# Report No.2 Software Project Management Plan

## Problem Definition

### Name of this Capstone Project

-Official name: iMuseum

-Vietnamese name: Bảo tàng thông minh

-Abbreviation: iBM

### Problem Abstract

To solve those problems, which mentioned above, we provide a system that provide fully information about the historic events, things, which are demonstrated in the museum for the visitors without a person as a tourist guide. The system also provide the related event. The system includes numbers of Estimote beacons, an internet connected mobile device and a web service. The system will plays the tourist guide to provide information about everything in the museum. We also provide an information system as a BOM website for the admin to manipulate information of the beacons and tracking the location of the beacons.

However, at starting point, there is some problem for developing the system. The newest official SDK of Estimote Beacon is not stable. Sometimes the application crash because of the newest official SDK.

Following to Estimote Beacon document, ***“do not expect distance estimations from beacons.”* So the team must study the new way about identify the distance between smartphone and Estimote Beacon.**

**Following to Estimote Beacon document, it** categorize the beacons into four **proximity zones**: *Immediate* (strong signal; usually up to a few centimeters), *near* (medium signal; usually up to a few meters), *far* (weak signal; more than a few meters), *unknown* (“hard to say”, usually when the signal is very, very weak). They do not provide us the exactly proximity zones in number. There for our team must test to determine the exactly number.

Estimote Beacon connects with smartphone via Bluetooth 4.0 BLE, our team should study about the connect protocol, which device support, which does not.

Team has to set a plan to approach the Estimote Beacon:

* + Test with available application to understand more about how to use the Estimote Beacon and how the Estimote Beacon work.
  + Find out how to monitor and range the Estimote Beacon with the mobile device.
  + Get data of Estimote Beacon of cloud and show it to mobile device.

### Project Overview

#### Current Situation

Below are the problems encountered in this project:

* **Disadvantages:**
* Risk: Because the project uses Estimote Beacon, team must study new technology/ API to apply it.
* Smartphone must always have internet connection to get data from beacon.

* **Advantages:**
* Receive good support from Estimote Beacon development forum: Because of the development of Estimote community, it is easier for team to get support from Estimote community forum when raise a problem.
* Estimote Beacon has the official SDK for Android.

#### The Proposed System

According to the technology researches, Estimote Beacon is the key to solve the current situation about providing information for the museum visitors. We can use the feature of Estimote Beacon to solve the problem. The basic idea is to use the Estimote Beacon to provide the way to store the information about the historic events and things in cloud. When visitors move nearby the event, visitors can choose the beacon to read all the information about the event, and the related event.

To deploy the system, the museum place the inputted information beacon at the proper event. The visitors must use smartphone that support Bluetooth v4.0 Less Energy with our application installed. While visitors explore the museum, they will pass by the events, things, which are demonstrated in the museum. The beacons will be display on the smartphone with overall description, to explore the information; the visitors have to choose the beacon on smartphone screen. The proper beacon will transfer the information to the smartphone including full information about the event and the related event.

##### BOM Website

BOM website is a place that admin can take manage the information on the beacons. Moreover, the admin can track on the beacons location to know if the beacons are moved illegally.

* *For admin*
* Manage information: Admin can take manage information by manipulating information of the historic event, things.

##### Web Services

Web service provide API for BOM Website and Mobile application to connect to server to perform function.

* For visitor:
* Check the ticket code of visitor is valid or not to provide them the function get data of Estimote Beacon in the museum.
* Get the historic event or things to mobile for visitor can read or save.
* For admin:
* Get the list of beacons in the museum.
* Get historic thing’s information from beacon cloud using Beacon’s UUID for admin to view.
* Push historic thing’s information to specific beacon cloud.
* Update historic thing’s information to specific beacon cloud.
* For staff:
* Notify beacon’s status for admin.

##### Mobile Application

* *For visitors*

This is the primary application, which provide to visitors with following functions:

* Confirm Ticket code: Visitor can confirm the code after buy the ticket to use the system. The code is printed on the ticket and available in a day.
* Detect Beacon location: Visitors can locate exactly the location of what they want to explore with an overview description.
* Provide information: Visitors can view fully information about the event, things that the beacon carries. Visitors can also know the related event, stories.
* Navigate: Visitors can view the navigations to know where the beacon that contain the related event to explore.
* *For staff*
* Detect beacon location: if the beacon is move out of it proper location, the system will notify for the staff.

#### Boundaries of the System

* A visitor who wants to use the functions of this system have to equip enough device includes:
* A mobile device that support Bluetooth v4.0, which has installed our application and connected to internet.
* To do the job, a staff of the system must be equipped the following devices:
* A mobile device that support Bluetooth v4.0, which has installed our application and connected to internet.
* The complete product includes:
* A mobile application that allow:
* Confirm ticket code (for visitor)
* Detect Beacons location (for visitor / for staff)
* Provide information (for visitor)
* Navigate (for visitor)
* A web application that allow:
* Manage Beacons information (for admin)
* Manage Beacons location (for admin)

#### Future Plans

Currently, the system only deploy on a single platform: Android. We design the system to make it easily to scale to be a bigger model with more functions and run on more platform:

* Run on multiple platform on client side: iOS, Windows Phone.
* The system is design to easily scale for bigger travel model such as national park, city, etc…
* The mobile application can fully support visually-impaired visitors by providing the text-to-speech function in order to read the historic events and things information for the visitors; visitors can also answer yes/no question by tapping the screen for “Yes” or the Back button of the device for “No”.

#### Development Environment

##### Hardware requirements

* **For server/web development**

|  |  |  |
| --- | --- | --- |
| **Windows** | **Minimum Requirements** | **Recommended** |
| **Internet Connection** | Cable, Wi-Fi (4 Mbps) | Cable, Wi-Fi (8 Mbps) |
| **Operating System** | Ubuntu Server 12 LTS/ Windows Server 2008 | Ubuntu Server 14.04.2 LTS/ Windows Server 2008 |
| **Computer Processor** | Intel® CORE i3 Quad core 2.1 GHz | Intel® CORE i7 Quad core 2.4 GHz |
| **Computer Memory** | 2GB RAM | 4GB or more |

Table 2: Hardware Requirement for server/ web development

* **For mobile development**

|  |  |  |
| --- | --- | --- |
| **Android** | **Minimum Requirements** | **Recommended** |
| **Internet Connection** | Wi-Fi (4 Mbps) | Wi-Fi (8 Mbps) |
| **Operating System** | Android 4.4: Kitkat | Android 5.1.1: Lollipop |
| **Processor** | Snapdragon 400 1.7GHz Dual Core | Snapdragon 600 1.89GHz Quad Core or higher |
| **Memory** | 512MB RAM | 2GB |
| **Bluetooth** | Bluetooth 4.0 required | Bluetooth 4.0 required |

Table 3: Hardware Requirement for client (Mobile device) development

##### Software requirements

|  |  |  |
| --- | --- | --- |
|  | Name / Version | Description |
| Modeling tool | Star UML 5.0 | Used to implement website and web service |
| IDE | Netbeans 8.0.2 | Programming tools |
| DBMS | MS SQL Server 2008 | Used to create & manage the database for system |
| Source control | SourceTree 1.8.3.0 or above | Used for source control |
| Web browser | Chrome 47 or above | Testing browser |

Table 4: Software requirements for develop web site and web service

|  |  |  |
| --- | --- | --- |
|  | Name / Version | Description |
| IDE | Android Studio 2.1.0 | Programming tools |
| Source control | SourceTree 1.8.3.0 or above | Used for source control |
| Testing OS | Android 5.0.1: Lollipop | Testing Client Operation System |

Table 5: Software requirements for develop client application



## Coding Convention

* Java: Using to develop website and web service.
* Android: Using to develop mobile application. Because team choose android native to develop the mobile application so the coding convention is base on Java.

Summary:

* Naming Conventions:

-Variable name should be short yet meaningful. If the name is more than one word, it must be in mixed case, starting word with a lowercase.

-Constants name should be all uppercase with words separated by underscores.

-Methods name should be verbs, in mixed case with the first word lowercase, the first letter of each internal word capitalized.

-Class name should be nouns, in mixed case with the first letter of each internal word capitalized.

* Package and import statements:

-Package statement is the first non-comment line.

-Import statement is after package statement.

* Constants

-Numerical constants should not be coded directly.

* Variable Assignments:

-Avoid assigning several variables to the same value in a single statement.

* Comments:

-Using /\* \*/ for block comments

-Using // for line comments

* Return Statements:

-A return statement with a value should not use parentheses.

* Using Java coding convention from:

<http://www.oracle.com/technetwork/java/codeconvtoc-136057.html>

* Using Android codding convention form:

<https://source.android.com/source/code-style.html>

References:

**Code Conventions for the Java TMProgramming Language**

Revised April 20, 1999

<http://www.oracle.com/technetwork/java/codeconvtoc-136057.html>