village Pollution Monitor System

Submitted by  
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#### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyễn Thành Bình'.

---

Name      Signature      Date

## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
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<b>Partner Organization</b>			
<b>Project Web URL</b>	<a href="https://github.com/Casca113s2/craft-village-pollution-monitor-system">https://github.com/Casca113s2/craft-village-pollution-monitor-system</a>		
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## DOCUMENT NAME

<b>Document Title</b>	Database Design Document		
<b>Author(s)</b>	Phuc, Hua Hoang		
<b>Date</b>	14/04/2023	<b>File Name</b>	C2SE.01_CVPMS_Database-Design-Document_v2.1.docx

## REVISION HISTORY

<b>Version</b>	<b>Date</b>	<b>Comments</b>	<b>Author</b>	<b>Approval</b>
1.0	18/09/2022	Create location entities	Hua Hoang Phuc	
1.1	02/10/2022	Create user system	Hua Hoang Phuc	
1.2	20/10/2022	Create survey system	Hua Hoang Phuc	
2.0	01/03/2023	Create question and answer entities	Phuc, Hua Hoang	
2.1	14/04/2023	Create data set entity	Phuc, Hua Hoang	

**Approve Document:** Sign in to approve the document

<b>Mentor</b>	Binh, Nguyen Thanh	Date	13/05/2023
		Sign	
<b>Scrum Master</b>	Ca, Van Cong Le	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Huy, Bui Duc	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Nhan, Huynh Ba	Date	13/05/2023
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<b>Scrum Member</b>	Phuc, Hua Hoang	Date	13/05/2023
		Sign	
<b>Scrum Member</b>	Trung, Nguyen Thanh	Date	13/05/2023
		Sign	

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# 1. Introduction

## 1.1. Purpose

Place information system's database design document describes structure of database and file structure of system. Database Design document will introduce all attribute the System that will help developer and tester base on this design to implement and test.

## 1.2. Goal

To create database tables most accurate.

## 1.3. Scope

- ❖ This Database Design Document provides the basic for “Craft Village Pollution Monitor System” Database design.
- ❖ It defines the database that will support the “Craft Village Pollution Monitor System” Data Model.
- ❖ It describes both logical and physical definition, non-functional issues, and the database interfaces; storage aspects are defined in the physical database design sections.
- ❖ The following topics are covered in this document:
  - Assumptions and decisions on database design.
  - Entity-mapping.
  - Table column definitions.
  - Primary, unique and foreign key definitions.
  - Column and row level validation rules (check constraints).
  - Rule for populating specific columns (sequences, derivations, demoralized (column)).
  - Interfaces and dependencies with other components.
  - Data access description.
- ❖ The database design for “Craft Village Pollution Monitor System” is composed of definitions for database objects derived by mapping entities to tables attributes to columns, unique identifiers to unique keys and relationship to foreign keys.

- ❖ During design, these initial definitions are enhanced to support the functionality described in the functional specification/ user stories and defined in the primary and supporting modules of the application high level design.

## 1.4. Definitions, Acronyms and Abbreviations

**Table 1. Definitions, Acronyms and Abbreviations**

Abbreviations	Description	Comment
PK/FK	Primary/ Foreign Key	Use to indicate a file is a Primary or Foreign key in a table
ERD	Entity Relationship Diagram	Show the relationship between entities in the system
Auto	Auto increment	Auto increment

## 2. Database Design For Sprint 1

### 2.1. Table Overview

**Table 2. Table Overview Sprint 1**

No	Table name	Short Description
1	AD_COUNTRY	This table contains the information about countries.
2	AD_PROVINCE	This table contains the information about provinces
3	AD_DISTRICT	This table contains the information about districts
4	UR_USER	This table shows all information of user
5	UR_ROLE	This table contains the roles
6	USER_ROLE	This table shows the roles of users
7	UR_SESSION	This table saves the sessions

No	Table name	Short Description
8	USER_SURVEY	This table saves surveys of personal user
9	SR_SURVEY_QUESTION	This table contains the information about questions in household survey.
10	SR_SURVEY_QUESTION_ANSWER	This table contains the information about answers for each question.
11	HOUSEHOLD_SURVEY	This table contains the information about household answers.

## 2.2. Entity Relationship Diagram

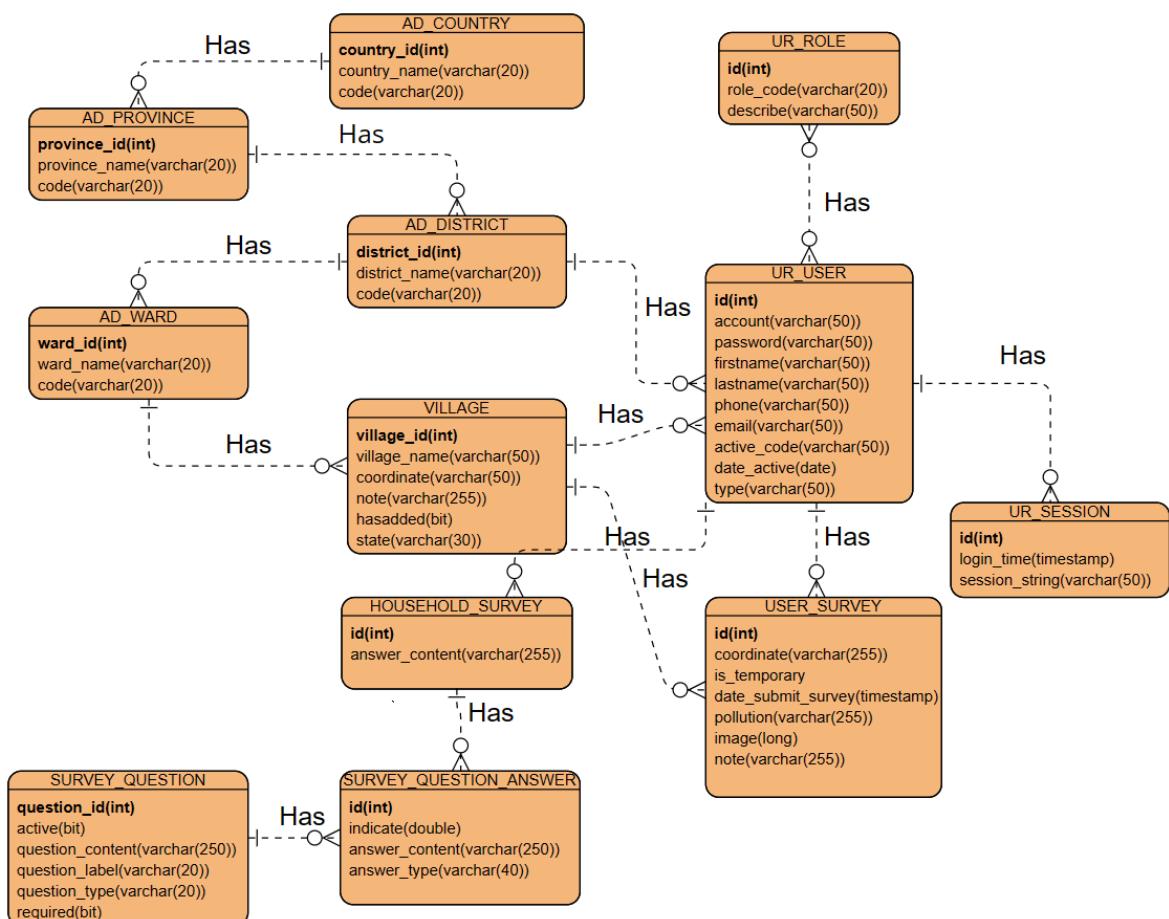


Figure 1. Entity Relationship Diagram Sprint 1

## 2.3. Table Relationship Diagram

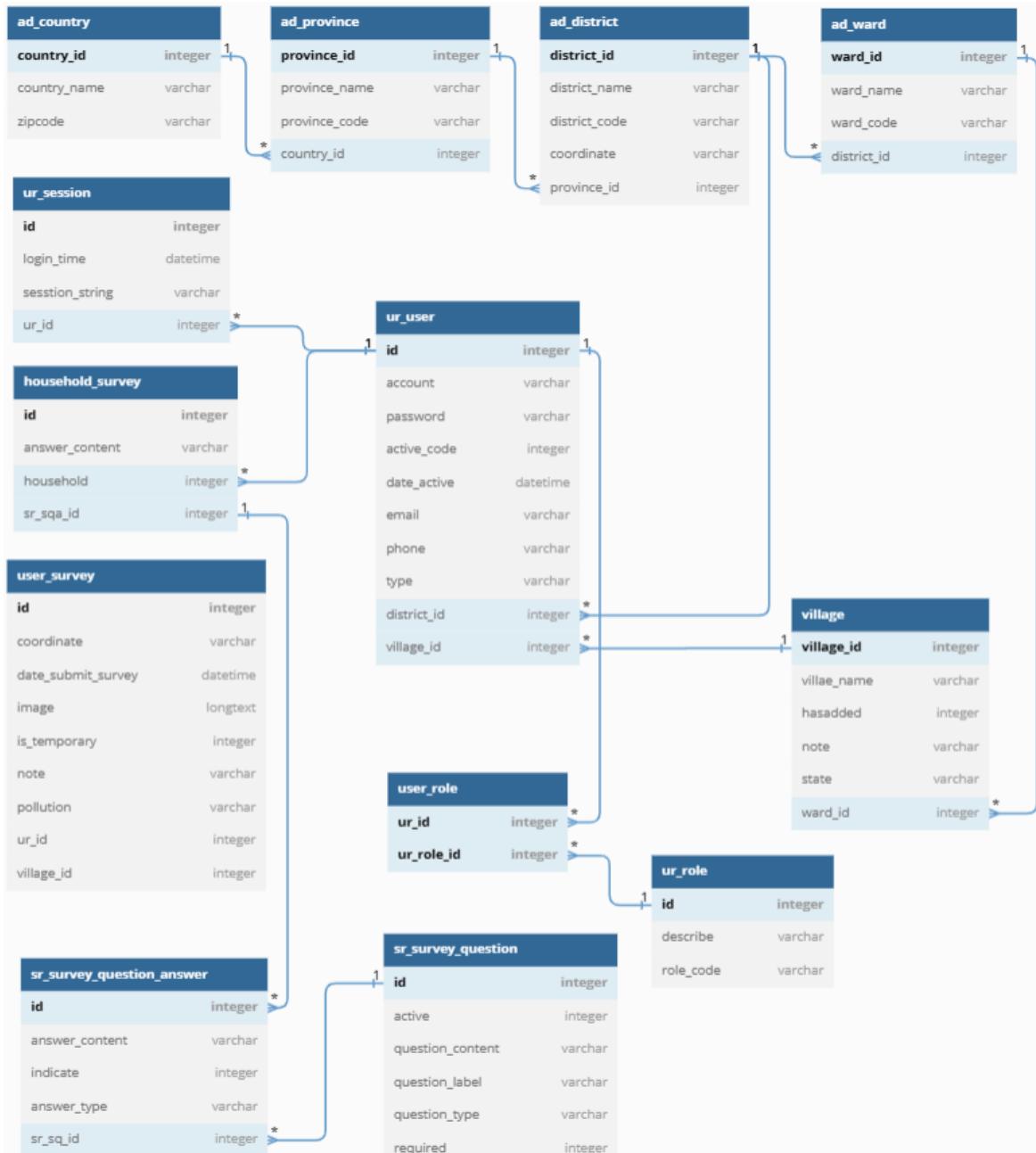


Figure 2. Table Relationship Diagram Sprint 1

## 2.4. Detail

### 2.4.1. AD\_COUNTRY

**Table 3.** *AD\_COUNTRY*

Attributes	Datatype	Null	Key	Default	Extra
Country_id	int	Not	PK		Auto
Country_name	varchar(50)	Not			
code	varchar(20)	Allow			

### 2.4.2. AD\_PROVINCE

**Table 4.** *AD\_PROVINCE*

Attributes	Datatype	Null	Key	Default	Extra
Province_id	int	Not	PK		Auto
Province_name	varchar(50)	Not			
code	varchar(20)	Allow			
Country_id	int	Not	FK		

### 2.4.3. AD\_DISTRICT

**Table 5.** *AD\_DISTRICT*

Attributes	Datatype	Null	Key	Default	Extra
District_id	int	Not	PK		Auto
District_name	varchar(50)	Not			
Code	varchar(20)	Allow			
Coordinate	Varchar(50)	Not			
Province_id	int	Not	FK		

### 2.4.4. AD\_WARD

**Table 6.** *AD\_WARD*

Attributes	Datatype	Null	Key	Default	Extra
ward_id	int	Not	PK		Auto
ward_name	varchar(50)	Not			
Code	varchar(20)	Allow			
district_id	int	Not	FK		

#### 2.4.5. VILLAGE

**Table 7. VILLAGE**

Attributes	Datatype	Null	Key	Default	Extra
village_id	int	Not	PK		Auto
village_name	varchar(50)	Not			
Coordinate	varchar(50)	Not			
Note	varchar(255)	Allow			
Hasadded	int	Not		0	
State	Varchar(3)	Not		“000”	
ward_id	int	Not	FK		

#### 2.4.6. UR\_USER

**Table 8. UR\_USER**

Attributes	Datatype	Null	Key	Default	Extra
Id	int(11)	Not	PK		Auto
Account	varchar(50)	Not			
password	varchar(50)	Not			
Firstname	varchar(50)	Not			
Lastname	varchar(50)	Not			
Phone	varchar(50)	Not			
Active_code	varchar(50)	Not			
Date_active	timestamp	Not			
District_id	int	Allow	FK		
Village_id	int	Allow	FK		

#### 2.4.7. UR\_ROLE

**Table 9. UR\_ROLE**

Attributes	Datatype	Null	Key	Default	Extra
Id	int	Not	PK		Auto
Role_code	varchar(20)	Not			
Describe	varchar(50)	Allow			

#### 2.4.8. USER\_ROLE

**Table 10.** *USER\_ROLE*

Attributes	Datatype	Null	Key	Default	Extra
Ur_id	int	Not	PK, FK		
Ur_role_id	int	Not	PK, FK		

#### 2.4.9. UR\_SESSION

**Table 11.** *UR\_SESSION*

Attributes	Datatype	Null	Key	Default	Extra
Id	int	Not	PK		Auto
Login_time	timestamp	Not			
Session_string	varchar(50)	Not			
Ur_id	int	Not	FK		

#### 2.4.10. USER\_SURVEY

**Table 12.** *USER\_SURVEY*

Attributes	Datatype	Null	Key	Default	Extra
Id	int	Not	PK		Auto
Coordinate	varchar(255)	Not			
Is_temporary	varchar(20)	Not			
Date_submit_survey	timestamp	Not			
Pollution	varchar(255)	Not			
Note	varchar(255)	Allow			
Image	longtext	Not			
Village_id	int	Not	FK		
Ur_id	int	Not	FK		

#### 2.4.11. SR\_SURVEY\_QUESTION

**Table 13.** *SR\_SURVEY\_QUESTION*

Attributes	Datatype	Null	Key	Default	Extra
Id	int	Not	PK		Auto
Question_content	varchar(255)	Not			

Attributes	Datatype	Null	Key	Default	Extra
Question_label	varchar(20)	Allow			
Question_type	Varchar(20)	Not			
Active	int	Not		1	
Required	Int	Not		0	

#### 2.4.12. SR\_SURVEY\_QUESTION\_ANSWER

**Table 14.** *SR\_SURVEY\_QUESTION*

Attributes	Datatype	Null	Key	Default	Extra
Id	int	Not	PK		Auto
Answer_content	Varchar(255)	Not			
Answer_type	varchar(50)	Not			
indicate	int	Allow			
Sr_sq_id	Int	Not	FK		

#### 2.4.13. HOUSEHOLD\_SURVEY

**Table 15.** *HOUSEHOLD\_SURVEY*

Attributes	Datatype	Null	Key	Default	Extra
Id	double	Not	PK		Auto
Answer_content	Varchar(255)	Not			
Household	Int	Not	FK		
Sr_sqa_id	Int	Not	FK		

### 3. Database Design For Sprint 4

#### 3.1. Table Overview

**Table 16.** *Table Overview Sprint 4*

No	Table name	Short Description
1	DATA_SET	This table contains data to detect and train pollution.

### 3.2. Entity Relationship Diagram

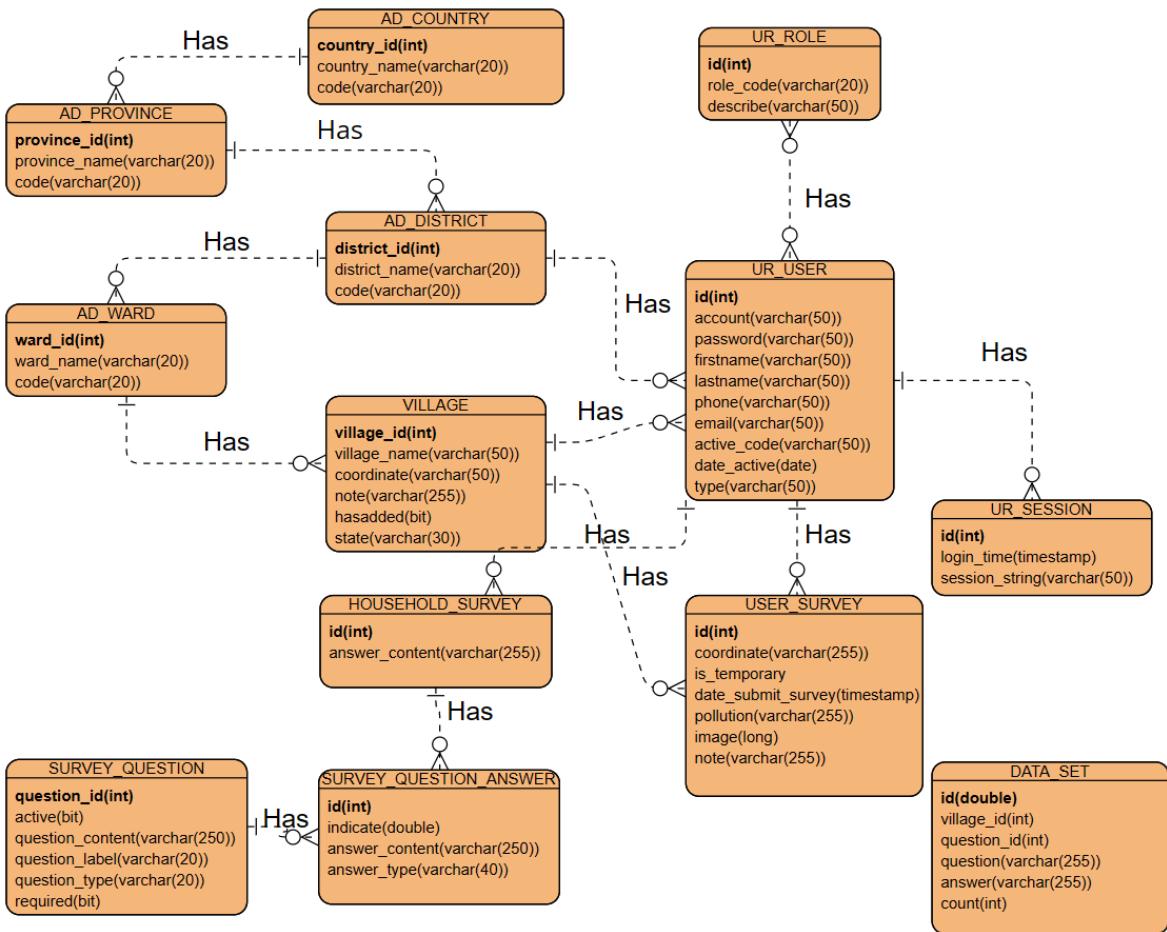


Figure 3. Entity Relationship Diagram Sprint 4

### 3.3. Table Relationship Diagram

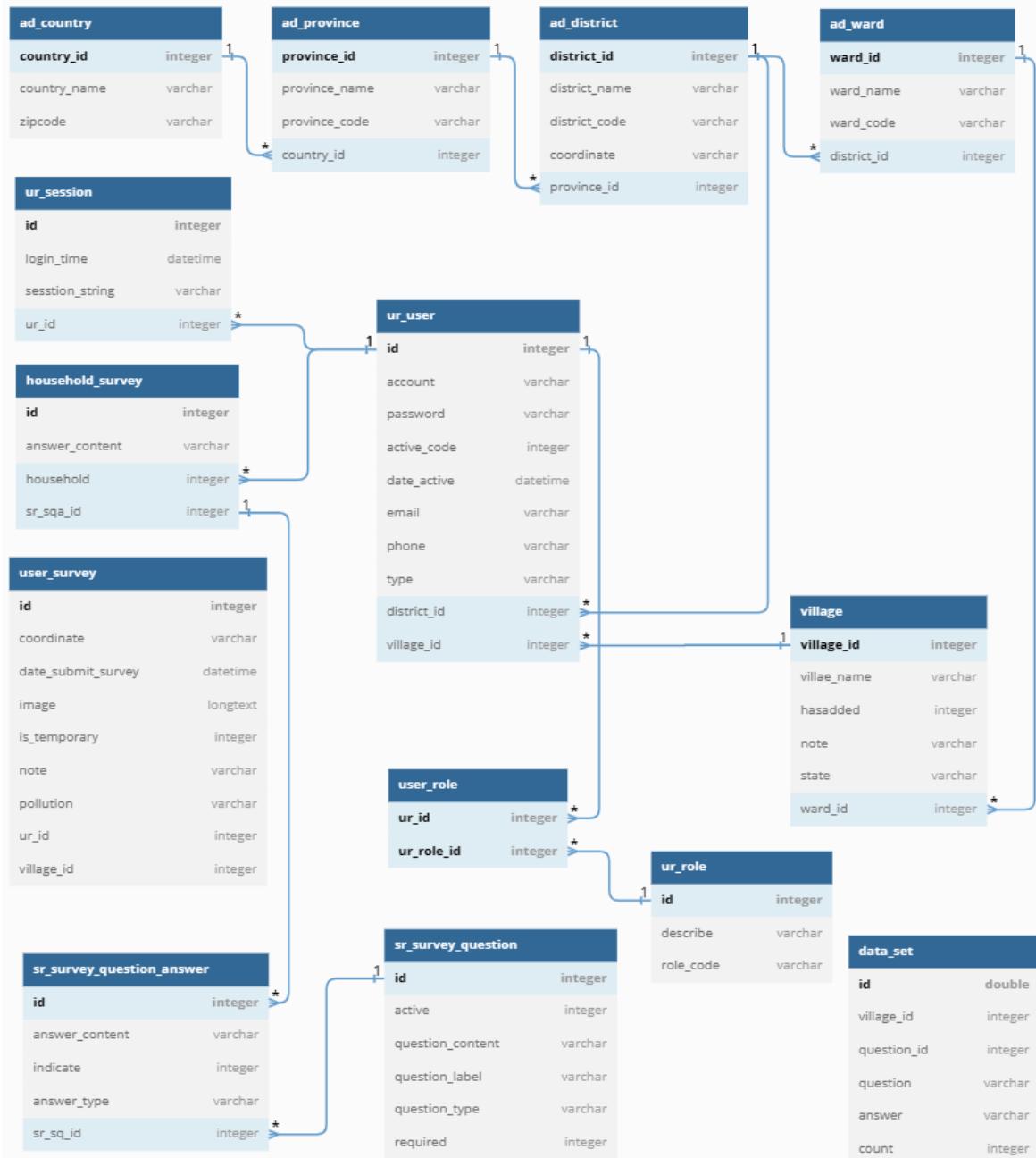


Figure 4. Table Relationship Diagram Sprint 4

## 3.4. Detail

### 3.4.1. DATA\_SET

**Table 17.** *DATA\_SET*

Attributes	Datatype	Null	Key	Default	Extra
Id	Double	Not	PK		
Village_id	int	Not			
Question_id	Int	Not			
Question	Varchar(255)	Not			
Answer	Varchar(255)	Not			
Count	Int	Not			



# Capstone Project 2

CMU-SE 451

## User Interface Design Document

Version 2.2  
Date: 13/04/2023

### Craft Village Pollution Monitor System

Submitted by  
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Approved by  
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Name              Signature              Date

#### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyễn Thành Bình'.

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Name              Signature              Date

## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
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<b>Partner Organization</b>			
<b>Project Web URL</b>	<a href="https://github.com/Casca113s2/craft-village-pollution-monitor-system">https://github.com/Casca113s2/craft-village-pollution-monitor-system</a>		
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<b>Author(s)</b>	Nguyen Thanh Trung		
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1.0	18/09/2022	Create Document	Nguyen Thanh Trung	
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2.2	13/04/2023	Update Document (Map, view survey, Edit layout, ...etc)	Nguyen Thanh Trung	

**Approve Document: Sign in to approve document**

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# 1. Introduction

## 1.1. Purpose

- This document helps to better understand the interface of the Comment Scraper Tool, detailed specification components and function of the system.
- With this document, the development team can understand detail the structure and composition to create a consistent and complete system.

## 1.2. Scope

- Overview of the stages and modules of the system.
- Create complete interfaces and describe them clearly.

# 2. List of User Interface

## 2.1. Local Authority

**Table 1.** List of Local Authority User Interface

User Interface ID	UI Name	Description
UI-01	Local Authority Home Page	This page to see statistics about craft villages
UI-02	Detail Declaration Page	This page displays detailed production information of the craft village
UI-03	Pollution Craft Village Map Data Page	This page displays a map of polluted craft villages and location information

## 2.2. Household

**Table 2.** List of Household User Interface

User Interface ID	UI Name	Description
UI-04	Survey Page	This page allows household heads to register their craft villages or register new craft villages if that craft village does not exist in the database

## 2.3.Admin

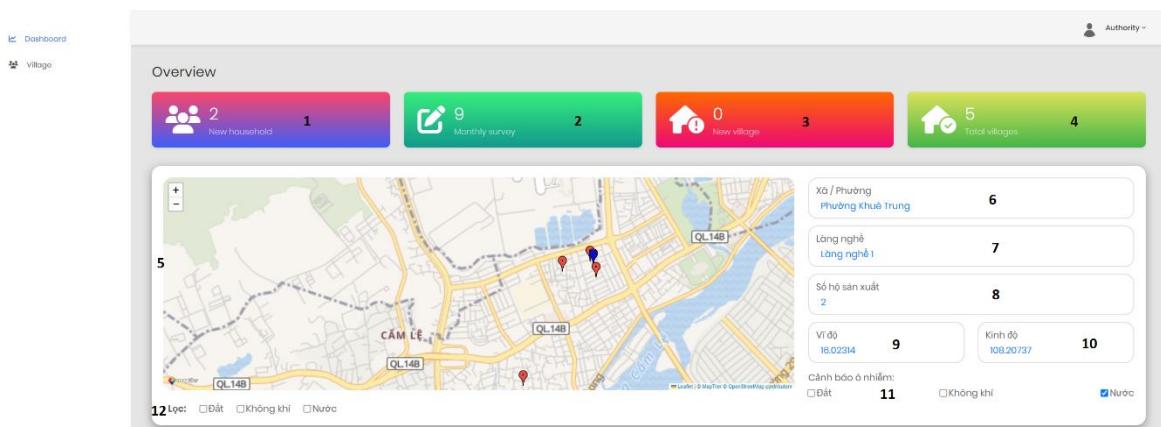
**Table 3.** List of Admin User Interface

User Interface ID	UI Name	Description
UI-05	Create New Local Authority Page	This page to create a new local authority account.

# 3. Describe the User Interface

## 3.1.Local Authority

### 3.1.1. Local Authority Home Page

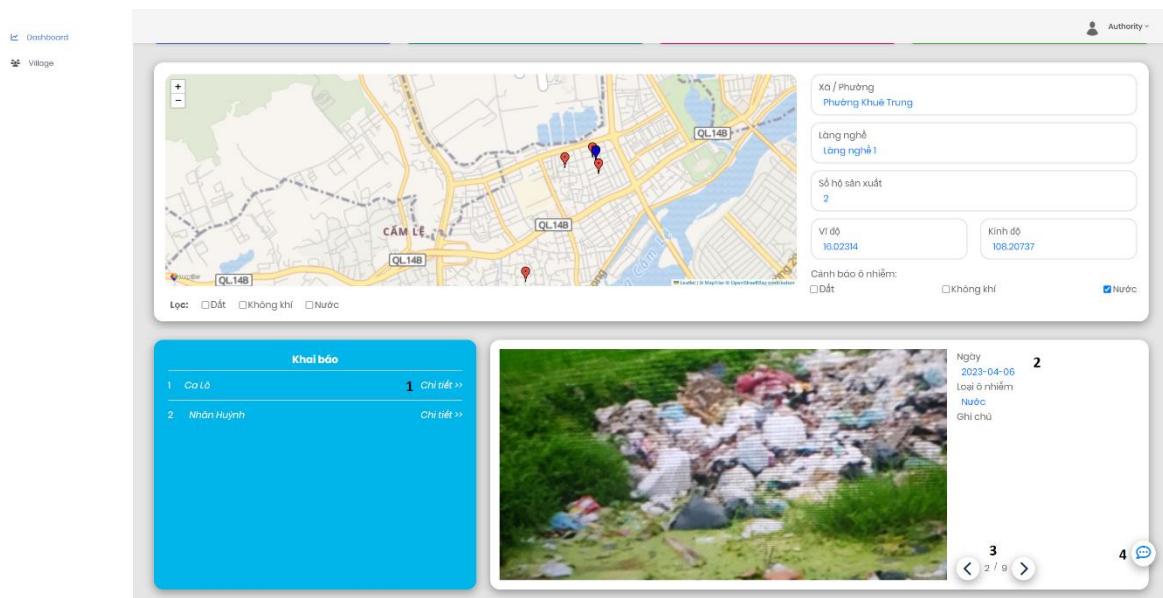


**Figure 1.** UI of Local Authority Home Page

**Table 4.** Elements of UI Local Authority Home Page

From	Condition	Control Type	Target	Notes
1	View	Lable	Display the number of new households	
2	View	Lable	Display the number of surveys	
3	View	Lable	Display the number of the new village	
4	View	Lable	Display the total village of the ward	
5	View	Map	Display the polluted craft villages	
6	View	Lable	Display ward address information	
7	View	Lable	Display name of craft village	

8	View	Label	Display the number of households of village	
9	View	Label	Display the latitude of village	
10	View	Label	Display the longitude of village	
11	View	Check Box	Warning about that kind of pollution in craft villages	
12	Click	Check Box	Click to filter the type of contaminated craft village	

**Figure 2. UI of Local Authority Home Page Below****Table 5. Elements of UI Local Authority Home Page Below**

From	Condition	Control Type	Target	Notes
1	Click	Label	Click to see detail information about the declaration	
2	View	Label	Display general information about the declaration	
3	Click	Button	Click to see another declaration	
4	Click	Button	Click to report site errors	

### 3.1.2. Detail Declaration

**Thống tin sản xuất**

- Lượng khí ga đã sử dụng (1000 m<sup>3</sup>): 5
- Lượng than đá sử dụng (tấn): 3
- Sử dụng dầu:
  - Có
  - Không
- Sử dụng chất thải rắn làm nhiên liệu:
  - Có
  - Không
- Có nhà máy xử lý nước thải nào tại xã không?:
  - Có
  - Không
- Xử lý chất thải rắn không được thu gom:
  - Bỏ bê
  - Chôn lấp
  - Tứt
  - Sản xuất biogas
  - Khác
- Tỷ lệ không được thu gom:
  - <10%
  - 20% - 40%
  - 40% - 60%
  - 60% - 80%
  - >80%
- Tỷ lệ được thu mua:
  - <20%
  - 20% - 40%
  - 40% - 60%
  - 60% - 80%
  - >80%

**1**

**Thống kê**

- Xử lý chất thải rắn được thu gom:
  - Bãi rác địa phương nhỏ lẻ (trường được đốt ngoài trời)
  - Bãi rác tập trung
  - Đốt trong lò đốt
  - Tái chế
  - Khác
- Tần suất thu gom rác:
  - Hàng ngày
  - Hàng tuần
  - Hơn
- Tỷ lệ rác thải tái chế bởi cá nhân:
  - <20%
  - 20% - 40%
  - 40% - 60%
  - 60% - 80%
  - >80%
- Số người: 5
- Ngày: 2023-04-06
- Loại ô nhiễm: Nước
- Ghi chú:

**2**

Figure 3. UI of Detail Declaration

**Xử lý chất thải rắn được thu gom**

- Bãi rác địa phương nhỏ lẻ (trường được đốt ngoài trời)
- Bãi rác tập trung
- Đốt trong lò đốt
- Tái chế
- Khác

**Tần suất thu gom rác?**

- Hàng ngày
- Hàng tuần
- Hơn

**Tỷ lệ rác thải tái chế bởi cá nhân**

- <20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- >80%

**Hình thức thu gom nước thải**

- Không được thu gom (và tự do)
- Không được thu gom (và tự do)
- Không được thu gom và xử lý tại hồ giả định (ví dụ xử lý trong bể tư hoặc, bồn cầu, bể lọc cá)
- Không thu gom và không xử lý (không tái sinh thoát nước không che đậy ra vùng nước mặt)
- Không thu gom và xử lý (Thu gom bao gồm thu gom qua hệ thống công nghiệp hoặc bằng tay)

**Vật liệu mới**

Vui lòng điện vào đây

**Vật liệu sản xuất**

Vui lòng điện vào đây

**Lượng điện đã sử dụng (kWh)**

**1**

**2 Close**

**Thống kê**

- Xử lý chất thải rắn được thu gom:
  - Bãi rác địa phương nhỏ lẻ (trường được đốt ngoài trời)
  - Bãi rác tập trung
  - Đốt trong lò đốt
  - Tái chế
  - Khác
- Tần suất thu gom rác:
  - Hàng ngày
  - Hàng tuần
  - Hơn
- Tỷ lệ rác thải tái chế bởi cá nhân:
  - <20%
  - 20% - 40%
  - 40% - 60%
  - 60% - 80%
  - >80%
- Số người: 5
- Ngày: 2023-04-06
- Loại ô nhiễm: Nước
- Ghi chú:

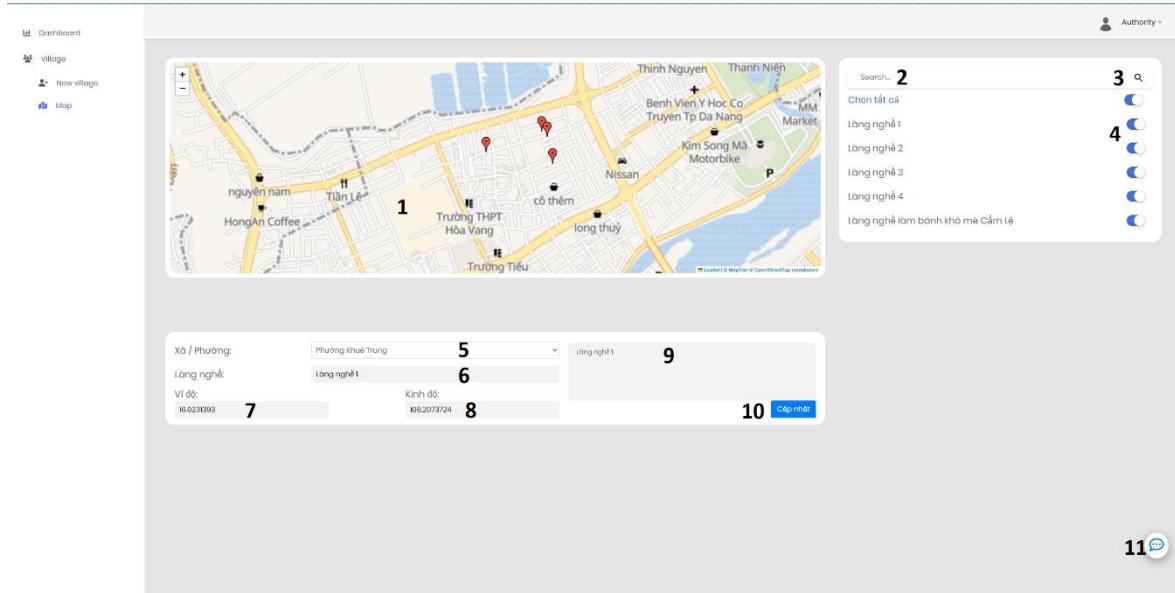
**2**

Figure 4. UI of Detail Declaration

Table 6. Elements of UI Detail Declaration

From	Condition	Control Type	Target	Notes
1	View	Label	Display detailed information about the production of the craft village	
2	Click	Button	Click to close detailed information	

### 3.1.3. Pollution Craft Village Map Data Page



**Figure 5.** UI of Pollution Craft Village Map Data Page

**Table 7.** Elements of UI Pollution Craft Village Map Data Page

From	Condition	Control Type	Target	Notes
1	View	Map	Display the polluted craft villages	
2	Input	Textbox	Enter the name of craft village	
3	Click	Button	Click to view the location of craft village	
4	Click	Button	Click to display or not display the location of the craft village on the map	
5	Click	DropDownList	Click to select ward of village	
6	Input	Textbox	Enter the name of village	
7	Input	Textbox	Enter latitude	
8	Input	Textbox	Enter longitude	
9	View	Texbox	Display the name of village	
10	Click	Button	Click to update information about village	
11	Click	Button	Click to report site errors	

## 3.2. Household

### 3.2.1. Survey Page

The screenshot shows a survey page for household information. The interface includes several sections and numbered fields:

- Hộ sản xuất (Làng nghề)** section (top left):
  - Chọn Tỉnh/Huyện/phố: 1
  - Chọn Quận/Huyện: 2
  - Chọn Xã/Huyện: 3
  - Làng nghề: 4
  - Khởi tạo: 5
- Làng nghề mới** section (top right):
  - Chọn Tỉnh/Huyện/phố: 6
  - Chọn Quận/Huyện: 7
  - Chọn Xã/Huyện: 8
  - Vị độ: 9
  - Kinh độ: 10
  - Tên làng nghề: 11
  - Nhập tên làng nghề: 12
  - Mô tả: 13
- Thông tin sản xuất** section (bottom left):
  - Lượng khí ga đã sử dụng (1000 m<sup>3</sup>): 15
  - Lượng than đã sử dụng (tấn): 17
  - Sử dụng dầu: 19 (radio buttons: Có, Không)
- Thông tin sản xuất** section (bottom right):
  - Lượng chất thải rắn đã sử dụng (tấn): 16
  - Bốt cháy: 18
  - Sử dụng khí ga: 20 (radio buttons: Có, Không)
  - Khởi tạo: 14

Figure 6. UI of Survey Page

Table 8. Elements of UI Survey Page

From	Condition	Control Type	Target	Notes
1	Click	DropDownList	Click to select province/city	
2	Click	DropDownList	Click to select district	
3	Click	DropDownList	Click to select ward	
4	Click	DropDownList	Click to select village	
5	Click	Button	Click to declare a new craft village	
6	Click	DropDownList	Click to select province/city	
7	Click	DropDownList	Click to select district	
8	Click	DropDownList	Click to select ward	
9	Input	Textbox	Enter the latitude	
10	Input	Textbox	Enter the longitude	
11	Input	Textbox	Enter the name of village	
12	Input	Textbox	Enter a description of the craft village	

13	Click	Button	Click to declare a new craft village	
14	Click	Button	Click to report site errors	
15	Input	Textbox	Enter amount of gas used	
16	Input	Textbox	Enter amount of solid waste used	
17	Input	Textbox	Enter amount of coal used	
18	Input	Textbox	Enter amount of combustion used	
19	Click	Radio Button	Click to declare whether to use oil or not	
20	Click	Radio Button	Click to declare whether to use gas or not	

The screenshot shows a survey page with the following elements:

- Header:** Includes "Khai báo" and "Chính sách" buttons.
- Section 1:** A group of checkboxes for waste collection methods:
  - Không
  - Bãi rác địa phương nhà / (thường được đốt ngoài trời)
  - Bãi rác tập trung
  - Đốt trong lò đốt
  - Tái chế
  - Khác
- Section 2:** A group of radio buttons for waste collection frequency:
  - Không
  - Hàng ngày
  - Hàng tuần
  - Hàng tháng
- Section 3:** A text input field labeled "Tỷ lệ rác thải thức ăn thừa" (Food waste ratio).
- Section 4:** A group of radio buttons for food waste ratio ranges:
  - <20%
  - 20% - 40%
  - 40% - 60%
  - 60% - 80%
  - >80%
- Section 5:** A group of checkboxes for water waste collection:
  - Không được thu gom (vết tay do)
  - Không được thu gom và xử lý tại hộ gia đình (ví dụ xử lý trong bể tư hoặc bồn cầu, bể lọc nước)
  - Được thu gom và không xử lý (xả thải từ mành thoát nước không che đầy ra vùng nước mặn)
  - Được thu gom và xử lý (thu gom bao gồm thu gom qua hệ thống cống rãnh hoặc bằng xe bồn)
- Section 6:** A text input field labeled "Số người" (Number of people) with the value "5".
- Section 7:** A text input field labeled "Vật liệu mới" (New material) containing "Vui lòng điền vào đây".
- Section 8:** A text input field labeled "Loại hình sản xuất" (Type of production) containing "Vui lòng điền vào đây".
- Section 9:** A text input field labeled "Lượng điện đã sử dụng (kWh)" (Electricity usage in kWh).
- Section 10:** A button labeled "Làm mới" (Reset) and a "Khai báo" (Report) button with a blue background and white text.
- Section 11:** A small blue icon with a speech bubble and a person symbol.

**Figure 7. UI of Survey Page****Table 9. Elements of UI Survey Page**

From	Condition	Control Type	Target	Notes
1	Click	Check Box	Click to choose how to collect solid waste	
2	Click	Radio Button	Click to select solid waste collection frequency	
3	Input	Textbox	Click to rate of food waste	
4	Click	Radio Button	Click to select village	

5	Click	Check Box	Click to declare a new craft village	
6	Input	Textbox	Enter the longitude	
7	Input	Textbox	Enter the latitude	
8	Input	Textbox	Enter the name of village	
9	Input	Textbox	Enter a description of the craft village	
10	Click	Button	Click to refresh the information just filled	
11	Click	Button	Click to declare detail information	

### 3.3. Admin

#### 3.3.1. Create New Local Authority Page

The screenshot shows a web browser window with the URL `localhost:5000/admin-site/localauthority`. The page title is "Create Account". The form contains the following fields:

- Province/City: A dropdown menu labeled "1 ---".
- District: A dropdown menu labeled "2 ---".
- Organization:
  - Name: A text input field labeled "3 Name".
  - Username: A text input field labeled "4".
  - Password: A text input field labeled "5".
  - Phone: A text input field labeled "6".
  - Email: A text input field labeled "7".
- Create: A blue button labeled "8 Create".

**Figure 8.** UI of Create New Local Authority Page

**Table 10.** Elements of UI Create New Local Authority Page

From	Condition	Control Type	Target	Notes
1	Click	DropDownList	Click to select province/city	
2	Click	DropDownList	Click to select district	
3	Input	Textbox	Enter the name of organization	
4	Input	Textbox	Enter the email address	

5	Input	Textbox	Enter the phone number	
6	Click	Button	Click to create a new local authority	
7	Click	Check Box	Click to select the questions that the household is asked to answer	
8	Scroll	Scroll Bar	Scroll to select question	
9	Click	Button	Click to save the questionnaire	
10	Click	Button	Click to download dataset to train AI	



# Capstone Project 2

CMU-SE 451

**Test Plan Document**  
**Version 2.4**  
**Date: 29/04/2023**

## Craft Village Pollution Monitor System

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## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
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<b>Partner Organization</b>			
<b>Project Web URL</b>	<a href="https://github.com/Casca113s2/craft-village-pollution-monitor-system">https://github.com/Casca113s2/craft-village-pollution-monitor-system</a>		
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2.1	15/03/2023	Update Test Plan for Sprint 2	Huynh Ba Nhan Hua Hoang Phuc Nguyen Thanh Trung	
2.2	30/03/2023	Update Test Plan for Sprint 3	Van Cong Le Ca Hua Hoang Phuc Nguyen Thanh Trung	
2.3	14/04/2023	Update Test Plan for Sprint 4	Huynh Ba Nhan Hua Hoang Phuc Nguyen Thanh Trung	
2.4	29/04/2023	Update Test Plan for Sprint 5	Huynh Ba Nhan Hua Hoang Phuc Bui Duc Huy	

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# **1. Introduction**

A test plan is a detailed software verification document that provides specifics on how the validate will test all aspects of software design. Test plans are test specifications used as guides for writing test case suites for design validation in both the software engineering fields. This test plan document contains a description of product functionality, a description of test cases to be written for each function, and a description of the testing platform to be used.

## **1.1. Purpose**

The purpose of the Test Plan is to define, schedule and monitor the test execution. It supports the following objectives:

- Provide a high-level list of the major target test functions.
- List the Requirements for testing.
- Describe the testing strategies to be employed on each target test functions.
- Identify the required resources and schedule the Test execution.

## **1.2. Scope**

This Test Plan is for release test plan for CVPMS system. The Test Plan defines the unit, integration and system testing approach. The test scope includes the following:

- Testing of all functions.
- Application performance.
- Use cases requirements listed in the Product Backlog and User Stories document.

## **1.3. Out Of Scope**

The following is considered out of scope for Craft Village Pollution Monitor System Test Plan and testing scope: Performance testing for Craft Village Pollution Monitor System.

## 1.4. Reference

**Table 1.** Reference documents

No	Document references	Document Information
01	Proposal document	C2SE.01_CVPMS_Project-Proposal-Document_v2.2.docx
02	Product Backlog and User Story document	C2SE.01_CVPMS_ProductBacklog-Userstory-SprintBacklog.xlsx
03	Project Plan Document	C2SE.01_CVPMS_Project-Plan_v2.1.docx

## 1.5. Risk List

**Table 2.** Risk List

Risk	Mitigation Strategy	Responsibility	Contingency (Risk is realized)
External Risks	Get fewer projects but will definitely succeed or have a high success rate	Not under control of the Project Team or Project Steering Group	Do your part, recognize and eliminate risks as soon as possible
Project Management	Agree on all the standards before starting the project	Leader	It is mandatory to revise the whole project to the original standard if it is not correct
Tester	Sick, busy or crash cannot do it	Team tester	self-supplementing undo their assigned work, the way other members are supposed to support
Technology	Technology analysis before starting each project	Tester	Exchange learning in groups
Tester Skill	Train, or recruit experienced people	Tester, Team leader	Train technology professionals or invite professors to help with the project
Estimate Plan	Calculate carefully and accurately when taking requests and analyzing, apply good models and	Request Collectors, Request Analyst	Enlist the product delivery time or overtime for timely delivery

Risk	Mitigation Strategy	Responsibility	Contingency (Risk is realized)
	methods for estimation		
Automation Tool Risks	Choose the right tools and quality, check the tools before starting the project	Tester, Team leader	Exchange in groups, change new tools and remove inconsistent tools
Out of system scope	Analyze and find solutions to test all testable areas	Tester	

## 2. Test Specification

### 2.1. Test Items

**Table 3. Test Items**

\* The following list describes the features that will be tested

\*\* Team acronym – F: Function

ID	Function	A part of	Priority	Type Test case	Note
FE01	Login	PB11	M	User interface, Functionality, Usability	
FE02	Register	PB10	M	User interface, Functionality, Usability	
FE03	Forgot Password	PB12	L	User interface, Functionality, Usability	
FE04	Change Password	PB19	L	User interface, Functionality, Usability	
FE05	Add New Authority	PB03	H	User interface, Functionality, Usability	
FE06	Report Form	PB01	L	User interface, Functionality, Usability	
FE07	Accept Decline New Village	PB22	H	User interface, Functionality, Usability	

ID	Function	A part of	Priority	Type Test case	Note
FE08	Declare Household Survey	PB02	H	User interface, Functionality, Usability	
FE09	Declare Household Survey Form	PB02 PB03	H	User interface, Functionality, Usability	
FE10	Dashboard	PB03	H	User interface, Functionality, Usability	
FE11	Edit Village	PB05	H	User interface, Functionality, Usability	
FE12	Change Language	PB17	L	User interface, Functionality, Usability	

## 2.2. Test Deliverables

- Test Plan Document.
- Test Case Document.
- Test Summary Report.

## 2.3. Test Strategy

**Table 4. Test Strategy**

<b>Test Types</b>	<b>Test Stages</b>		
	<b>Unit</b>	<b>Integration</b>	<b>Acceptance</b>
Functional Tests	X	X	X
User Interface	X	X	X
Reliability ➤ Integrity ➤ Structure	X	X	

## 2.4. Tools

**Table 5. Tools**

<b>Purpose</b>	<b>Tool</b>	<b>Vendor</b>	<b>Version</b>
Microsoft Excel is used to write Test Plan and Test Cases.	Microsoft Excel	Microsoft	2016
Katalon Platform is an automation testing software tool developed by Katalon, Inc. The software is built on top of the <u>open-source</u> automation frameworks <u>Selenium</u> , <u>Appium</u> with a specialized <u>IDE</u> interface for <u>web</u> , <u>API</u> , <u>mobile</u> and desktop application testing.	Katalon	Katalon Studio	8.5.2

## 2.5. Resource

**Table 6. Resources**

The role	Resource	Specific responsibilities
Tester	All members	Executes the tests. Responsibilities include: ➤ Execute test suites ➤ Log results ➤ Analyze and recover from test failures ➤ Document incidents
Testing System	All members	Ensures test environments are managed and maintained. Responsibilities include: ➤ Administer test management system. ➤ Install and support access to, and recovery of, test environment configurations and test labs.

## 3. Test Cycle and Exit Criteria

### 3.1. Entry Criteria

- All test hardware platforms must have been successfully installed, configured, and functioning properly.
- All the necessary documentation, design, and requirements information should be available that will allow testers to operate the system and judge the correct behavior.
- Proper test case is available.
- The test environment such as, lab, hardware, software, and system administration support should be ready.

### 3.2. Exit Criteria

- All test cases have been run.
- A certain level of requirements coverage has been achieved.
- No high priority or severe bugs are left outstanding.
- All high-risk areas have been fully tested, with only minor residual risks left outstanding.
- The schedule has been achieved.
- Not over the allowed project budget

## 4. Test Milestones

**Table 7.** *Test milestones*

Milestone Task	Name	Date Start	Date Finish
Test Plan	Test Plan Document	01/03/2023	13/05/2023
Test plan and test case for Sprint 1	Test plan and test case for Sprint 1	01/03/2023	14/03/2023
Test plan and test case for Sprint 2	Test plan and test case for Sprint 2	15/03/2023	29/03/2023
Test plan and test case for Sprint 3	Test plan and test case for Sprint 3	30/03/2023	13/04/2023
Test plan and test case for Sprint 4	Test plan and test case for Sprint 4	14/04/2023	28/04/2023
Test plan and test case for Sprint 5	Test plan and test case for Sprint 5	29/04/2023	13/05/2023



# Capstone Project 2

CMU-SE 451

## Test Case

### Craft Village Pollution Monitor System

Submitted by  
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## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
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<b>Partner Organization</b>			
<b>Project Web URL</b>	<a href="https://github.com/Casca113s2/craft-village-pollution-monitor-system">https://github.com/Casca113s2/craft-village-pollution-monitor-system</a>		
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# 1. Integration Testing

## 1.1. Sprint 1

**Table 1. Login on Website**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Declare empty password	1. Enter the correct username 2. Leave the password blank 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023
TC02	Declare empty username	1. Leave the username blank 2. Enter the correct password 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023
TC03	Declare empty username & password	1. Leave username blank 2. Leave password blank 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023
TC04	Declare wrong password	1. Enter the correct username 2. Enter the wrong password 3. Click the "Đăng nhập" button	Display Error Message "Sai mật khẩu"	Display Error Message "Sai mật khẩu"	Pass	12/03/2023
TC05	Declare unregistered username	1. Enter the unregistered username 2. Enter the password 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023
TC06	Declare incorrect username	1. Enter the incorrect username format 2. Enter the password 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023
TC07	Declare username & password with a space	1. Enter a space in the username 2. Enter a space in the password 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC08	Declare password in an incorrect format	1. Enter the correct username 2. Enter the password in an incorrect format 3. Click the "Đăng nhập" button	Display Error Message "Sai mật khẩu"	Display Error Message "Sai mật khẩu"	Pass	12/03/2023
TC09	Check login page success	1. Enter the correct username 2. Enter the correct password 3. Click the "Đăng nhập" button	Redirect to homepage according to user's role	Redirect to homepage according to user's role	Pass	12/03/2023
TC10	Declare the deleted username	1. Enter the deleted username 2. Enter the password 3. Click the "Đăng nhập" button	Display Error Message "User không tồn tại"	Display Error Message "User không tồn tại"	Pass	12/03/2023
TC11	Check forget password	Click on "Quên mật khẩu?"	Switch to Forget Password Page	Switch to Forget Password Page	Pass	12/03/2023
TC12	Check register page	Click on "Đăng ký tại đây!"	Switch to Register Page	Switch to Register Page	Pass	12/03/2023

**Table 2. Register on Website**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Check register success	1. Enter correct username 2. Enter password 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Registered a new account to database	Registered a new account to database	Pass	12/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC02	Declare invalid username	1. Enter invalid username 2. Enter password 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC03	Declare empty username	1. Leave username blank 2. Enter password 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC04	Check register	1. Enter username with a space 2. Enter password 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC05	Declare empty password	1. Enter correct username 2. Leave password blank 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC06	Declare empty re-enter password	1. Enter correct username 2. Enter password 3. Leave the box to re-enter password blank 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC07	Declare empty re-enter password & invalid email address	1. Enter correct username 2. Enter password 3. Leave the box to re-enter password blank 4. Enter phone number 5. Enter invalid email address 6. Click on "Gửi mã" button 7. Enter the code received from email 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC08	Declare any code	1. Enter correct username 2. Enter password 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Enter any code 7. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC09	Declare empty code	1. Enter correct username 2. Enter password 3. Re-enter password 4. Enter phone number 5. Enter email address 6. Click on "Gửi mã" button 7. Leave the box to code blank 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC10	Check register	1. Enter correct username 2. Enter password 3. Re-enter password 4. Enter phone number 5. Leave email address blank 6. Click on "Gửi mã" button 7. Leave the box to code blank 8. Click on "Đăng ký" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	12/03/2023
TC11	Check switch to Login Page	Click on "Trở lại trang đăng nhập"	Switch to Login Page	Switch to Login Page	Pass	12/03/2023

**Table 3. Change Language Mobile**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Check Languge Change	1. Click on "VIE" 2. Select "ENG"	Change application language to English	Change application language to English	Pass	12/03/2023

**Table 4.** Change Password on Website

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Check Change Password Page success	1. Enter current password 2. Enter new password 3. Enter confirmed password 4. Click on Save button	Change password and redirect to homepage	Change password and redirect to homepage	Pass	12/03/2023
TC02	Declare wrong current password	1. Enter wrong current password 2. Enter new password 3. Enter confirmed password 4. Click on Save button	Display Error Message "Wrong password!"	Display Error Message "Wrong password!"	Pass	12/03/2023
TC03	Declare empty current password	1. Leave the box to current password blank 2. Enter new password 3. Enter confirmed password 4. Click on Save button	Display Error Message "Empty field!"	Display Error Message "Empty field!"	Pass	12/03/2023
TC04	Declare empty new password	1. Enter current password 2. Leave the box to new password blank 3. Enter confirmed password 4. Click on Save button	Display Error Message "Empty field!"	Display Error Message "Empty field!"	Pass	12/03/2023
TC05	Declare empty confirmed password	1. Enter current password 2. Enter new password 3. Leave the box to confirmed password blank 4. Click on Save button	Display Error Message "Empty field!"	Display Error Message "Empty field!"	Pass	12/03/2023
TC06	Declare wrong confirmed password	1. Enter current password 2. Enter new password 3. Enter wrong confirmed password 4. Click on Save button	Display Error Message "Confirmed password incorrect!"	Display Error Message "Confirmed password incorrect!"	Pass	12/03/2023
TC07	Cancel password change	1. Enter current password 2. Enter new password 3. Enter confirmed password 4. Click on Cancel button	Redirect to homepage	Redirect to homepage	Pass	12/03/2023

**Table 5. Forget Password on Website**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Check forget password page success	1. Enter the registered username 2. Enter the registered email address 3. Click Reset button	Change password and redirect to login page	Change password and redirect to login page	Pass	12/03/2023
TC02	Declare wrong registered username	1. Enter the wrong registered username 2. Enter the registered email address 3. Click Reset button	Display Error Message "Xử lý thất bại, vui lòng kiểm tra lại tên đăng nhập"	Display Error Message "Xử lý thất bại, vui lòng kiểm tra lại tên đăng nhập"	Pass	12/03/2023
TC03	Declare wrong registered email address	1. Enter the registered username 2. Enter the wrong registered email address 3. Click Reset button	Display Error Message "Xử lý thất bại, vui lòng kiểm tra lại email"	Display Error Message "Xử lý thất bại, vui lòng kiểm tra lại email"	Pass	12/03/2023
TC04	Declare wrong registered username and email address	1. Enter the wrong registered username 2. Enter the wrong registered email address 3. Click Reset button	Display Error Message "Xử lý thất bại, vui lòng kiểm tra lại tên đăng nhập"	Display Error Message "Xử lý thất bại, vui lòng kiểm tra lại tên đăng nhập"	Pass	12/03/2023
TC05	Check switch to Login Page	Click on "Trở lại trang đăng nhập"	Redirect to login	Redirect to login	Pass	12/03/2023

## 1.2. Sprint 2

**Table 6. Add New Authority on Website**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Check create new authority success	1. Select Province/City 2. Select District 3. Enter name of Organization 4. Enter correct email address 5. Enter correct phone number 6. Click on "Create" button	Create a new user	Create a new user	Pass	27/03/2023
TC02	Declare empty Province/City	1. Unselect Province/City 2. Select District 3. Enter name of Organization 4. Enter correct email address 5. Enter correct phone number 6. Click on "Create" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC03	Declare empty Province/City and District	1. Unselect Province/City 2. Unselect District 3. Enter name of Organization 4. Enter correct email address 5. Enter correct phone number 6. Click on "Create" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC04	Declare name of Organization with special characters	1. Select Province/City 2. Select District 3. Enter the name of Organization with special characters 4. Enter correct username 5. Enter correct password 6. Enter correct phone number 7. Enter correct email address 8. Click on "Create" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC05	Declare empty phone number	1. Select Province/City 2. Select District 3. Enter name of Organization 4. Enter correct username 5. Enter correct password 6. Leave phone number blank 7. Enter correct email address 8. Click on "Create" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC06	Declare empty email address	1. Select Province/City 2. Select District 3. Enter name of Organization 4. Enter correct username 5. Enter correct password 6. Enter correct phone number 7. Leave email address blank 8. Click on "Create" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC07	Declare invalid phone number	1. Select Province/City 2. Select District 3. Enter name of Organization 4. Enter correct username 5. Enter correct password 6. Enter correct phone number 7. Enter invalid email address 8. Click on "Create" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023

**Table 7. Report Form on Website**

<b>ID</b>	<b>Test Case Description</b>	<b>Test Case Procedure</b>	<b>Excepted Output</b>	<b>Actual Result</b>	<b>Test Result</b>	<b>Test Date</b>
TC01	Check Report Form success	1. Enter the type of error you get 2. Enter details about that type of error 3. Click on "Güç"	A success dialog box appears	A success dialog box appears	Pass	27/03/2023
TC02	Enter the missing information about the error type	1. Leave the error type blank 2. Enter details about that type of error 3. Click on "Güç"	A dialog box informing that you have entered missing information appears	Nothing changes	Fail	27/03/2023
TC03	Do not enter detailed error description	1. Enter the type of error you get 2. Leave error details blank 3. Click on "Güç"	A dialog box informing that you have entered missing information appears	Nothing changes	Fail	27/03/2023
TC04	Leave all information blank	1. Leave the error type blank 2. Leave error details blank 3. Click on "Güç"	A dialog box informing that you have entered missing information appears	Nothing changes	Fail	27/03/2023
TC05	Close the completed form	1. Enter the type of error you get 2. Enter details about that type of error 3. Click on button "X"	Filled information is still there when the Report button is pressed	Filled information is still there when the Report button is pressed	Pass	27/03/2023

**Table 8. Accept Decline New Village on Website**

<b>ID</b>	<b>Test Case Description</b>	<b>Test Case Procedure</b>	<b>Expected Output</b>	<b>Actual Result</b>	<b>Test Result</b>	<b>Test Date</b>
TC01	Check Accept new village success	Click on "√" button	Accept new village	Accept new village	Pass	27/03/2023
TC02	Check Decline new village success	Click on "X" button	Decline new village	Decline new village	Pass	27/03/2023
TC03	Check Create a new village success	1. Select Ward 2. Enter the name of craft village 3. Enter the longitude 4. Enter the latitude 5. Enter the description about craft village 6. Click on "Tạo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC04	Declare empty ward	1. Unselect Ward 2. Enter the name of craft village 3. Enter the longitude 4. Enter the latitude 5. Enter the description about craft village 6. Click on "Tạo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC05	Declare name of craft village with special character	1. Select Ward 2. Enter the name of craft village with special characters 3. Enter the longitude 4. Enter the latitude 5. Enter the description about craft village 6. Click on "Tạo" button	Create a new village to database	Create a new village to database	Pass	27/03/2023

ID	Test Case Description	Test Case Procedure	Excepted Output	Actual Result	Test Result	Test Date
TC06	Declare invalid longitude	1. Select Ward 2. Enter the name of craft village 3. Enter the invalid longitude 4. Enter the latitude 5. Enter the description about craft village 6. Click on "Tạo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC07	Declare invalid latitude	1. Select Ward 2. Enter the name of craft village 3. Enter the longitude 4. Enter the invalid latitude 5. Enter the description about craft village 6. Click on "Tạo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC08	Declare empty description about craft village	1. Select Ward 2. Enter the name of craft village 3. Enter the longitude 4. Enter the latitude 5. Leave the description about craft village blank 6. Click on "Tạo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC09	Declare empty name of craft village	1. Select Ward 2. Leave the box to the name of craft village blank 3. Enter the longitude 4. Enter the latitude 5. Enter the description about craft village 6. Click on "Tạo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023

**Table 9. Declare Household Survey Form on Website**

<b>ID</b>	<b>Test Case Description</b>	<b>Test Case Procedure</b>	<b>Expected Output</b>	<b>Actual Result</b>	<b>Test Result</b>	<b>Test Date</b>
TC01	Fill full the information	1. Click on "Thông tin sản xuất" 2. Fill full the information 3. Click on "Khai báo"	A dialog box informing that the request has been sent will appear	A dialog box informing that the request has been sent will appear	Pass	27/03/2023
TC02	Declare empty information	1. Click on "Thông tin sản xuất" 2. Leave all information blank 3. Click on "Khai báo"	The control will focus on the question which is required	The control will focus on the question which is required	Pass	27/03/2023
TC03	Only declare required fields	1. Click on "Thông tin sản xuất" 2. Leave all information blank 3. Click on "Khai báo"	A dialog box informing that the request has been sent will appear	A dialog box informing that the request has been sent will appear	Pass	27/03/2023
TC04	Click on "Refresh" button to refresh the information you just entered	1. Click on "Thông tin sản xuất" 2. Fill full the information 3. Click on "Làm mới"	The declaration form is refreshed	Nothing Change	Fail	27/03/2023
TC05	Close the form and then reopen it but still have the information you just filled in	1. Click on "Thông tin sản xuất" to open 2. Fill full the information 3. Click on "Thông tin sản xuất" to close 4. Click on "Thông tin sản xuất" to reopen	The information you just filled in is still there	The information you just filled in is still there	Pass	27/03/2023
TC06	Declare negative parameters	1. Click on "Thông tin sản xuất" 2. Enter negative parameters 3. Click on "Khai báo"	The message dialog box asks to fill in the correct format	A dialog box informing that the request has been sent will appear	Fail	27/03/2023
TC07	Declare a percentage greater than 100	1. Click on "Thông tin sản xuất" 2. Enter a number greater than 100% in the percent field 3. Click on "Khai báo"	The message dialog box asks to fill in the correct format	A dialog box informing that the request has been sent will appear	Fail	27/03/2023

**Table 10. Declare Household Survey**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Check survey page success	1.Select Province/City 2. Select District 3. Select Ward 4. Select Village 5. Click on "Khai báo" button	Enter new data to database	Enter new data to database	Pass	27/03/2023
TC02	Declare empty Province/City	1.Unselect Province/City 2. Select District 3. Select Ward 4. Select Village 5. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC03	Declare empty Province/City & District	1.Unselect Province/City 2. Unselect District 3. Select Ward 4. Select Village 5. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC04	Declare empty Province/City, District & Ward	1. Unelect Province/City 2. Unselect District 3. Unselect Ward 4. Select Village 5. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC05	Declare empty Province/City, District, Ward & Village	1. Unselect Province/City 2. Unselect District 3. Unselect Ward 4. Unselect Village 5. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC06	Declare a new village success	1. Select Province/City 2. Select District 3. Select Ward 4. Enter the latitude 5. Enter the longitude 6. Enter the name of village 7. Enter the description about craft village 8. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC07	Declare invalid latitude	1. Select Province/City 2. Select District 3. Select Ward 4. Enter the invalid latitude 5. Enter the longitude 6. Enter the name of village 7. Enter the description about craft village 8. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC08	Declare invalid longitude	1. Select Province/City 2. Select District 3. Select Ward 4. Enter the latitude 5. Enter the invalid longitude 6. Enter the name of village 7. Enter the description about craft village 8. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC09	Declare the name of village with special characters	1. Select Province/City 2. Select District 3. Select Ward 4. Enter the latitude 5. Enter the longitude 6. Enter the name of village with special characters 7. Enter the description about craft village 8. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023
TC10	Declare empty description about craft village	1. Select Province/City 2. Select District 3. Select Ward 4. Enter the latitude 5. Enter the longitude 6. Enter the name of village 7. Leave the box to the description about craft village blank 8. Click on "Khai báo" button	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Display Error Message "Vui lòng nhập đầy đủ thông tin!"	Pass	27/03/2023

**Table 11.** Dashboard on Website

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	When a marker is clicked, the information is displayed	Click the marker on the map	Display information about that craft village	Display information about that craft village	Pass	27/03/2023
TC02	Display craft villages by pollution type	Click on a pollution type in the filter section	Indicate craft villages that belong to that type of pollution	Indicate craft villages that belong to that type of pollution	Pass	27/03/2023
TC03	View surveys about craft village	Click button "<" or ">"	Display another survey about craft village	Display another survey about craft village	Pass	27/03/2023

### 1.3. Sprint 3

**Table 12.** Edit Village on Website

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Search craft village by name	1. Enter the name of the village you want to find 2. Click button search	Map showing the location of the craft village	Map showing the location of the craft village	Pass	11/04/2023
TC02	Do not enter anything in the search bar	1. Leave the search bar blank 2. Click button search	Map showing the location of the craft village	Map showing the location of the craft village	Pass	11/04/2023
TC03	Click the deselect all button to hide the location of all craft villages	Click the deselect button in select all	The location of the craft villages will disappear on the map	The location of the craft villages will disappear on the map	Pass	11/04/2023
TC04	Click the deselect all button to hide the location of a craft village	Click the deselect button in craft village	The location of the craft village will disappear on the map	The location of the craft villages will disappear on the map	Pass	11/04/2023
TC05	Declare empty name of village	1. Leave the name of village blank 2. Click "Cập nhật"	Display message please fill in information	Display message please fill in information	Pass	11/04/2023
TC06	Declare empty latitude	1. Leave the latitude blank 2. Click "Cập nhật"	Display message please fill in information	Display message please fill in information	Pass	11/04/2023
TC07	Declare empty longitude	1. Leave the longitude blank 2. Click "Cập nhật"	Display message please fill in information	Display message please fill in information	Pass	11/04/2023
TC08	Declare empty description	1. Leave the description blank 2. Click "Cập nhật"	Display message please fill in information	Display message please fill in information	Pass	11/04/2023

## 1.4.Sprint 4

**Table 13.** View Submitted Survey

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	View detailed household declaration	Click on "Chi tiết"	Display details of household production	Display details of household production	Pass	26/04/2023

## 1.5. Sprint 5

**Table 14.** Download Dataset

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	The dataset has been downloaded successfully	1. Click the download button 2. Choose a storage location 3. Click the Save button	Successfully downloaded the JSON dataset	Successfully downloaded the JSON dataset	Pass	11/05/2023

**Table 15.** AI Predicts The Outcome

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Display forecast of pollution type in craft villages through survey	Click to select a craft village on the map	Displays the type of pollution being warned	Displays the type of pollution being warned	Pass	11/05/2023

**Table 16. Warning Notice**

ID	Test Case Description	Test Case Procedure	Expected Output	Actual Result	Test Result	Test Date
TC01	Displays a conflict warning message between the user's declaration and the pollution forecast through the declaration of the craft village.	1. Click the notification button 2. Click on the notification line	Display village information Display marker warning for this survey on map and marker turns yellow Display that survey information	Display village information Display marker warning for this survey on map and marker turns yellow Display that survey information	Pass	11/05/2023

## 1.6. Integration Testing Sumary

**Table 17. Integration Testing Sumary**

Sprint	Number of Test Case	PASS	FAIL
1	36	36	0
2	41	35	6
3	8	8	0
4	1	1	0
5	3	3	0
<b>Total</b>	<b>89</b>	<b>83</b>	<b>6</b>

## 2. API Testing

### 2.1. Sprint 1

**Table 18. API Testing Sprint 1**

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
1	API Address	Get countries	GET	/craftvillage/api/address/getcountrylist		[           {             "countryId": int,             "zipcode": String,             "countryName": String           },         ]	[           {             "countryId": 1,             "zipcode": "AF",             "countryName": "AFGHANISTAN"           },           {             "countryId": 2,             "zipcode": "AX",             "countryName": "ÅLAND ISLANDS"           }         ]	Pass
2		Get provinces by countryid	GET	/craftvillage/api/address/getprovincelist?countryid=234		[           {             "provinceId": int,             "provinceCode": String,             "provinceName": String           },         ]	[           {             "provinceId": 1,             "provinceCode": null,             "provinceName": "Thành phố Hà Nội"           },           {             "provinceId": 2,             "provinceCode": null,             "provinceName": "Tỉnh Hà Giang"           }         ]	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
3	Get districts by provinceid	Get districts by provinceid	GET	/craftvillage/api/address/getdistrictlist?provinceid=1		[ { "districtId": int, "districtCode": String, "districtName": String }, ]	[ { "districtId": 1, "districtCode": null, "districtName": "Quận Ba Đình" }, { "districtId": 4, "districtCode": null, "districtName": "Quận Long Biên" }, ]	Pass
4		Get wards by districtid	GET	/craftvillage/api/address/getwardlist?districtid=1		[ { "wardId": int, "wardCode": String, "wardName": String }, ]	[ { "wardId": 1, "wardCode": null, "wardName": "Phường Phúc Xá" }, { "wardId": 4, "wardCode": null, "wardName": "Phường Trúc Bạch" }, ]	Pass
5		Get villages by wardid	GET	/craftvillage/api/address/getvillage?wardid=20029		[ { "villageId": int, "villageName": String, "coordinate": String, "note": }, ]	[ { "villageId": 3, "villageName": "Làng Nghè Bánh Tráng", "coordinate": "16.450702, 107.530666", "note": "Bánh tráng truyền thống ở làng Lụ Bão được t: "hasAdded": 1 }, { "villageId": 13, "villageName": "ln1", "coordinate": "16.46084699999999,107.60372199999999", "note": "not1", "hasAdded": 1 }, ]	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
						String, "hasAdded": int ],		
6	Create new village	POST	/craftvillage/api/village/new village	<pre>... "wardId": "3226", ... "longitude": "989", ... "latitude": "999", ... "note": "25/10", ... "hasAdded": "0", ... "villageName": "lang nghe moi 25/10 lan 11"</pre>	205	205		Pass
7	Create same village	POST	/craftvillage/api/village/new village	<pre>... "wardId": "3226", ... "longitude": "989", ... "latitude": "999", ... "note": "25/10", ... "hasAdded": "0", ... "villageName": "lang nghe moi 25/10 lan 11"</pre>	-1	-1		Pass

## 2.2. Sprint 2

**Table 19. API Testing Sprint 2**

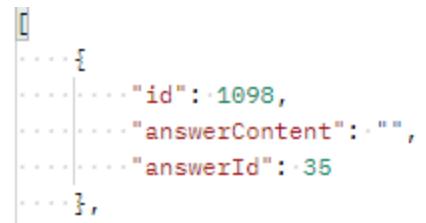
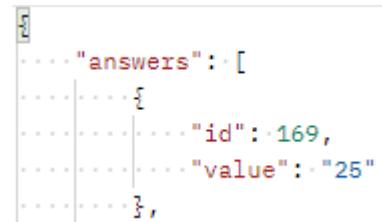
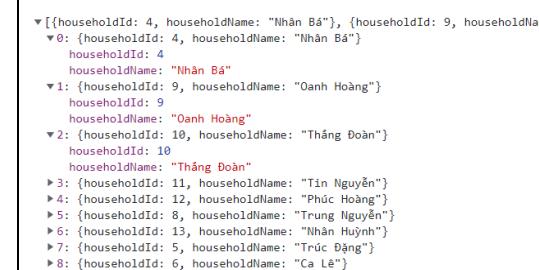
No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
1	Send mail	Send activated code	GET	/craftvillage/api/user/sendmail?email=capstone_1@gmail.com		{           "activeCode": String,           "activeDate": String         }	{           .... "activeCode": "x7Hjx8",           .... "activeDate": "2022-10-1"         }	Pass
2		Register_success	POST	/craftvillage/api/user/register	{           .... "username": "user01",           .... "password": "user01",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123456",           .... "email": "capstone_1@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "eDdIang4",           .... "activeCodeSubmit": "x7Hjx8"         }	{           "key": "11"         }	{           .... "key": "11"         }	Pass
3	Register	Register with same username	POST	/craftvillage/api/user/register	{           .... "username": "user01",           .... "password": "user02",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123789",           .... "email": "capstone_11@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "aTg3Skhr",           .... "activeCodeSubmit": "i87JHk"         }	{           "key": "12"         }	{           .... "key": "12"         }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
4	Register with same Email	Register with same Email	POST	/craftvillage/api/user/register	{           .... "username": "user02",           .... "password": "user02",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123789",           .... "email": "capstone_1@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "aTg3Skhr",           .... "activeCodeSubmit": "i87JHk"         }	{           "key": "13"         }	{           .... "key": "13"         }	Pass
5		Register with same phone number	POST	/craftvillage/api/user/register	{           .... "username": "user02",           .... "password": "user02",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123456",           .... "email": "capstone_11@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "aTg3Skhr",           .... "activeCodeSubmit": "i87JHk"         }	{           "key": "14"         }	{           .... "key": "14"         }	Pass
6		Register with wrong code	POST	/craftvillage/api/user/register	{           .... "username": "user02",           .... "password": "user02",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123789",           .... "email": "capstone_11@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "aTg3Skhr",           .... "activeCodeSubmit": "abcxyz"         }	{           "key": "0"         }	{           .... "key": "0"         }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
7		Register with expired code	POST	/craftvillage/api/user/register	{           "username": "user02",           "password": "user02",           "role": "USER",           "firstname": "firstname",           "lastname": "lastname",           "phone": "0905123789",           "email": "capstone_11@gmail.com",           "activeDate": "2022-9-1",           "activeCode": "aTg3Skhr",           "activeCodeSubmit": "i87JHk"         }	{           "key": "2"         }	{           "key": "2"         }	Pass
8		Login success	POST	/craftvillage/api/user/loginapp	{           "name": "user01",           "password": "user01"         }	{           "error": null,           "token": String         }	{           "error": null,           "token": "eyJhbGciOiJIUzI1NiJ9.eyJzdWIiOiJsYTAzIiwic2Vzc2lvbkIjoiRUYM0IxNjY2RUE1MDQ1MDM5OTJCODg0RTZDRTRCMkEiLCJleHAiOjE2NzE5NTE1ODMsImIhdCI6MTY3MDQ4MDM1NH0.r3V0wFtBYYwPlGizK8oAm9qp5TsL0NuZE6fMWKHbugc"         }	Pass
9	Log in	Login with wrong username	POST	/craftvillage/api/user/loginapp	{           "name": "user02",           "password": "user01"         }	{           "error": "ERR_USER_NOT_EXIST",           "token": null         }	{           "error": "ERR_USER_NOT_EXIST",           "token": null         }	Pass
10		Login account on 2 devices	POST	/craftvillage/api/user/loginapp	{           "name": "user01",           "password": "user01"         }	{           "error": "ERROR_LOGIN_DOUBLE",           "token": null         }	{           "error": "ERROR_LOGIN_DOUBLE",           "token": null         }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
11		Login with wrong password	POST	/craftvillage/api/user/loginapp	{ "username": "user01", "password": "user02" }	{           "error": "ERR_USER_WRONG_PASS",           "token": null         }	{           "error": "ERR_USER_WRONG_PASS",           "token": null         }	Pass
12	Log out	Log out	GET	/craftvillage/api/user/logoutapp		TRUE	TRUE	Pass
13		Reset password _success	POST	/craftvillage/api/user/forg etpass	{ "username": "user01", "email": "capstone_1@gmail.com" }	TRUE	TRUE	Pass
14	Forget password	Reset password with wrong username	POST	/craftvillage/api/user/forg etpass	{ "username": "user02", "email": "capstone_1@gmail.com" }	FALSE	FALSE	Pass
15		Reset password with wrong email	POST	/craftvillage/api/user/forg etpass	{ "username": "user01", "email": "capstone_11@gmail.com" }	FALSE	FALSE	Pass
16		Change password _success	POST	/craftvillage/api/user/changepass	{ "oldPass": "user01", "newPass": "newpass" }  { "oldPass": "oldpass", "newPass": "user01" }	TRUE	TRUE	Pass
17		Change password with wrong	POST	/craftvillage/api/user/changepass		FALSE	FALSE	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
		current password						
18	Update info	Update user info	POST	/craftvillage/api/user/updateuser	<pre>{   "firstname": "newfirstname",   "lastname": "newlastname",   "phone": "0905123456" }</pre>	TRUE	TRUE	Pass
19	Report	Report bug	POST	/report	<pre>{   "title": "Test Report",   "detail": "Day la loi" }</pre>	TRUE	TRUE	Pass
7	API Question	Get question	GET	/craftvillage/api/survey/question		<pre>[   {     "id": 181,     "questionContent": "Lượng khí ga đã sử dụng",     "questionType": "TextFieldNumber",     "questionLabel": "1000 m3",     "required": 1,     "srSurveyQuestionAnswers": [       {         "id": 169,         "answerContent": "Vui lòng điền vào đây",         "indicate": null,         "answerType": "TFN"       }     ]   },   ... ]</pre>		Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
8	API answer	Get answer	GET	/craftvillage/api/survey/answer				Pass
9	API answer	Submit answer	POST	/craftvillage/api/survey/answer		TRUE	TRUE	Pass
8	Get household	Get household	GET	/api/map/getHousehold?villageId=10711				Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
9	Get image	Get image	GET	/craftvillage/api/survey/getImage?surveyId=5		▼ {date: "2023-03-31 11:11:11.0", note: "Có mùi hôi",...} coordinate: "108.2075091, 16.0229705" date: "2023-03-31 11:11:11.0" image: "/9j/4QAYRXhpZgAASUkqAAgAAAAAAAAP/sABFEdwNre Show more (32.8 kB) Copy note: "Có mùi hôi" pollution: "Đất - Nước" warning: true		Pass
10	Get household answer	Get household answer	GET	/craftvillage/api/survey/answerHousehold?householdId=4		▼ [{id: 659, answerContent: "", answerId: 174}, {id: 645, answerContent: "16", answerId: 166},-] ▼ 0: {id: 659, answerContent: "", answerId: 174} answerContent: "" answerId: 174 id: 659 ▼ 1: {id: 645, answerContent: "16", answerId: 166} answerContent: "16" answerId: 166 id: 645 ▼ 2: {id: 643, answerContent: "true", answerId: 67} answerContent: "true" answerId: 67 id: 643 ► 3: {id: 644, answerContent: "true", answerId: 65} ► 4: {id: 657, answerContent: "", answerId: 72} ► 5: {id: 635, answerContent: "true", answerId: 125}		Pass

## 2.3. Sprint 3

**Table 20. API Testing Sprint 3**

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
1	Detect village	Detect village by coordinate	GET	/craftvillage/api/village/detectvillage?longitude=123.123&latitude=123.23	{ "hasAdded": "1", "wardName": "Phường Phúc Xá", "villageLongitude": "123.23", "districtId": "1", "districtName": "Quận Ba Đình", "villageNote": "day la mo ta", "villageLatitude": "123.123", "wardId": "1", "provinceName": "Thành phố Hà Nội", "villageName": "7/12 test", "villageId": "241", "provinceId": "1" }	{ "hasAdded": "1", "wardName": "Phường Phúc Xá", "villageLongitude": "123.23", "districtId": "1", "districtName": "Quận Ba Đình", "villageNote": "day la mo ta", "villageLatitude": "123.123", "wardId": "1", "provinceName": "Thành phố Hà Nội", "villageName": "7/12 test", "villageId": "241", "provinceId": "1" }	Pass	

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
2	Submit survey	Submit survey	POST	/craftvillage/api/village/submitvillage	{           .... "villageId": "1",           .... "longitude": "123",           .... "latitude": "latitude",           .... "image": "imageEncodeBase64String",           .... "result": "111",           .... "note": ""         }	TRUE	TRUE	Pass
3		Submit survey	POST	/craftvillage/api/village/submitvillage	{           .... "villageId": "-1",           .... "longitude": "123",           .... "latitude": "latitude",           .... "image": "imageEncodeBase64String",           .... "result": "111",           .... "note": ""         }	FALSE	FALSE	Pass
4	Declare village	Declare household's village	POST	/web/household/village	{           .... "villageId": "1"         }	TRUE	TRUE	Pass
5		Declare household's village	POST	/web/household/village	{           .... "villageId": "-1"         }	FALSE	FALSE	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
6	Create_success	Create with same account	POST	/web/admin/createauthority	{           .... "username": "localauthority1",           .... "password": "localauthority1",           .... "role": "LOCALAUTHORITY",           .... "name": "LOCALAUTHORITY name",           .... "phone": "0905111111",           .... "email": "localauthority1@gmail.com",           .... "district": "1"         }	{           "key": "1",           "message": "Đăng ký thành công!"         }	{           "key": "1",           "message": "Đăng ký thành công!"         }	Pass
7	Create Local Authority account	Create with same account	POST	/web/admin/createauthority	{           .... "username": "localauthority1",           .... "password": "localauthority1",           .... "role": "LOCALAUTHORITY",           .... "name": "LOCALAUTHORITY name",           .... "phone": "0905111111",           .... "email": "localauthority1@gmail.com",           .... "district": "1"         }	{           "key": "2",           "message": "Người dùng này đã tồn tại!"         }	{           "key": "2",           "message": "Người dùng này đã tồn tại!"         }	Pass
8	Create with same email	Create with same account	POST	/web/admin/createauthority	{           .... "username": "localauthority2",           .... "password": "localauthority2",           .... "role": "LOCALAUTHORITY",           .... "name": "LOCALAUTHORITY name",           .... "phone": "0905222222",           .... "email": "localauthority1@gmail.com",           .... "district": "1"         }	{           "key": "3",           "message": "Email này đã được sử dụng!"         }	{           "key": "3",           "message": "Email này đã được sử dụng!"         }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
9		Create with same phone number	POST	/web/admin/createauthority	<pre>{     "username": "localauthority2",     "password": "localauthority2",     "role": "LOCALAUTHORITY",     "name": "LOCALAUTHORITY name",     "phone": "0905111111",     "email": "localauthority2@gmail.com",     "district": "1" }</pre>	<pre>{     "key": "4",     "message": "Số điện thoại này đã được sử dụng!"}</pre>	<pre>{     "key": "4",     "message": "Số điện thoại này đã được sử dụng!"}</pre>	Pass
10	API answer	Submit answer	POST	/craftvillage/api/village/update	<p>▼ Request Payload <a href="#">view source</a></p> <pre>▼{villageId: 10711, wardId: 20260, note: "Làng nghề 1", longitude: "108.20720079802258",--}   latitude: "16.02312829010941"   longitude: "108.20720079802258"   note: "làng nghề 1"   villageId: 10711   villageName: "Làng nghề 5"   wardId: 20260</pre>	<pre>▼{villageId: 10711, villageName: "Làng nghề 5", coordinate: "16.02312829010941, 108.20720079802258",--}   coordinate: "16.02312829010941, 108.20720079802258"   hasAdded: 1   note: "Làng nghề 1"   state: "111"   villageId: 10711   villageName: "Làng nghề 5"</pre>		Pass

## 2.4. Sprint 4

**Table 21. API Testing Sprint 4**

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
1	Get surveys	Get survey	GET	/craftvillage/api/survey/allsurvey		{         "completedSurvey": [             {                 "villageId": "1",                 "villageName": "Làng gốm Bát Tràng",                 "date": "2022-11-05"             }         ],         "inprogressSurvey": []     }	{         "completedSurvey": [             {                 "villageId": "1",                 "villageName": "Làng gốm Bát Tràng",                 "date": "2022-11-05"             }         ],         "inprogressSurvey": []     }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
2	Register	Register_success	POST	/craftvillage/api/user/register	{           .... "username": "user01",           .... "password": "user01",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123456",           .... "email": "capstone_1@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "eDdIang4",           .... "activeCodeSubmit": "x7Hjx8"         }	{           "key": "11",           "message": "Đăng ký thành công!"         }	{           .... "key": "11",           .... "message": "Đăng ký thành công!"         }	Pass
3		Register with same username	POST	/craftvillage/api/user/register	{           .... "username": "user01",           .... "password": "user02",           .... "role": "USER",           .... "firstname": "firstname",           .... "lastname": "lastname",           .... "phone": "0905123789",           .... "email": "capstone_11@gmail.com",           .... "activeDate": "2022-10-1",           .... "activeCode": "aTg3Skhr",           .... "activeCodeSubmit": "i87JHk"         }	{           "key": "12",           "message": "Người dùng này đã tồn tại!"         }	{           .... "key": "12",           .... "message": "Người dùng này đã tồn tại!"         }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
4	Register with same Email	POST	/craftvillage/api/user/register		{     ....     "username": "user02",     ....     "password": "user02",     ....     "role": "USER",     ....     "firstname": "firstname",     ....     "lastname": "lastname",     ....     "phone": "0905123789",     ....     "email": "capstone_1@gmail.com",     ....     "activeDate": "2022-10-1",     ....     "activeCode": "aTg3Skhr",     ....     "activeCodeSubmit": "i87JHk" }	{     "key": "13",     "message": "Email này đã được sử dụng!" }	{     ....     "key": "13",     ....     "message": "Email này đã được sử dụng!" }	Pass
5	Register with same phone number	POST	/craftvillage/api/user/register		{     ....     "username": "user02",     ....     "password": "user02",     ....     "role": "USER",     ....     "firstname": "firstname",     ....     "lastname": "lastname",     ....     "phone": "0905123456",     ....     "email": "capstone_11@gmail.com",     ....     "activeDate": "2022-10-1",     ....     "activeCode": "aTg3Skhr",     ....     "activeCodeSubmit": "i87JHk" }	{     "key": "14",     "message": "Số điện thoại này đã được sử dụng!" }	{     ....     "key": "14",     ....     "message": "Số điện thoại này đã được sử dụng!" }	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
6		Register with wrong code	POST	/craftvillage/api/user/register	{     .... "username": "user02",     .... "password": "user02",     .... "role": "USER",     .... "firstname": "firstname",     .... "lastname": "lastname",     .... "phone": "0905123789",     .... "email": "capstone_11@gmail.com",     .... "activeDate": "2022-10-1",     .... "activeCode": "aTg3Skhr",     .... "activeCodeSubmit": "abxyz" }	{     "key": "0",     "message": "Sai mã xác nhận!" }	{     .... "key": "0",     .... "message": "Sai mã xác nhận!" }	Pass
7		Register with expired code	POST	/craftvillage/api/user/register	{     .... "username": "user02",     .... "password": "user02",     .... "role": "USER",     .... "firstname": "firstname",     .... "lastname": "lastname",     .... "phone": "0905123789",     .... "email": "capstone_11@gmail.com",     .... "activeDate": "2022-9-1",     .... "activeCode": "aTg3Skhr",     .... "activeCodeSubmit": "i87JHK" }	{     "key": "2",     "message": "Mã xác nhận đã hết hạn!" }	{     .... "key": "2",     .... "message": "Mã xác nhận đã hết hạn!" }	Pass
8	Make decision	Accept new village	POST	/web/authority/accept?villageId=4		TRUE	TRUE	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
9		Decline new village	POST	/web/authority/accept?villageId=5		TRUE	TRUE	Pass
10	Get data set	Get data set	GET	/craftvillage/api/dataSet/getAll			<pre>{   "pollution": "101",   "question": [     {       "questionId": 191,       "content": "Lượng nước đầu vào",       "answer": [         {           "value": "12",           "count": 1         }       ]     },     ...   ] }</pre>	Pass

## 2.5. Sprint 5

**Table 22. API Testing Sprint 5**

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
1	Detect village	Detect village by coordinate	GET	/craftvillage/api/village/detectvillage?longitude=123.123&latitude=123.23	[{"hasAdded": "1", "wardName": "Phường Phúc Xá", "villageLongitude": "123.23", "districtName": "Quận Ba Đình", "villageNote": "day la mo ta", "villageLatitude": "123.123", "provinceName": "Thành phố Hà Nội", "villageName": "7/12 test", "villageId": "241"}]	[{"hasAdded": "1", "wardName": "Phường Phúc Xá", "villageLongitude": "123.23", "districtName": "Quận Ba Đình", "villageNote": "day la mo ta", "villageLatitude": "123.123", "provinceName": "Thành phố Hà Nội", "villageName": "7/12 test", "villageId": "241"}]		Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
2	Update question	Update required state	PUT	/craftvillage/api/survey/question	<pre>{   "questionId": 22,   "required": 1 },</pre>	TRUE	TRUE	Pass
3	Notification	Get notification	GET	/craftvillage/api/notification		<pre>[   {     "villageId": 10711,     "surveyId": 5,     "date": "2023-03-31T04:11:11.000+0000",     "villageName": "Làng nghề 1"   } ]</pre>	<pre>[   {     "villageId": 10711,     "surveyId": 5,     "date": "2023-03-31T04:11:11.000+0000",     "villageName": "Làng nghề 1"   } ]</pre>	Pass

No	Test case name	Title	Method	URL	Payload	Expected result	Actual result	Status
4	Seen notification		PUT	/craftvillage/api/notification?id=2		TRUE	TRUE	Pass

## 2.6. API Testing Sumary

**Table 23. API Testing Sumary**

SPRINT	Sprint 1	Sprint 2	Sprint 3	Sprint 4	Sprint 5	Total
PASS	7	25	10	10	4	56
FAIL	0	0	0	0	0	0



# Capstone Project 2

CMU-SE 451

**Code Standard Document**  
**Version 2.0**  
**Date: 01/03/2023**

## Craft Village Pollution Monitor System

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A handwritten signature in blue ink, appearing to read 'Nguyễn Thành Bình'.

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## PROJECT INFORMATION

<b>Project acronym</b>	CVPMS		
<b>Project Title</b>	Craft Village Pollution Monitor System		
<b>Start Date</b>	01/03/2023	<b>End Date</b>	15/05/2023
<b>Lead Institution</b>	International School, Duy Tan University		
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2.0	01/03/2023	Initial Release	All members	

**Approve Document:** Sign in to approve the document

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# 1. Introduction

## 1.1. Purpose

This Coding Standard requires certain practices for developing programs in the Java, Dart language. The objective of this coding standard is to have a positive effect on:

- Avoidance of errors/bugs, especially the hard-to-find ones.
- Maintainability, by promoting some proven design principles

## 1.2. Scope

This standard pertains to the use of the Java, Dart language.

# 2. Code Standards

## 2.1. Dart Language Code Standard

### 2.1.1. Identifiers

- DO name types using UpperCamelCase.
- DO name extensions using UpperCamelCase.
- DO name libraries, packages, directories, and source files using lowercase\_with\_underscores.
- DO name import prefixes using lowercase\_with\_underscores.
- DO name other identifiers using lowerCamelCase.
- PREFER using lowerCamelCase for constant names.
- DO capitalize acronyms and abbreviations longer than two letters like words.
- PREFER using \_\_, \_\_\_, etc. for unused callback parameters.
- DON'T use a leading underscore for identifiers that aren't private.
- DON'T use prefix letters.

### 2.1.2. Ordering

- DO place “dart:” imports before other imports.
- DO place “package:” imports before relative imports.
- DO specify exports in a separate section after all imports.
- DO sort sections alphabetically.

### 2.1.3. Formatting

- DO format your code using dart format.
- CONSIDER changing your code to make it more formatter-friendly.

- AVOID lines longer than 80 characters.
- DO use curly braces for all flow control statements.

#### **2.1.4. Comments**

- DO format comments like sentences.
- DON'T use block comments for documentation.

#### **2.1.5. Doc comments**

- DO use /// doc comments to document members and types.
- PREFER writing doc comments for public APIs.
- CONSIDER writing a library-level doc comment.
- CONSIDER writing doc comments for private APIs.
- DO start doc comments with a single-sentence summary.
- DO separate the first sentence of a doc comment into its own paragraph.
- AVOID redundancy with the surrounding context.
- PREFER starting function or method comments with third-person verbs.
- PREFER starting a non-boolean variable or property comment with a noun phrase.
- PREFER starting a boolean variable or property comment with “Whether” followed by a noun or gerund phrase.
- DON'T write documentation for both the getter and setter of a property.
- PREFER starting library or type comments with noun phrases.
- CONSIDER including code samples in doc comments.
- DO use square brackets in doc comments to refer to in-scope identifiers.
- DO use prose to explain parameters, return values, and exceptions.
- DO put doc comments before metadata annotations.

#### **2.1.6. Markdown**

- AVOID using markdown excessively.
- AVOID using HTML for formatting.
- PREFER backtick fences for code blocks.

#### **2.1.7. Writing**

- PREFER brevity.
- AVOID abbreviations and acronyms unless they are obvious.
- PREFER using “this” instead of “the” to refer to a member’s instance.

### 2.1.8. Libraries

- DO use strings in part of directives.
- DON'T import libraries that are inside the src directory of another package.
- DON'T allow an import path to reach into or out of lib.
- PREFER relative import paths.

### 2.1.9. Null

- DON'T explicitly initialize variables to null.
- DON'T use an explicit default value of null.
- PREFER using ?? to convert null to a boolean value.
- AVOID late variables if you need to check whether they are initialized.
- CONSIDER assigning a nullable field to a local variable to enable type promotion.

### 2.1.10. Strings

- DO use adjacent strings to concatenate string literals.
- PREFER using interpolation to compose strings and values.
- AVOID using curly braces in interpolation when not needed.
- Collections
  - DO use collection literals when possible.
  - DON'T use .length to see if a collection is empty.
  - AVOID using Iterable.forEach() with a function literal.
  - DON'T use List.from() unless you intend to change the type of the result.
  - DO use whereType() to filter a collection by type.
  - DON'T use cast() when a nearby operation will do.
  - AVOID using cast().

### 2.1.11. Functions

- DO use a function declaration to bind a function to a name.
- DON'T create a lambda when a tear-off will do.
- DO use = to separate a named parameter from its default value.
- Variables
  - DO follow a consistent rule for var and final on local variables.
  - AVOID storing what you can calculate.

### 2.1.12. Members

- DON'T wrap a field in a getter and setter unnecessarily.
- PREFER using a final field to make a read-only property.
- CONSIDER using => for simple members.
- DON'T use this. except to redirect to a named constructor or to avoid shadowing.
- DO initialize fields at their declaration when possible.

### 2.1.13. Constructors

- DO use initializing formals when possible.
- DON'T use late when a constructor initializer list will do.
- DO use ; instead of {} for empty constructor bodies.
- DON'T use new.
- DON'T use const redundantly.

### 2.1.14. Error handling

- AVOID catches without on clauses.
- DON'T discard errors from catches without on clauses.
- DO throw objects that implement Error only for programmatic errors.
- DON'T explicitly catch Error or types that implement it.
- DO use rethrow to rethrow a caught exception.

### 2.1.15. Asynchrony

- PREFER async/await over using raw futures.
- DON'T use async when it has no useful effect.
- CONSIDER using higher-order methods to transform a stream.
- AVOID using Completer directly.
- DO test for Future<T> when disambiguating a FutureOr<T> whose type argument could be Object.

### 2.1.16. Names

- DO use terms consistently.
- AVOID abbreviations.
- PREFER putting the most descriptive noun last.
- CONSIDER making the code read like a sentence.
- PREFER a noun phrase for a non-boolean property or variable.

- PREFER a non-imperative verb phrase for a boolean property or variable.
- CONSIDER omitting the verb for a named boolean parameter.
- PREFER the “positive” name for a boolean property or variable.
- PREFER an imperative verb phrase for a function or method whose main purpose is a side effect.
- PREFER a noun phrase or non-imperative verb phrase for a function or method if returning a value is its primary purpose.
- CONSIDER an imperative verb phrase for a function or method if you want to draw attention to the work it performs.
- AVOID starting a method name with get.
- PREFER naming a method to `__()` if it copies the object’s state to a new object.
- PREFER naming a method as `__()` if it returns a different representation backed by the original object.
- AVOID describing the parameters in the function’s or method’s name.
- DO follow existing mnemonic conventions when naming type parameters.

### **2.1.17. Libraries**

- PREFER making declarations private.
- CONSIDER declaring multiple classes in the same library.

### **2.1.18. Classes and mixins**

- AVOID defining a one-member abstract class when a simple function will do.
- AVOID defining a class that contains only static members.
- AVOID extending a class that isn’t intended to be subclassed.
- DO document if your class supports being extended.
- AVOID implementing a class that isn’t intended to be an interface.
- DO document if your class supports being used as an interface.
- DO use mixin to define a mixin type.
- AVOID mixing in a type that isn’t intended to be a mixin.

### **2.1.19. Constructors**

- CONSIDER making your constructor const if the class supports it.
- Members
- PREFER making fields and top-level variables final.

- DO use getters for operations that conceptually access properties.
- DO use setters for operations that conceptually change properties.
- DON'T define a setter without a corresponding getter.
- AVOID using runtime type tests to fake overloading.
- AVOID public late final fields without initializers.
- AVOID returning nullable Future, Stream, and collection types.
- AVOID returning this from methods just to enable a fluent interface.

### **2.1.20. Types**

- DO type annotate variables without initializers.
- DO type annotate fields and top-level variables if the type isn't obvious.
- DON'T redundantly type annotate initialized local variables.
- DO annotate return types on function declarations.
- DO annotate parameter types on function declarations.
- DON'T annotate inferred parameter types on function expressions.
- DON'T type annotate initializing formals.
- DO write type arguments on generic invocations that aren't inferred.
- DON'T write type arguments on generic invocations that are inferred.
- AVOID writing incomplete generic types.
- DO annotate with dynamic instead of letting inference fail.
- PREFER signatures in function type annotations.
- DON'T specify a return type for a setter.
- DON'T use the legacy typedef syntax.
- PREFER inline function types over typedefs.
- PREFER using function type syntax for parameters.
- AVOID using dynamic unless you want to disable static checking.
- DO use Future<void> as the return type of asynchronous members that do not produce values.
- AVOID using FutureOr<T> as a return type.

### **2.1.21. Parameters**

- AVOID positional boolean parameters.
- AVOID optional positional parameters if the user may want to omit earlier parameters.

- AVOID mandatory parameters that accept a special “no argument” value.
- DO use inclusive start and exclusive end parameters to accept a range.
- Equality
- DO override hashCode if you override ==.
- DO make your == operator obey the mathematical rules of equality.
- AVOID defining custom equality for mutable classes.
- DON’T make the parameter to == nullable.

## 2.2. Java Language Code Standard

### 2.2.1. Source file structure

- License or copyright information, if present: If license or copyright information belongs in a file, it belongs here.
- Package statement: The package statement is not line-wrapped. The column limit does not apply to package statements.
- Import statements
  - ❖ No wildcard imports
  - ❖ No line-wrapping
  - ❖ Ordering and spacing
  - ❖ No static import for classes
- Class declaration
  - ❖ Exactly one top-level class declaration
  - ❖ Ordering of class contents

### 2.2.2. Formatting

- Braces
  - ❖ Use of optional braces
  - ❖ Nonempty blocks: K & R style
  - ❖ Empty blocks: may be concise
- Block indentation: +2 spaces
- One statement per line
- Column limit: 100
- Line-wrapping
  - ❖ Prefer to break at a higher syntactic level
  - ❖ Indent continuation lines at least +4 spaces

- Whitespace
  - ❖ Vertical Whitespace
  - ❖ Horizontal whitespace
  - ❖ Horizontal alignment: never required
- Grouping parentheses: recommended
- Specific constructs
  - ❖ Enum classes
  - ❖ Variable declarations
    - One variable per declaration
    - Declared when needed
  - ❖ Arrays
    - Array initializers: can be "block-like"
    - No C-style array declarations
  - ❖ Switch statements
    - Indentation
    - Fall-through: commented
    - Presence of the *default* label
  - ❖ Annotations
    - Type-use annotations
    - Class annotations
    - Method and constructor annotations
    - Field annotations
    - Parameter and local variable annotations
  - ❖ Comments
    - Block comment style: Block comments are indented at the same level as the surrounding code.
  - ❖ Modifiers: Class and member modifiers, when present, appear in the order recommended by the Java Language Specification
  - ❖ Numeric Literals: long-valued integer literals use an uppercase L suffix, never lowercase (to avoid confusion with the digit 1).

### 2.2.3. Naming

- Rules common to all identifiers: Identifiers use only ASCII letters and digits, and, in a small number of cases noted below, underscores.
- Rules by identifier type
  - ❖ Package names use only lowercase letters and digits (no underscores). Consecutive words are simply concatenated together.
  - ❖ Class names are written in UpperCamelCase. Class names are typically nouns or noun phrases
  - ❖ Method names are written in lowerCamelCase. Method names are typically verbs or verb phrases.
  - ❖ Constant names use UPPER\_SNAKE\_CASE: all uppercase letters, with each word separated from the next by a single underscore.
  - ❖ Non-constant field names (static or otherwise) are written in lowerCamelCase. These names are typically nouns or noun phrases.
  - ❖ Parameter names are written in lowerCamelCase. One-character parameter names in public methods should be avoided.
  - ❖ Local variable names are written in lowerCamelCase. Even when final and immutable, local variables are not considered to be constants, and should not be styled as constants.
  - ❖ Each type variable is named in one of two styles:
    - A single capital letter, optionally followed by a single numeral (such as E, T, X, T2)
    - A name in the form used for classes (see Section 5.2.2, Class names), followed by the capital letter T (examples: RequestT, FooBarT).
- Camel case: defined
  - ❖ Convert the phrase to plain ASCII and remove any apostrophes. For example, "Müller's algorithm" might become "Muellers algorithm".
  - ❖ Divide this result into words, splitting on spaces and any remaining punctuation (typically hyphens).
    - Recommended: if any word already has a conventional camel-case appearance in common usage, split this into its constituent

parts (e.g., "AdWords" becomes "ad words"). Note that a word such as "iOS" is not really in camel case per se; it defies any convention, so this recommendation does not apply.

- ❖ Now lowercase everything (including acronyms), then uppercase only the first character of:
  - ... each word, to yield upper camel case, or
  - ... each word except the first, to yield lower camel case
- ❖ Finally, join all the words into a single identifier.

#### 2.2.4. Programming Practices

- @Override: always used
- Caught exceptions: not ignored
- Static members: qualified using class
- Finalizers: not used

### 3. References

1. *Google team*, [“Effective Dart”](#)
2. *Google team*, [“Google Java Style Guide”](#)



## Capstone Project 2

CMU-SE 451

### Meeting With Mentor Document

**Craft Village Pollution Monitor System**

Submitted by  
Ca, Van Cong Le  
Huy, Bui Duc  
Phuc, Hua Hoang  
Trung, Nguyen Thanh  
Nhan, Huynh Ba

Approved by  
**Ph.D. Nguyen Thanh Binh**

**Proposal Review Panel Representative:**

---

Name              Signature              Date

**Capstone Project 2 - Mentor:**

A handwritten signature in blue ink, appearing to read 'Nguyen Thanh Binh'.

---

Name              Signature              Date

Meeting Information								
Product	Craft Village Pollution Monitor System							
Subject	First meeting with mentor							
Location	Online on skype							
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>					
	03/03/2023	20:00	21:00					
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 						
Related documents	Proposal document							
Content								
<ul style="list-style-type: none"> <li>➤ Introducing new member</li> <li>➤ Demo of the functions implemented in capstone 1</li> <li>➤ Get new requests for capstone 2           <ul style="list-style-type: none"> <li>❖ Push mobile apps to the store and Backend, web application to online</li> <li>❖ Check the system when deploying online</li> </ul> </li> </ul>								
Result Items								
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Project Proposal</li> <li>❖ Project Plan</li> <li>❖ Architecture Document</li> <li>❖ Test Plan</li> </ul> </li> </ul>								

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	First meeting with mentor					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	13/03/2023	20:00	20:35			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	All documents					
Content						
<ul style="list-style-type: none"> <li>➤ Update the situation of the capstone 2 project:           <ul style="list-style-type: none"> <li>❖ Mobile apps pushed to Google Play Store</li> <li>❖ Backend and Web application pushed to AWS</li> <li>❖ AI up and running through AWS</li> </ul> </li> <li>➤ Get more project requests:           <ul style="list-style-type: none"> <li>❖ Documentation that clearly describes AI and Location-based workflows.</li> <li>❖ Deploy system test on real device. Especially mobile applications need to run on real phones to check and report errors on different types of mobile phones.</li> </ul> </li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Project Proposal</li> <li>❖ Project Plan</li> <li>❖ Architecture Document</li> <li>❖ Test Plan</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Technical review					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	22/03/2023	20:00	20:45			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Update the situation of the capstone 2 project:           <ul style="list-style-type: none"> <li>❖ Mobile apps pushed to the Google Play Store are approved by Google and allow users to download.</li> <li>❖ Backends, web apps, and AI uploaded to AWS are made into services to avoid crashes and manual restarts.</li> </ul> </li> <li>➤ Clarifying AI and location-based workflow.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Idea clarification and demo					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	30/03/2023	20:00	20:35			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Demo function of production declaration.</li> <li>➤ Demo function report.</li> <li>➤ Design dashboard of local government (In process).</li> <li>➤ Clarification of AI and Location-based workflows.</li> <li>➤ Request capstone 2 project update:           <ul style="list-style-type: none"> <li>❖ AI and Location-Based Documentation.</li> </ul> </li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Technical review and demo					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	06/04/2023	23:00	00:00			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Update the situation of capstone 2 project:           <ul style="list-style-type: none"> <li>❖ Backend, web application and AI are uploaded to VPS rented in Vietnam to replace the previous AWS.</li> <li>❖ Fix mobile apps when running on real devices.</li> </ul> </li> <li>➤ Demo of positioning functions on the product when running online.</li> <li>➤ Clarifying AI and location-based workflows.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Idea clarification and demo					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	13/04/2023	20:30	21:10			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ More demo about having 2-3 craft villages in one location.</li> <li>➤ The AI team will have a report as well as seek additional opinions to come up with a new AI that matches the requirements.</li> <li>➤ Clarifying AI and location-based workflows:           <ul style="list-style-type: none"> <li>❖ When making decisions, AI needs to synthesize information from craft villages and photos to be able to make the most accurate decisions.</li> </ul> </li> <li>➤ Unify how to generate/Data to train AI.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Idea clarification and demo					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	20/04/2023	20:30	21:30			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Team AI will have a report as well as ask for more opinions on creating data sets for train AI.</li> <li>➤ Clarification of AI and Location-based workflows.</li> <li>➤ Agree on how to get GPS tags for LSB.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information								
Product	Craft Village Pollution Monitor System							
Subject	Technical review and demo							
Location	Online on skype							
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>					
	08/05/2023	20:00	21:00					
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 						
Related documents	Architecture Document, Test Cases							
Content								
<ul style="list-style-type: none"> <li>➤ Team AI will report:           <ul style="list-style-type: none"> <li>❖ Train dataset</li> <li>❖ The questionnaire affects the type of pollution the craft village can cause</li> <li>❖ Random Forest algorithm application.</li> <li>❖ Application of Decision Tree algorithm.</li> </ul> </li> <li>➤ Use standard Exif and metadata tags for LSB:           <ul style="list-style-type: none"> <li>❖ GPS GPSLatitude</li> <li>❖ GPS GPSLatitudeRef</li> <li>❖ GPS GPSLongitude</li> <li>❖ GPS GPSLongitudeRef</li> <li>❖ DateTime</li> </ul> </li> </ul>								
Result Items								
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>								

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Demo					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	15/05/2023	20:00	20:50			
Attendees	 Nguyen Thanh Binh  Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan	<b>Mentor Signature</b> 				
Related documents	All Documents					
Content						
<ul style="list-style-type: none"> <li>➤ Team AI will report:           <ul style="list-style-type: none"> <li>❖ Train dataset</li> <li>❖ The questionnaire affects the type of pollution the craft village can cause</li> <li>❖ Random Forest algorithm application.</li> <li>❖ Application of Decision Tree algorithm.</li> </ul> </li> <li>➤ Handling survey conflicts with pollution of craft villages.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ All Documents</li> </ul> </li> </ul>						



# Capstone Project 2

CMU-SE 451

## Team Meeting Document

### Craft Village Pollution Monitor System

Submitted by  
Ca, Van Cong Le  
Huy, Bui Duc  
Phuc, Hua Hoang  
Trung, Nguyen Thanh  
Nhan, Huynh Ba

Approved by  
Ph.D. Nguyen Thanh Binh

#### Proposal Review Panel Representative:

---

Name      Signature      Date

#### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyễn Thành Bình'.

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Name      Signature      Date

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Introduce, discuss topic & process					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	03/03/2023	21:00	21:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	All Documents					
Content						
<ul style="list-style-type: none"> <li>➤ Confirm new requirement for capstone 2 and find solution:           <ul style="list-style-type: none"> <li>❖ Mobile application to Google Play Store.</li> <li>❖ Backend, web application and AI online via AWS or VPS.</li> <li>❖ Assign roles to new members.</li> </ul> </li> </ul>						
Result Items						
All Documents						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	13/03/2023	20:35	21:15			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Get more project requirements:           <ul style="list-style-type: none"> <li>❖ The documentation section clearly describes the AI and Location-base workflow for members. (Ca, Huy, Phuc)</li> <li>❖ Consider whether a solution using AWS is appropriate.</li> <li>❖ Check for errors detected during use on real devices.</li> <li>❖ Implement new functional code for web application.</li> </ul> </li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	22/03/2023	20:45	21:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ More specific analysis of AI and Location-Based Workflows discussed with previous teachers.</li> <li>➤ Research the free version of AWS and look at paid options.</li> <li>➤ Check the detected errors on the system after running online.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	28/03/2023	20:00	20:50			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Declare the functions that have been - are - will do. (Summarize words for teachers).</li> <li>➤ Report bugs using trello.</li> <li>➤ Server rental:           <ul style="list-style-type: none"> <li>❖ Use temporary free version.</li> <li>❖ The next time you meet, you will ask if you need a paid copy.</li> </ul> </li> <li>➤ Fixed group meeting schedule:           <ul style="list-style-type: none"> <li>❖ The format of the meeting will be to meet the teacher and then have a group meeting.</li> <li>❖ Fixed at 20:30 every Thursday. (There will be additional group meetings during the week or change meetings if necessary)</li> </ul> </li> <li>➤ Next Thursday: The Backend team will report to you on the work done and have related questions.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	30/03/2023	20:35	21:15			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ More specific analysis of AI and Location-Based Workflows discussed with previous teachers.</li> <li>➤ Take into account the option of renting VPS.</li> <li>➤ Check the detected errors on the system.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report, demo and idea clarification					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	06/04/2023	22:00	23:00			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Re-deploy the notice of the faculty meeting for those who could not attend that afternoon.</li> <li>➤ Clarifying AI and location-based workflows.</li> <li>➤ Notice about renting VPS server and guide other teams to change IP for the application.</li> <li>➤ Review bugs</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	11/04/2023	20:00	20:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs</li> </ul>						
Result Items						
All Documents						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report, demo and idea clarification					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	13/04/2023	21:10	22:20			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Clarifying AI and location-based workflows:           <ul style="list-style-type: none"> <li>❖ When making decisions, AI needs to synthesize information from craft villages and photos to be able to make the most accurate decisions.</li> </ul> </li> <li>➤ Unify how to generate/Data to train AI.</li> <li>➤ Agree on the mobile application that will extract data from the image.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	15/04/2023	19:00	21:00			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ AI team presents AI training plan.</li> <li>➤ Agree on the plan to get/create data for AI.</li> <li>➤ Review bugs</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	18/04/2023	20:00	20:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ AI team presents AI training plan.</li> <li>➤ Review bugs</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	20/04/2023	21:30	22:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Update the progress of data creation and division of new tasks for the whole team.</li> <li>➤ Review bugs</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	22/04/2023	16:00	16:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Update the progress of data creation and division of new tasks for the whole team.</li> <li>➤ Review bugs</li> <li>➤ Prepare for the midterm review:           <ul style="list-style-type: none"> <li>❖ Documents</li> <li>❖ Source code</li> <li>❖ Laptop</li> <li>❖ Mobile Phone</li> <li>❖ Time and place of meeting</li> </ul> </li> </ul>						
Result Items						
All Documents						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	25/04/2023	20:00	20:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Plan, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Update the progress of data creation and division of new tasks for the whole team.</li> <li>➤ Review bugs</li> <li>➤ Deploy and re-evaluate the bad contents in the mid-term review:           <ul style="list-style-type: none"> <li>❖ Product backlog documentation</li> <li>❖ Test plan documentation.</li> <li>❖ Documentation of test cases.</li> </ul> </li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Plan</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report and idea clarification					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	03/05/2023	13:00	13:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs</li> <li>➤ Algorithm update and workflow reassessment for AI and LSB.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	04/05/2023	21:15	22:00			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs</li> <li>➤ Updated datasets for AI training and data processing.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	06/05/2023	19:00	19:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	08/05/2023	21:00	22:15			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	Product Backlog, Architecture Document, Test Cases					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs.</li> </ul>						
Result Items						
<ul style="list-style-type: none"> <li>➤ Required documents:           <ul style="list-style-type: none"> <li>❖ Product Backlog</li> <li>❖ Architecture Document</li> <li>❖ Test Cases</li> </ul> </li> </ul>						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	10/05/2023	19:00	19:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	All Documents					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs.</li> </ul>						
Result Items						
All Documents						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Report					
Location	Online on Facebook					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	12/05/2023	19:00	19:30			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	All Documents					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Review bugs.</li> </ul>						
Result Items						
All Documents						

Meeting Information						
Product	Craft Village Pollution Monitor System					
Subject	Emergency meeting					
Location	Online on skype					
Date and Time	<i>Date</i>	<i>Start Time</i>	<i>End Time</i>			
	15/05/2023	20:50	21:40			
Attendees	 Van Cong Le Ca  Bui Duc Huy  Hua Hoang Phuc  Nguyen thanh Trung  Huynh Ba Nhan					
Related documents	All Documents					
Content						
<ul style="list-style-type: none"> <li>➤ Teams announce the functions that have been - are - will do.</li> <li>➤ Divide and update related documents.</li> <li>➤ Handle conflict survey with household.</li> <li>➤ Review bugs.</li> </ul>						
Result Items						
All Documents						



# Capstone Project 2

CMU-SE 451

## Reflection

Date: 13/05/2023

### Craft Village Pollution Monitor System

Submitted by  
Ca, Van Cong Le  
Huy, Bui Duc  
Phuc, Hua Hoang  
Trung, Nguyen Thanh  
Nhan, Huynh Ba

Approved by  
Ph.D. Nguyen Thanh Binh

#### Proposal Review Panel Representative:

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Name              Signature              Date

#### Capstone Project 2 - Mentor:

A handwritten signature in blue ink, appearing to read 'Nguyen Thanh Binh'.

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Name              Signature              Date

<b>Team Number/</b>	C2SE.01
<b>Team Name</b>	
<b>Project title</b>	CVPMS – Craft Village Pollution Monitor System
<b>How many students are on your team?</b>	5
<b>List the team member's name</b>	Ca, Van Cong Le Huy, Bui Duc Phuc, Hua Hoang Trung, Nguyen Thanh Nhan, Huynh Ba

### Reflection (Required)

#### What challenges did you face while completing this project?

- A common difficulty of the group in completing the project is new knowledge and technology. Our group has to get in touch with new knowledge and technology such as machine learning, location base, image processing, ...etc.
- Lack of communication is also a barrier for my team.
- Lack of practical experience. Estimating workload depends heavily on the feelings and experiences of each individual.
- Appropriately matching skills to project tasks requires the experience to know what skills are required for what tasks.

#### What were the highlights for you/your team during this project?

- New technology:
  - ✧ Image Classification is used to predict pollution types from the input image.
  - ✧ Location-based service is used to get user's location automatically.
- The main point is that we apply these technologies to monitor pollution from craft villages. Currently, most of Vietnam's craft villages were and are now being polluted. Therefore, we hope that our system can encourage people of all ages to take part in protecting the environment.
- After working together for four months, individuals had positive changes in their opinions, ways of thinking and acting, and attitudes toward other people. We also felt more responsible for the work.

- We have successfully used machine learning technology to build a model that can predict the types of pollution from the input image.

### **What is the most important thing you learned in this project?**

- Teamwork and communication, this always is an important thing when working with others. Although we already have time to work together but when starting doing something new, this job requires different skills and the ability to manage team members.
- We learned that it is very simple to develop features and modules when we understand the requirements.
- We gained experience in how to research previously unknown topics.
- Process and framework, estimating is also important. After going through this project, we have a better understanding and more accurate estimation of the time to complete the task, function scores, ...
- Problem solving and accountability, in order to keep up with project progress, each team member always has the responsibility for the assigned work and instead of dealing with a big problem, we know how to divide small problems to handle them effectively.

### **What part of the project did you do your best work on?**

Each team member will have strengths and they will do well in the following parts:

- Ca: Interface design, beautify the User Interface for the mobile application, participate in location-based service and AI technology research, collect data and integrate AI.
- Huy: Research on applying machine learning to classify environmental pollution from images, crawl and prepare data for training, train machine learning model, create API to predict and return the pollution types from the input image.
- Phuc: Interact with databases, develop Backend API services, research and deploy location-based service technology, collect data and integrate AI.
- Trung: Interface design, beautify the User Interface for the web application, participate in pollution AI technology research, collect data and integrate AI.

- Nhan: Interface design, beautify the User Interface for the web application, deploy the web application to the server, manage the project's server, participate in pollution AI technology research, collect data and integrate AI.

### **What was the most enjoyable part of this project?**

- Planning Poker activities. This is an activity that happens every Sprint starts. After the Product owner read each backlog, the team members asked to analyze and clarify this backlog. This is when the members give their opinions, evaluate the complexity of the backlog, give the score of the backlogs (corresponding to the execution time) and agree on their views.
- All members respect the opinions of others.
- Offline working with members: This is the time when everyone in the team exchange knowledge, talk best, consolidate the solidarity in the team.
- Sprint Retrospective. This is the activity that takes place at the end of a Sprint. Team members reviewed what was good and bad and what needed to be improved during the sprint. From there, the members are clear about each other and comfortably communicate and implement projects.

### **What is the least interesting part of this project?**

- Making a professional and detailed document takes time and researches many aspects.
- It is possible for requirements to change at any time.
- Detailed planning for each task requires experience in project work and accurate time measurement for that task.

### **What needs to be improved to make the project team work best?**

- The schedule should be more accurate and relevant.
- Improving risk management
- Participate more actively in working together, especially face-to-face meetings and daily meetings.
- There is a clear purpose.
- Set and follow the rules in the group.
- Accept differences.

**How could you/your mentor(s) change this project to make it better next time?**

- We should keep in touch with our mentors and report the difficulties that we are facing.
- More focus and discussion on the project.
- Release the application on many different other stores.
- Try to understand the problems faced by market applications and from that improve, apply and our application.