Universiti Teknologi PETRONAS

Health, Safety and Environment

Mobile Application

by

Adkham Kuchkarbek Ugli Sindorov

14186

Dissertation submitted in partial fulfilment of the requirements for the

Bachelor of Technology (Hons)

(Business Information System)

FINAL YEAR PROJECT II

MAY 2014

Universiti Teknologi PETRONAS

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CERTIFICATION OF APPROVAL

Universiti Teknologi PETRONAS

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Approved by,

_____

(Dr Helmi Md Rais)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2014

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project/assignment, that the original work is my own except as specified in the references and acknowledgements, and the original work contained herein have not been undertaken or done by unspecified sources or persons.

ADKHAM KUCHKARBEK UGLI SINDOROV

(STUDENT'S NAME)   (STUDENT'S SIGNATURE)

ABSTRACT

These, project and study, are based on Rapid Application Development (RAD) and research methodology toward meeting my Final Year Project goals. It has been achieved by using research and experiment method. The main objective of this project is to provide a mobile application platform for Universiti Teknologi PETRONAS (UTP) students and all of its employees to access and obtain information with regards to Health, Safety and Environment (HSE) and Sustainable Development (SD) within UTP. The problem statements of this study are difficulty of reporting about the incidents and to prevent from them and implementation of PETRONAS' ZeTo (Zero Tolerance) Rules at UTP. Furthermore, the scope of study for this project is to improve UTP HSE's performance and regulations among students and employees. A methodology was developed based upon a combination of the available literatures and the experiences of the authors, who are actively involved with the development of mobile applications. This covered many parts such as surveys, data gathering from respective Subject-Matter Experts, focal points, and analyzing information. It is intended to have a mobile application with user friendly navigation and eye-catching look to reflect the fast-paced nature of today's communications and better promote its new initiatives and available resources. The future improvements and plans have been recommended and discussed in the recommendations section. Thus, it is believed that UTP HSE Mobile Application, once implemented, will become a helpful platform to ensure and deliver efficiency and productivity of health and safety practices across the University's wide range of daily activities.

ACKNOWLEDGEMENTS

I would like to take this opportunity to express my appreciations and acknowledgements to the following people for their support and assistance through the entire Final Year Project.

The special acknowledgments go to my supportive supervisors, Dr. Helmi Md Rais, co-supervisor Mr. Azamudin Badri, and UTP HSE personal Mr. Rizal, for guiding and supporting me throughout my Final Year Project. Their supervision and support contributed truly help the progression and smoothness of the Final Year Project and its elements. It is extremely remarkable and educative. I am really grateful for their constant support and help.

Furthermore, I would like to thank all other personnel of UTP HSE Management. Through their guidance and helpfulness shown by UTP HSE employees, helped me in understanding appropriately the functioning of HSE at UTP.

I would like to extend my appreciation to my family and all people whose name has not been mentioned, for encouraging and making this Final Year Project memorable and knowledgeable journey.

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ABBREVIATIONS AND NOMENCLATURES

PETRONAS - PETROLIAM NASIONAL BERHAD

HSE – Health, Safety and Environment

SD – Sustainable Development

UTP - Universiti Teknologi PETRONAS

ZeTo Rules – Zero Tolerance Rules

RAD – Rapid Application Development

Chapter 1
Introduction

1.1 Background of Study

In any industry, safety has always been a primary attention part. All industrial employees have been tightening and going through developments and procedures to make sure risks posed to people and the environments are minimized, and mitigating measures can be quickly employed in the event of an incident. As UTP has numerous and various international staff and students, they have been ensuring the integrity of assets, and assessing the protections in place are integral components of maintaining a safe operating environment. Actions to manage and prevent from the incidents at the workplace and work guidelines have been developed by UTP to better protect the health and safety of its staff and students where they do their daily activities. Moreover, it will assist the University's fulfillment of its main objectives in education and research.

Today, the information plays an important part in our lives. What we need today is to manage knowledge and communication, which is defined as gaining access to the true knowledge and know-how from the correct people at the right time. Doing it well needs much more than having technology and procedures, it requires individuals building the accurate connections with each other at the correct time. Appropriate information and knowledge is significant to the way HSE conducts activities, improves policy, conducts research and accomplishes communications, both internally and with the wider health and safety community. By implementing and achieving the right and respectable information and know-how in good time allows staff and students to work and to study more effectively.

These are initial tasks of managing knowledge and communication in HSE:

- Developing a clear vision for knowledge sharing in HSE
- Collecting information for the future, including what has been done up to now and what has been achieved

- Inculcating a culture where staff or student share their knowledge learning before, during and after projects

Thus, today, one of the quickest ways of sharing the information is by using mobile technologies. It became widespread, teachers and students will be increasingly mobile, using more portable devices and interacting with computationally-enhanced learning environment. According to Steenderen (2002), the era of mobile technologies have been improved and vast amount of changes are generated in facilitation communication and the transfer of information namely from each other providing more and more added value services. The use of mobile technologies is increasingly widespread especially among the Asian countries such as Malaysia. Users of mobile phone grew from 9.7 percent in 1995 to 55.9 percent in 2004 and to 143 percent in 2014 and these statistical numbers have been increasing quite noticeably since 1995.

As a matter of fact, PETROLIAM NASIONAL BERHAD, national oil company of Malaysia, has developed their own HSE Zero Tolerance (ZeTo) Rules in order to manage and minimize, and prevent from the incidents at their daily work operations.
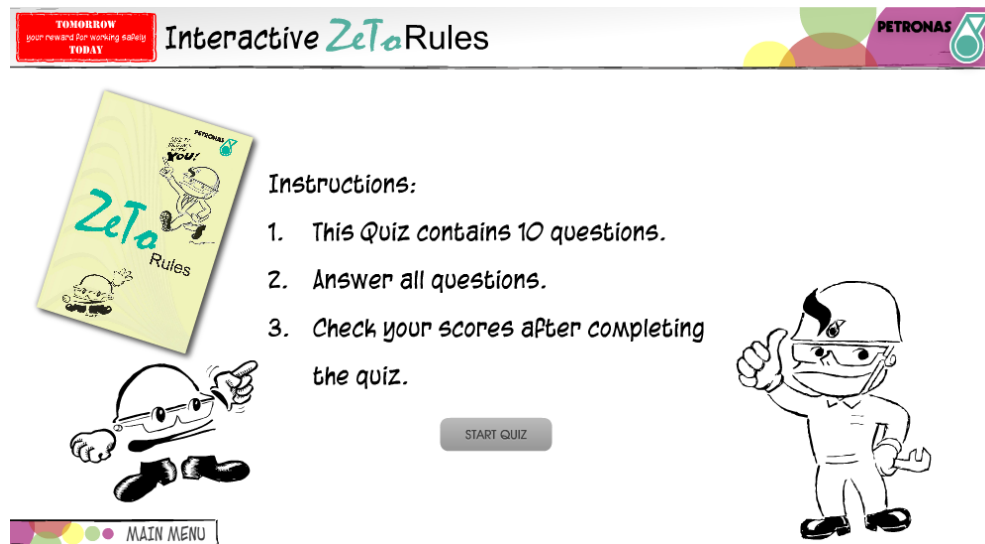
Figure 1.1: ZeTo Rules Online Quiz

Hence, the ZeTo Rules have been converted into Mobile Application for quick access by its users anywhere and anytime. Therefore, in order to prevent from any kind of incidents at UTP and in light of the above explanation, this study is important to

identify, analyses and to develop a mobile application to improve HSE performance at UTP. It would be a new information sharing and incident reporting application platform offered by UTP HSE to all UTP employees and students to get the right information on safety and ZeTo Rules using their personal mobile devices.

1.2 Problem Statement

The technology is by far the best source of information and knowledge. It will help us to deliver and share our information more quickly. I had a conversation with UTP HSE' staff, Mr. Rizal and he gave me some information about HSE matters at UTP. Here are some of them:

Figure 1.2: Bird's eye-view of UTP

Figure 1.3: A car incident

Figure 1.4: Case with wild animals

Road Accident Statistic By Month FY 2014

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
3	1	3		1								8

Table 1.1: Statistics of road accident by month FY 2014

Others Incident Statistic By Month FY 2014

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
0	0	3		1								4

Table 1.2: Statistics of other incident by month FY 2014

Road Accident Statistic By Month FY 2014
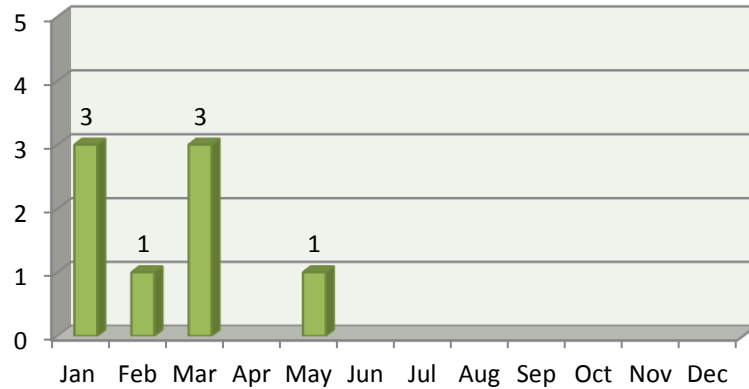
Figure 1.5: Statistics of road accident 2014

Accident Location

	In Campus	Out Campus
Minor/Major Accident	6	1

Table 1.3: Accident Location
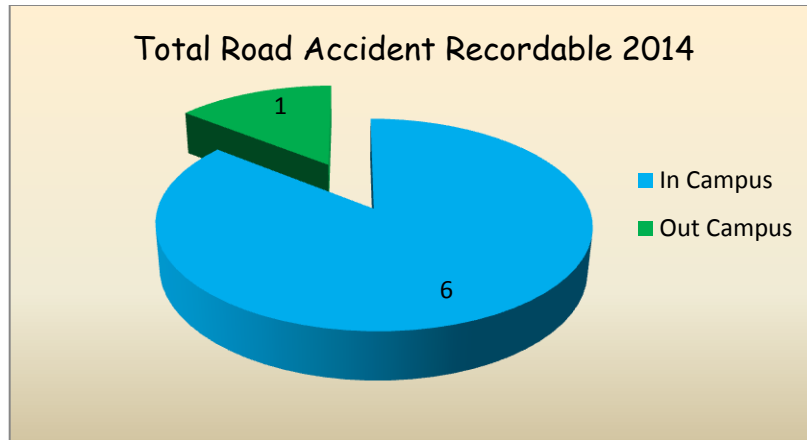
Figure 1.6: Road accidents records 2014

Victim Involved

Victim	In Campus	Out Campus
Student	10	7
Staff	0	0
Contractor	1	0
Visitor	0	0

Table 1.4: Victims Involved

Student Category Involved in Road Accident

Students	In Campus	Out Campus
Local	6	7
International	4	0

Table 1.5: Category of Students

Type of Vehicle Involved In Road Accident

Vehicle	In Campus	Out Campus
Car	6	2
Motor	3	0
Lorry	0	0

Table 1.6: Vehicle Types

Type of Severity

Severity	In Campus	Out Campus
Fatality	0	0
LWD	0	0
First Aid	1	3
No Injury	9	4

Table 1.7: Types of severity
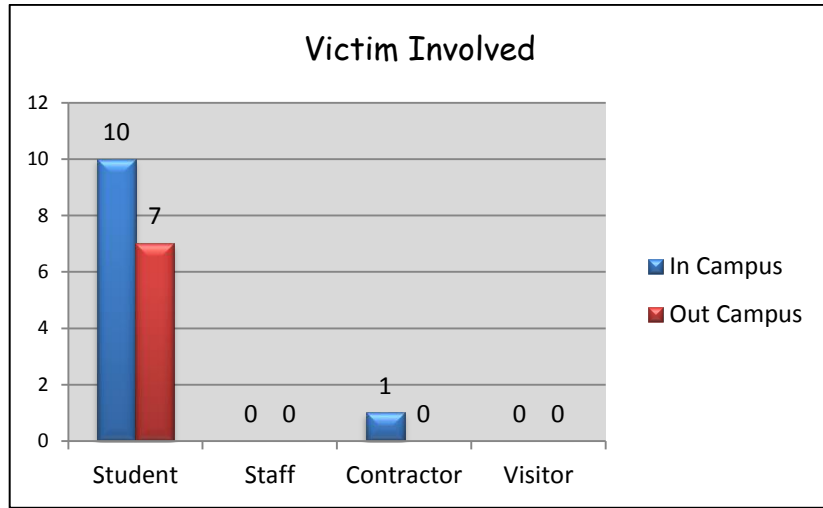
Figure 1.7: Victims Involved
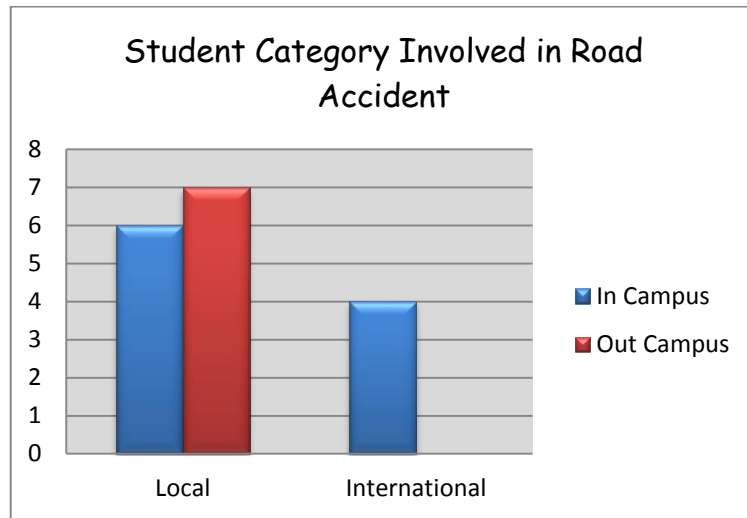
Figure 1.8: Student Category
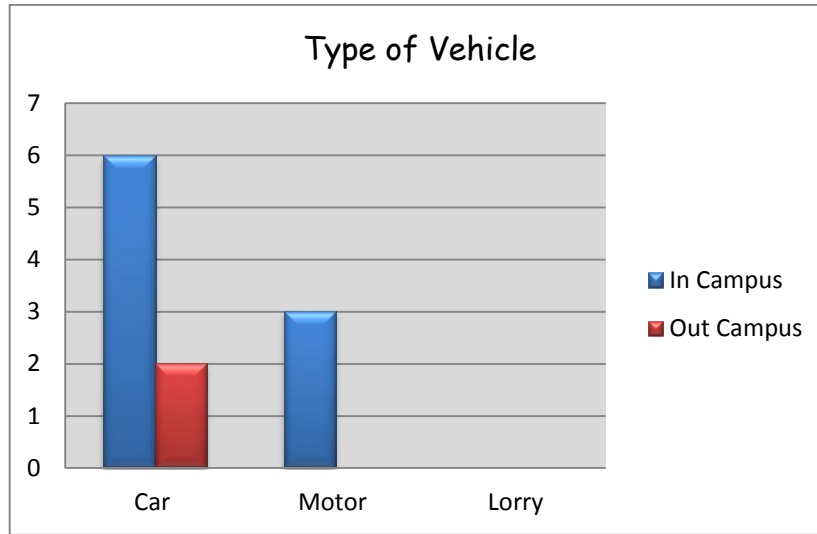
Figure 1.9: Type of vehicle
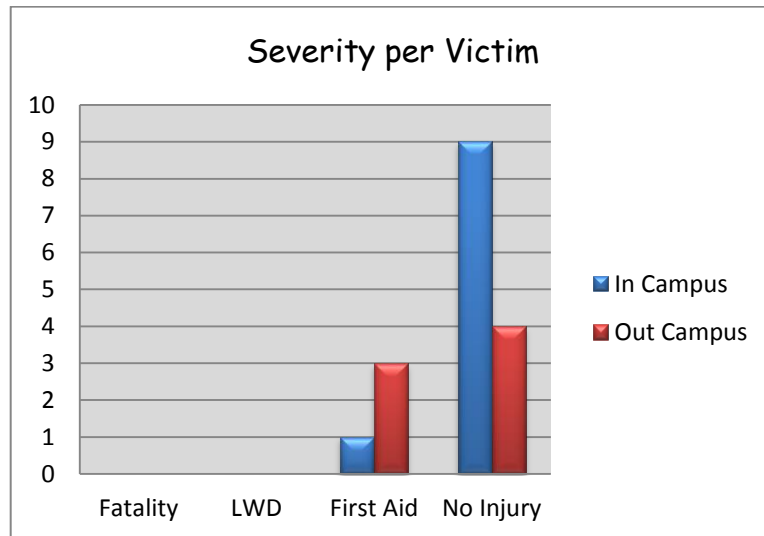
Figure 1.10: Severity per victim

We always try to avoid from the incidents and risks, however they are unpredictable. As you can see from the information given, there are some incidents happened at UTP, mostly road accidents and other safety minor incidents. Based on my observation and conversation with UTP HSE' staff, Mr. Rizal, there is new issues are being faced and I have brought these into being current problem statements:

- There is a difficulty of quickly reporting about the incident and alerts at UTP HSE
- There is not widely impact of PETRONAS ZeTo Rules at UTP (among staff and students)
- Awareness about UTP HSE announcements

In order to solve these issues, there will be developed UTP HSE Mobile Application. As a matter of fact, mobile applications are widely used today by students and staffs. Hence they can access the information quickly and easily anytime and anywhere. UTP HSE Mobile Application will act as a bridge among UTP HSE staff, UTP employees and students. Hence users can get the appropriate information easily and report about the incidents quickly anytime and anywhere.

1.3 Objectives and Scope of Study

Growth and development of information these days are at amazing rates. This productiveness is blooming to this changing atmosphere. From time to time, new systems and disciplines are being advanced and the diversity of accessible systems to assist manage this information spread is growing speedily. Appropriate information and proficiency is enormously important to the way HSE, such as to conduct operational work, to improve policy, to carry researches and manage communications, both internally and with the wider health and safety organisation. It assists employees to perform their work and daily activities more effectively and protect HSE's image by using the accurate information and expertise in good time.

The goals and objectives of this research project are:

- To develop a mobile application platform for sharing information and to ensure that all risk activities are carried out safely
- Being familiar with ZeTo Rules, and implementation them in our daily activities
- To improve UTP HSE's performance and regulations among students and employees

The scope of the study includes the experimental work in studying and developing an Android Mobile Application Development and its elements. This project is devoted to a way to incorporate UTP HSE and UTP employee and students by investigating its performance activities through the use of experiments and mobile application.

1.4 Project Feasibility

Feasibility Analysis is the most required part in every project or study. It defines and helps you to make a decision whether to develop or not with the project that you are going to take care of. This mobile application is a key approach to utilize user access and making it more convenient for UTP students and employees.

The project's basic techniques of Feasibility Analysis are:

Technical Feasibility:

UTP HSE Mobile Application will be built on Android Operating Systems Platform. Android devices, such as various phones or tablets are available in the market and quite affordable and the Android applications are known for its user friendly features. In order to develop UTP HSE Mobile Application, I shall use Android Developer, NetBeans Java, MIT App Inventor and ECLIPSE development tools and the programming code can be referred through open sources.

- Understanding tools, such as Android Mobile Application Platform
- Project's Research and knowledge is adequate
- To find and use the right development tools for the implementation

Time:

UTP HSE Mobile Application is estimated to be completed within the timeframe since the time allocated for project development, which is twenty-eight (28) weeks. As there are several and various stages of development, Rapid Application Development and other traditional models were chosen for the methodology and development. They contain stages such as:

- Analysis
- Development
- Integrating
- Testing
- Implementation
- Documentation and the concept where the product can be developed faster and of higher quality due to the time constraint

Organizational:

All the resources and support, such as information and guidelines have been made available for this project by UTP HSE department and my supervisors as well.

Cost:

With the help of using RAD methodology and open source development tools, such as Android Developer, Sencha Touch, Note ++, MIT Apps Inventor and ECLIPSE, the Mobile Application development will be able to minimize the cost by eliminating consultancy services. However, to implement the mobile application, user required to use Android Mobile Operating Systems Platform to run the application, where the Android devices are quite affordable comparing to other devices in technology market.

Chapter 2

Literature Review

A literature review is an explanation, commonly stated to as a review of published work that is related to your project, assignment or research. It gives me a great chance to gain further knowledge in the area of the project research and verifies that I understand the theoretical background of the project.

There are adequately numbers of published academic research studies in the field of Mobile Application Development. Far more have been written and discussed in industry of journals, online and in books guiding people on the best practice for design and develop. Hence, the most of the materials in the literature review comes from those sources.

2.1 Information Systems and their role in the field of HSE

According to one of the largest engineering companies, ABB's data sheet, Mobile Public Safety (2013), an increase in community safety is directly related to lower crime rates and faster emergency response times. A wireless broadband network enables access to critical information and communication to dispatch centers and other mobile public safety workers from the field, improving efficiencies and safety.

Here, below, you may find the list of initial tasks, basic requirements and benefits of using Information Systems in the field of HSE.

Indicative Initial Tasks

- Forming a clear and strong vision for knowledge sharing in HSE
- Identifying and developing the requirements addressing through Health, Safety and Environment
- Applying the changes in their part of HSE, such as organisational, behavioural, process or technology

- Assigning work to learn lessons from everywhere and exchanging them among everybody

Basic Requirements

- Discover and make available the right information system(s) in place to contribute to improving HSE outcomes.
- Practice and teach applicable users on use of systems(s)
- Ensure any updated training on systems or procedures is provided to all applicable staff
- Distribution information among departments

Benefits of effective information systems

- Proficiently adaption to new programs and significances
- Efficient and effective communications internally and with other administrations

The daily responsibility of HSE is for applying health, safety and environment regulation and its anxiety region from nuclear and chemical plants, through to mines, workshops, farmhouses and other various workplaces. Mostly, in order to provide the industry with a fully understanding of the part Information Systems play in regulating HSE in any industry.

2.2 Zero Tolerance Rules

As I stated above, PETROLIAM NASIONAL BERHAD, national oil company of Malaysia, has developed their own Zero Tolerance (ZeTo) Rules in order to manage and minimize, and prevent from the incidents at their daily work. Furthermore, here are some details about it.

- ZeTo stands for **Zero Tolerance**, a principle to ensure all activities are carried out in a safe manner and any non-compliance is not tolerated.
- ZeTo Rules must be complied with at all times by all employees and contractors.
- ZeTo Rules are intended to supplement safety rules and regulations imposed by PETRONAS, its Operating Units and Holding Company Units and any laws and regulations applicable at the location where the works are being carried out which must also be observed at all times.

As it is stated in ZeTo Rules' guidelines (2010), all PETRONAS employees and contractors' personnel shall follow ZeTo Rules at all times whenever they are in the company's premises or when carrying our company business. For the rules relating to the use of walkie-talkie, mobile phone, seat belts and speed limit, it will be applicable at all times to employees and contractors operating the company's owned, hired or leased vehicles whether inside or outside the company's premises. It is also applicable to employees when travelling on company business.

These rules are being applied always during its operations at PETRONAS and its subsidiaries as well. It can be accessed at any time and in anywhere. In addition, here is the image of PETRONAS' ZeTo Rules.

ZETO RULES

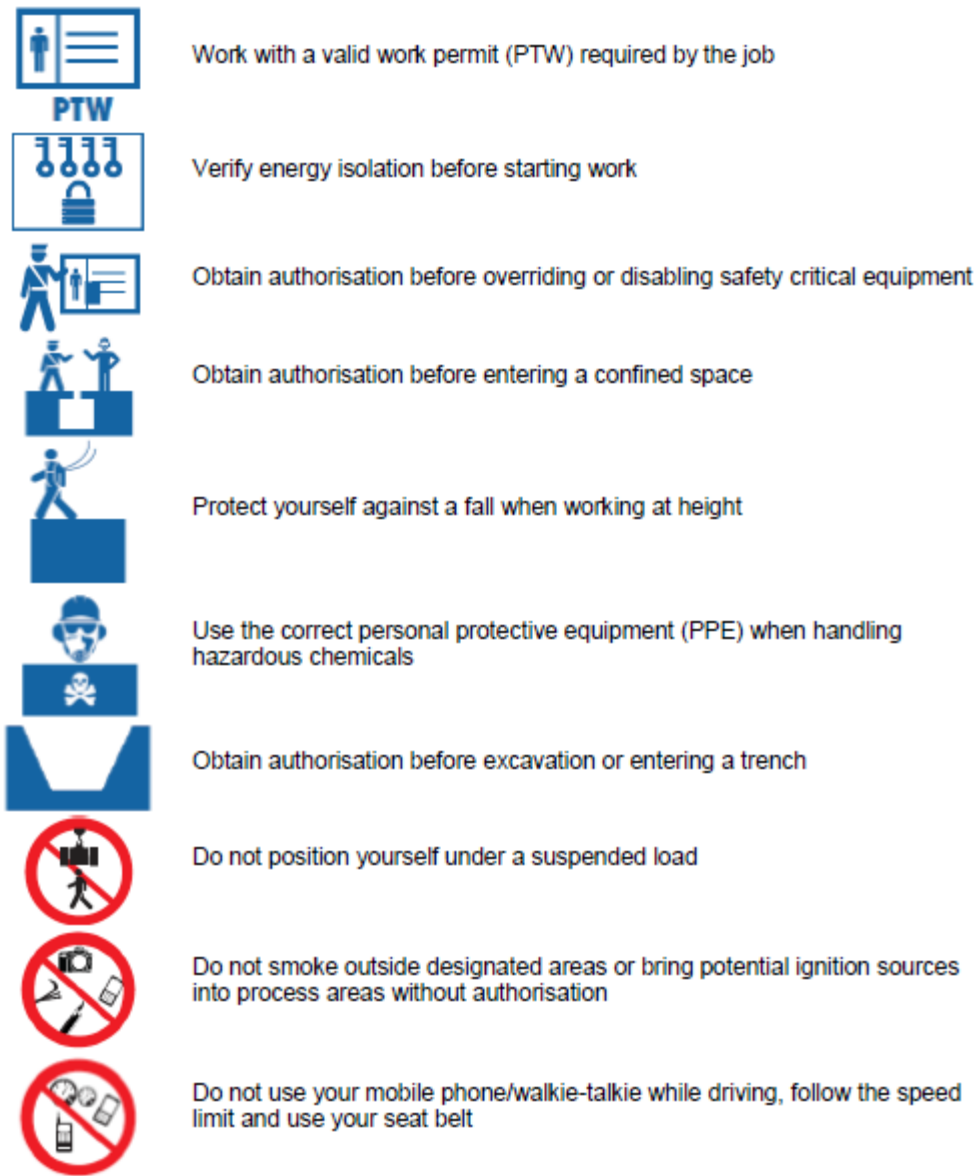|	
PTW	Work with a valid work permit (PTW) required by the job
	Verify energy isolation before starting work
	Obtain authorisation before overriding or disabling safety critical equipment
	Obtain authorisation before entering a confined space
	Protect yourself against a fall when working at height
	Use the correct personal protective equipment (PPE) when handling hazardous chemicals
	Obtain authorisation before excavation or entering a trench
	Do not position yourself under a suspended load
	Do not smoke outside designated areas or bring potential ignition sources into process areas without authorisation
	Do not use your mobile phone/walkie-talkie while driving, follow the speed limit and use your seat belt

Figure 2.1: ZeTo Rules

According to Lorenzo and his research team members' research, Walk Safe: A Pedestrian Safety App for Mobile Phone Users Who Walk and Talk While Crossing Roads (2012), that social science has shown that mobile phone conversations distract users, presenting a significant impact to pedestrian safety, for instance, a mobile phone user deep in conversation while crossing a street is generally more at risk than other pedestrians not engaged in such behavior. Therefore, they have proposed Walk Safe, an

Android smartphone application that aids people that walk and talk, improving the safety of pedestrian mobile phone users. Walk Safe uses the back camera of the mobile phone to detect vehicles approaching the user, alerting the user of a potentially unsafe situation.

2.3 World of Mobile Technology

Mobile communication is so integrated into our lives that many people feel uncomfortable without a cell phone. Once upon a time, the most popular functions of phones were calling and sending texts. A smart phone is multifunctional device that not only communicates, but helps to learn, earn, and have fun. Hence, this is made possible by the development of mobile applications. As a matter of fact, according to World Wide Web, Juniper Research estimates in 2014 the direct and indirect revenues from sales of mobile applications will total 25 billion dollars. Mobile applications are widespread as compared to the use of personal computers, and it can be clearly seen in our lives.

Malaysia is one of the countries riding the wave of telecommunication evolution. With the improvements of mobile technology, it also influences the economic growth of a country and makes available various job opportunities. The Malaysian Communication and Multimedia Commission (2004) survey indicated that 12.3% (percent) of the user groups are young adults, while senior groups accounted for about 9 % (percent). That was 10 years ago, and now we are in 2014, and those percentages are grown extremely high today. According to Kundu (2000) that today mobile technology has already become as information repository and it is quite related to healthcare industry. Because of current technology you may get various and valuable information about the HSE in our daily lives. Furthermore, as Lopez, I.M (2011) states that the help of mobile application is incredible, as it deliver actions to users anytime and anywhere.

You may find numerous successful applications in HSE area, where the mobile technology was used as the main tool to collect process and manage HSE information in a professional manner.

2.4 Android Mobile Operating System

World's well-known and affordable Android Mobile Operating System has been released under Google, Apache License. What makes it special is that it is open-source code and permissive licensing allows the software to be freely modified and distributed by device manufacturers. In October 2012, there were huge a number of apps available for Android, and the approximation number of applications downloaded from Google Play, Android's primary app store, was 25 billion. A developer survey conducted in April–May 2013 found that Android is the most popular platform for developers, used by 71% of the mobile developer population. Android powers hundreds of millions of mobile devices in more than 190 countries around the world. It is the largest installed base of any mobile platform and growing fast every day another million users power up their Android devices for the first time and start looking for applications, games and other digital content.

As a matter of fact, according to Bowen's Student Preferences for Mobile App Usage (2012), the result of survey of student mobile application use distributed during the fall 2011 semester at Purdue University, were that students device ownership was largely focused on two smartphone platforms, Android, and iPhone, which together represented 83% of the survey responses – Android (43%) slightly edged iPhone (40%). Below, the figure shows the percentage of response by platform.
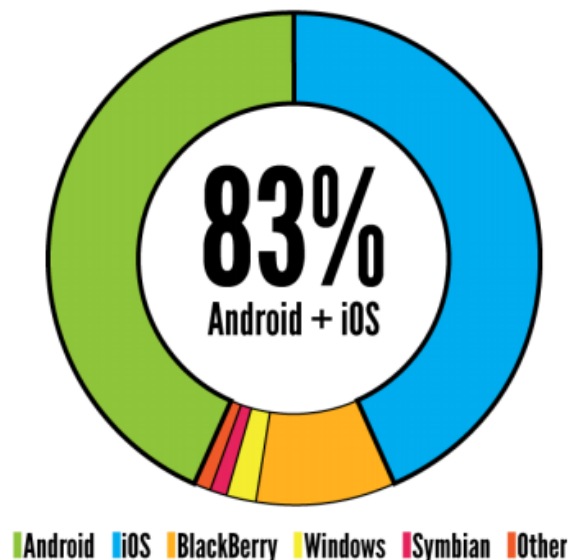

Figure 2.2: Student Device Ownership

2.5 Current available various HSE Mobile Applications for Android Platform

Currently at the market of Android Applications, there are numerous HSE related applications. Hence, here are the some examples of them.

"HSEQ Free" is a smart phone app for easy reporting of HSE and quality reports. The app will simplify the work of collecting reports of safe job analysis/job safe analysis (SJA/JSA), nonconformity, observations or incidents, accidents, near misses and improvement suggestions related to safety and quality.
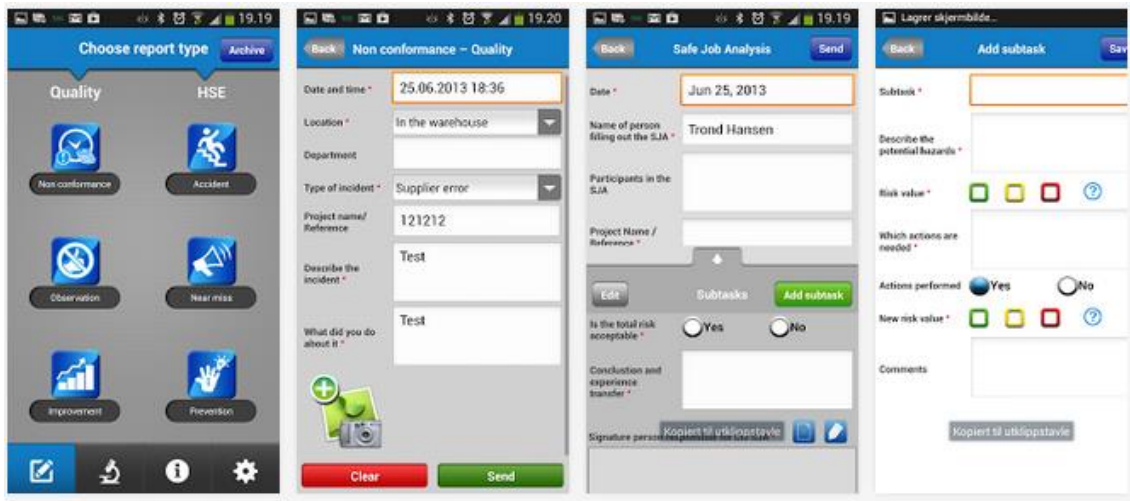

Figure 2.3: HSEQ Free

Figure 2.4: Safety at working place

Chapter 3
Methodology

3.1 Research Methodology

There are many traditional methodologies to develop mobile application. Before moving on to put forward a methodology for mobile application development, allow me to list some of the considering traditional Information Systems methodologies and their applicability to this process. There are many articles, academic and journalistic, which are available reference for this project and guide how to develop mobile application. A methodology was developed based upon a combination of the available literature and the experiences of the authors, who are actively involved with the development of mobile application. Hence, the methodologies mentioned below will be used for this project. This will cover many parts such as surveys, data gathering and analysing information from respective Subject-Matter Experts and focal points. However, the main methodology for this project is used, Rapid Application Development methodology.
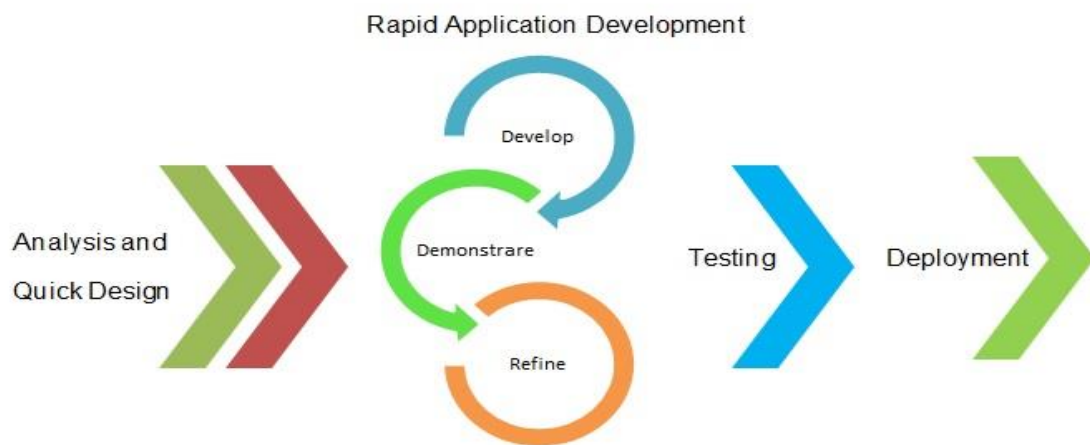

Figure 3.1: Rapid Application Development

Waterfall

This type of methodology involves a series of cascading steps that cover the development process with a small level of iteration between every phase. There is a disadvantage of using this methodology for the development of websites, is the rigidity of its structure and lack of iteration between any phases other than adjacent stages. But, almost daily news technologies are becoming available as the Web is developing extremely fast these days. Hence, any type of methodology used for the development of the Web should be flexible with any kind of technology requirement.

Structured Systems Analysis and Design Method (or SSADM)

It is designed usually for the development of large Information Systems projects. Therefore, it does not cover complete life-cycle of a development project. However it focuses on the analysis and design phases. Hence, it helps reducing costly errors on analysis and design.

Prototyping

It is very useful methodology for the development of interactive application, where the user is more concerned with the layout than the process of the system. But, this type has a tendency towards project "creep", which leads to the problem of completing the project.

Rapid Application Development (or RAD)

RAD is a form of prototyping that involves building several small "throwaway" prototypes for the system and the system once they have been analysed.

Incremental Prototyping

It contains of developing in phases for large systems, which is good for avoiding delays between specification and delivery. The most important features of the system are developed to completion first, and then less important features are added to the system later.

Table 3.1: Table of various traditional methodologies

Rapid Application Development is a development lifecycle designed to give much faster development and higher-quality results than those achieved with the traditional lifecycle. It is designed to take the maximum advantage of powerful development software that has evolved recently. RAD compresses the step-by-step development of conventional methods into an iterative process. The RAD approach thus includes developing and refining the data models, process models, and prototype in parallel using an iterative process. User requirements are refined, a solution is designed, the solution is prototyped, the prototype is reviewed, user input is provided, and the process begins again.
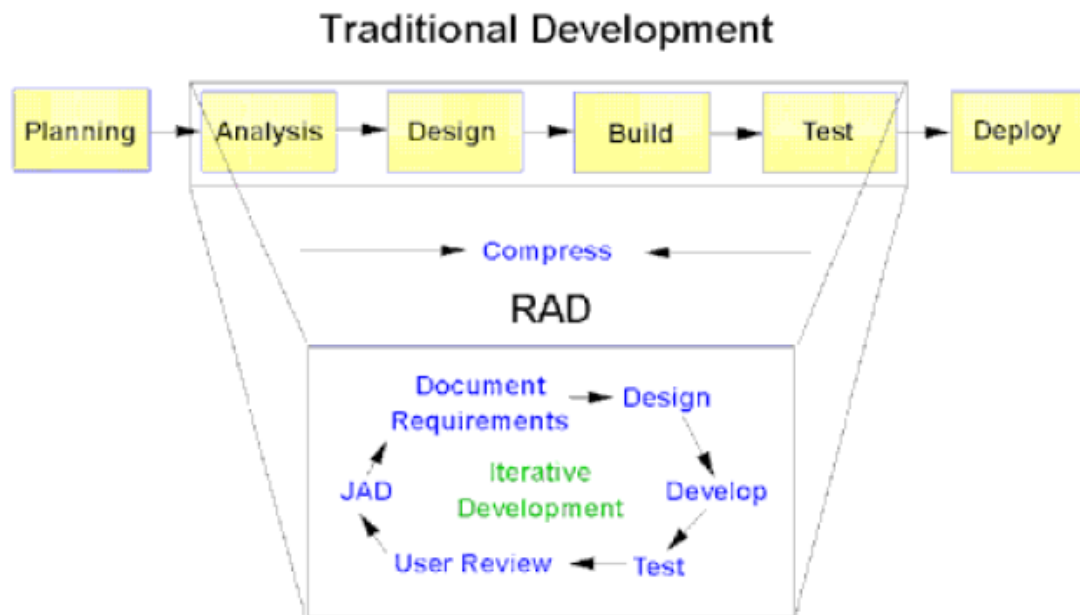

Figure 3.2: Traditional Method and RAD

3.2 Project Phases

The development of the mobile application will be completed on four-phase activities with sub phases.

- **Planning**

  This phase includes elements of traditional planning and analysis phase. The process in this phase is to determine all the system requirements.

- **Design**

  Subsequently, identifying completely the requirements, a design will be developed based on necessities.

- **Development**

  The following step is developing the design, which will cover sub phases such as **Review**, **Testing** and **Defect Review**.

- **Concluding Mobile Application Launch**

  The concluding step after all the above phases will be completed successfully. It is a delivery the new system to end users.

In order to create and develop an Android Mobile Application, I have chosen Android Development Tools, which is a plugin for the Eclipse IDE that is designed to give a powerful, integrated environment in which to build Android applications.
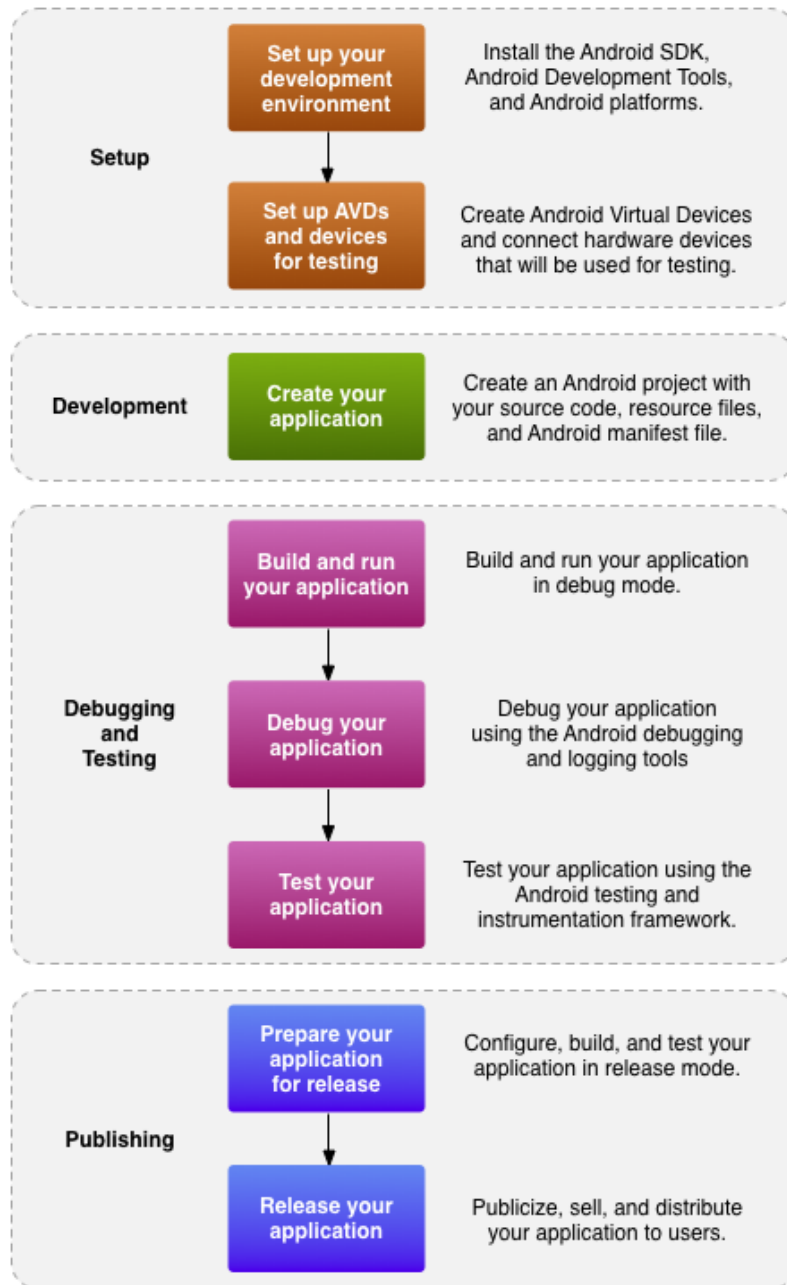
Figure 3.3: Process of development for Android Applications

3.3 Key Milestone and Gantt chart

Activities	Week
Submission of Progress Report	4
Pre-SEDEX	10
Submission of Dissertation	12
Submission of Technical Report	12
VIVA	13

Figure 3.4: Milestone of FYP II

| No.	Project Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14
															Week
1	**Project Work Continues**	■	■	■	■	■									
	Process	■	■	■	■	■									
	Process	■	■	■	■	■									
2	**Submission of Progress Report**	■	■	■	■	■	▨								
	Writing Progress Report	■	■												
	Submit Progress Report			■											
3	**Project Work Continues**			■	■	■	■	■	■	■	■	■	■	■	
	Continue with the Development			■	■	■	■	■	■	■					
	Identify and analyse again				■	■	■	■	■	■					
	Complete the design					■	■	■	■						
	Find out the errors					■	■								
4	**Pre-SEDEX**						■	■	■	■	▨				
	Prepare poster						■	■	■						
	Present your complete design									■	▨				
5	**Submission of Draft Final Report**										■	■	▨		
6	**Submission of Dissertation (soft)**										■	■	▨		
7	**Submission of Technical Paper**											■	▨		
8	**VIVA**												■	▨	
9	**Submission of Project Dissertation**												■	■	▨

■ Process

▨ Milestone
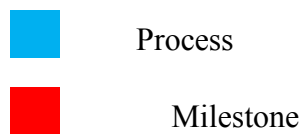
Figure 3.5: Gantt Chart of FYP II

3.4 Necessary Implements

In order to develop and create a mobile application we need these tools.

Hardware

Personal Computer

- Intel® Core™ 2 Duo 2.5GHz
- 4GB RAM
- 320 GB Hard Disk (Internal)
- 1 TB External Hard Disk (Back-up Purposes)

Software:

- NetBeans IDE 7.1.2
- Eclipse
- Android Developer
- GUI Developer
- Adobe Photoshop

Programming Language

- jQuery (JavaScript)
- Visual Basic

Chapter 4
Results and Discussion

4.1 Data Gathering and Results

Acquainted methods were used for the collecting and investigating the information in order to process this study project:

Analysing Materials:

The actual way of discovering keys for the subject matter is the discussion and exploration. The benefit of providing discussion allows us to get more user needs and analyses of the current subject matter. Subsequently collecting all the related information, the exploration is made to realise the real subject matter, what is the actual issue has UTP HSE and it gives clear explanation of why UTP HSE needs a mobile application.

A survey of UTP students, employees' opinion about HSE was developed and distributed at the beginning of previous semester, January 2014 at UTP. Distributed survey was made available online and had received respond from 43 respondents. The survey consisted of several questions about their age, department of study and their opinion about ZeTo Rules and UTP HSE performance. For this survey, it was particularly important that the respondents had a clear understanding of the HSE and its elements.

Hence, below is given a brief summary of the research, which were analysed from the conversation with users and as well as we have been suggested on how to make the UTP HSE Mobile Application more efficient and appropriate.
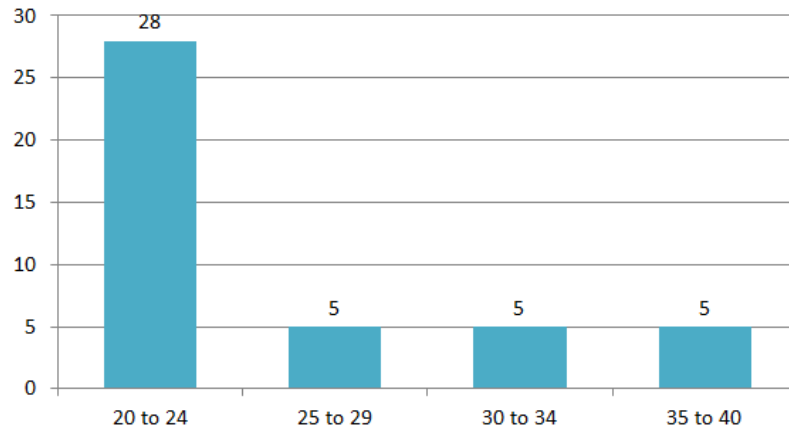
Respondents' Age

Figure 4.1: Respondents' Age

The survey received responses from a diverse group of students and employees. In general demographics, more than 50 % of respondents' age is between 20 to 25, and others' is between 25 to 40.
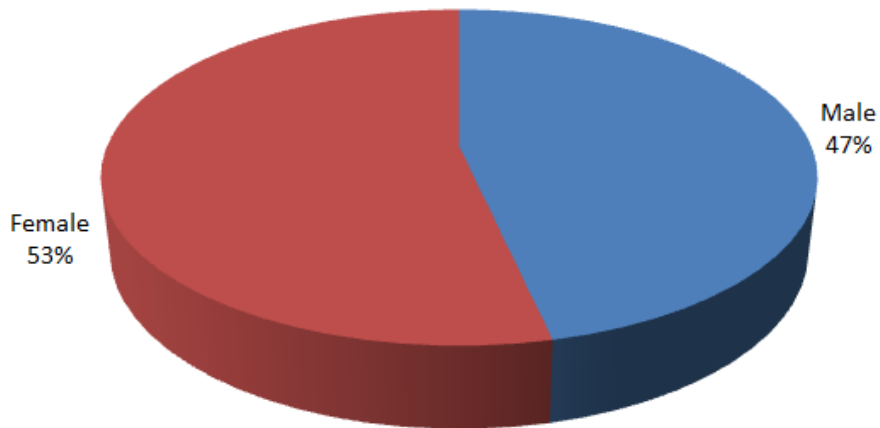
Respondents' Gender

Figure 4.2: Respondents' Gender

The figure above shows us the respondents, 53% were female and 47 % were male.
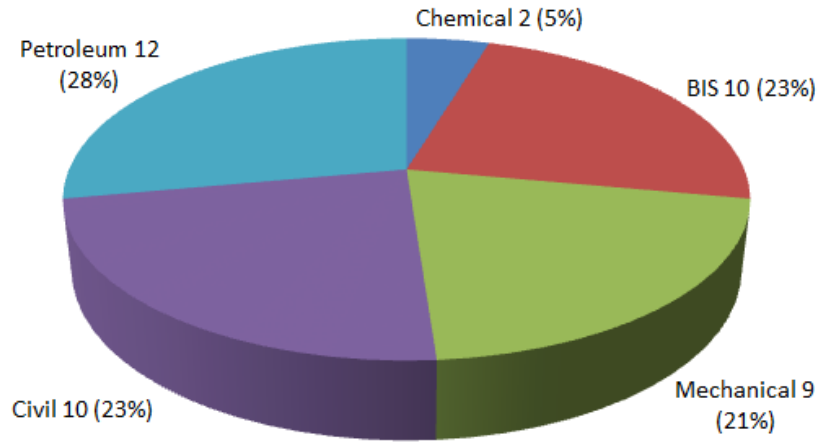
Respondents' Department

Figure 4.3: Respondents' Department

And this figure describes us which department do belong our respondents. Here, they are: Petroleum 28%, Chemical 5%, BIS 23%, Mechanical 21%, and Civil 23%.

Which mobile operating platform do you use ?
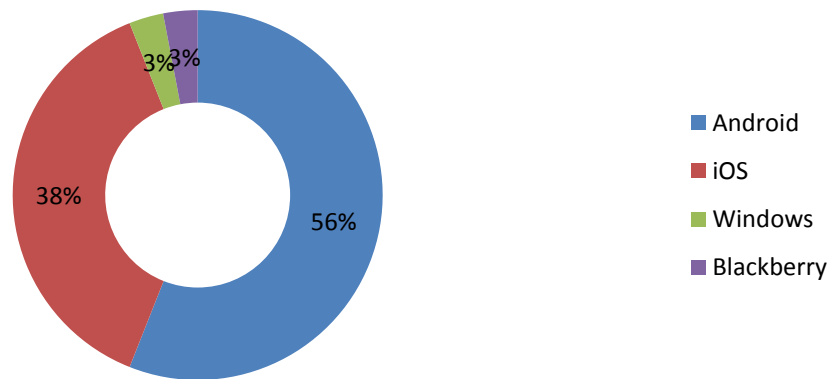
Figure 4.4: Which mobile operating platform do you use?

Figure above shows the percentage of response by platform. Respondents' device ownership was represented of the survey responses – Android 56 % and iOS 38 %, Windows – 3%, Blackberry – 3% as well.

How often do you use Mobile Applications ?
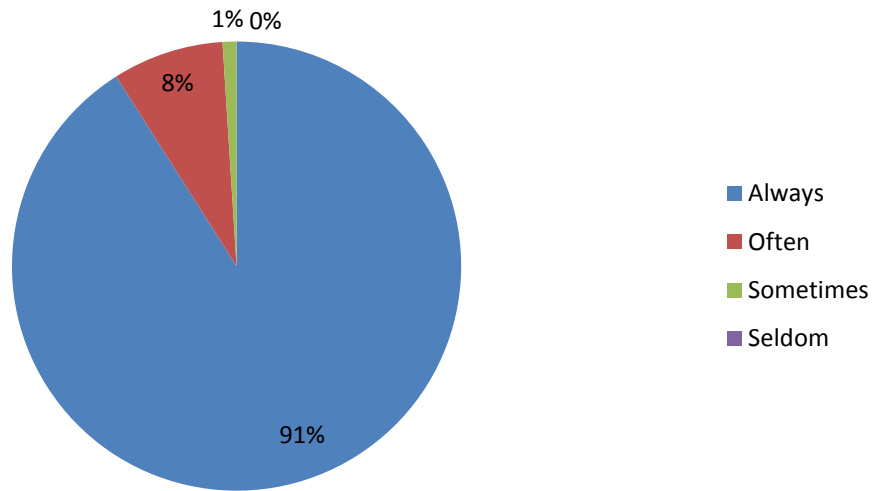
Figure 4.5: How often do you use Mobile Applications?

When asked about the usage of Mobile Applications, 91 % of respondents identified themselves as "Always" users, and other 8 % and 1 % identified themselves as "Often and Sometimes" users.

Criteria for user's current satisfaction on HSE performance
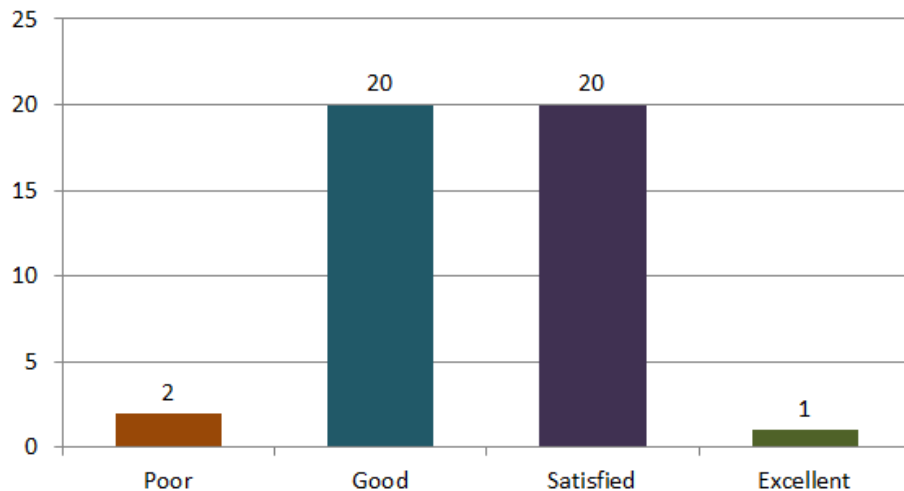
Figure 4.6: Criteria for user's current satisfaction on HSE Performance

Furthermore, when asked respondents' opinion about the UTP HSE's performance, most of the answers were "Good" and "Satisfied", which represented more than 90 % of the survey responses – Good (45 %) and Satisfied (45%) as well.
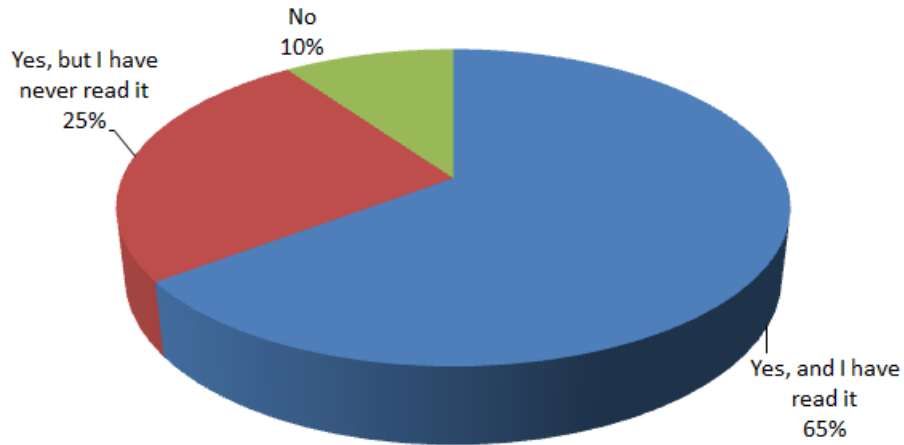
How well do you know about ZeTo Rules ?

Figure 4.7: How well do you know about ZeTo Rules ?

It was really nice to know that reposdents are aware about PETRONAS ZeTo Rules. The percentage of knowing it well is 65 % and the percentage of knowing it, but not so familiar is 25 % and others 5 % do not know about it.

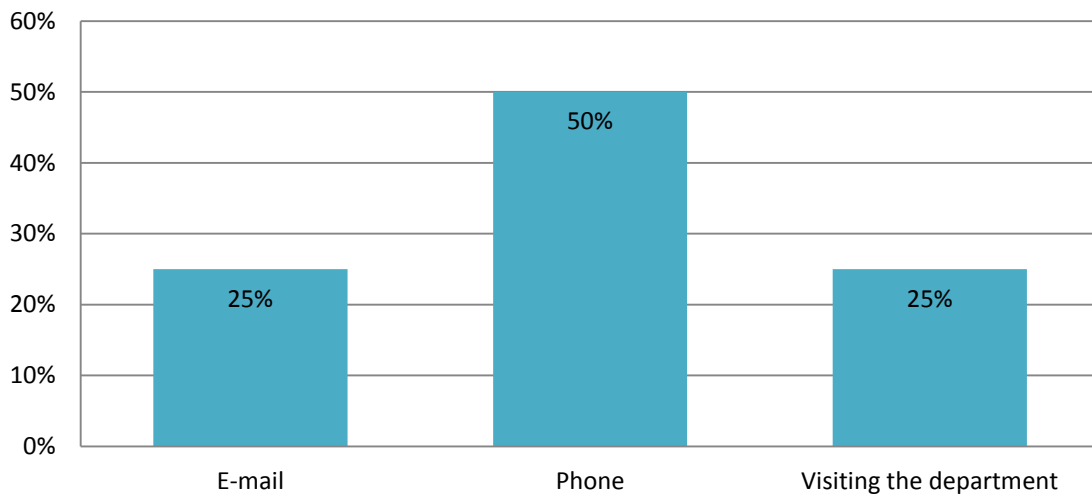**How do you usually report about the incidents or alerts ?**

Figure 4.8: How do you usually report about the incidents or alerts ?

The percentage of HSE reporting by students and employee by phone call was the highest among other types of reporting, which is Phone – 50 %, E-mail 25 % and Visiting the department – 25 % as well.

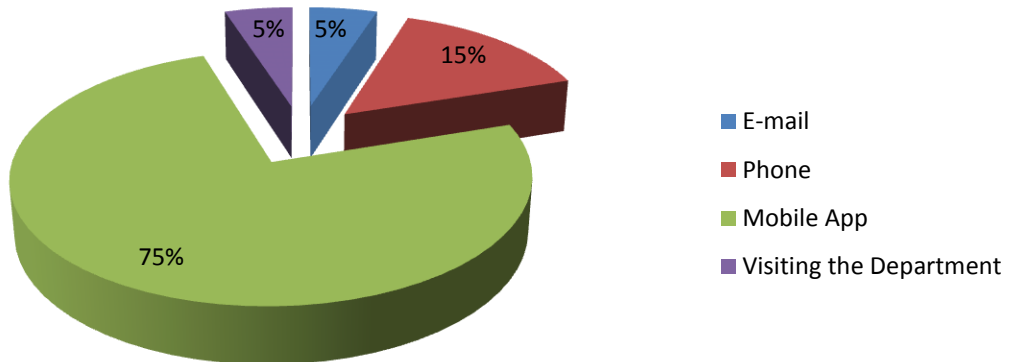## Which way of reporting do you prefer ?

Figure 4.9: Which way of reporting do you prefer ?

The respondents answer for they question about the types of reporting were, 75 % - Mobile App, 15 % - Phone, 5 % - E-mail and 5 % - Visiting the Department.

What do you think, if we create a mobile application for UTP HSE ?
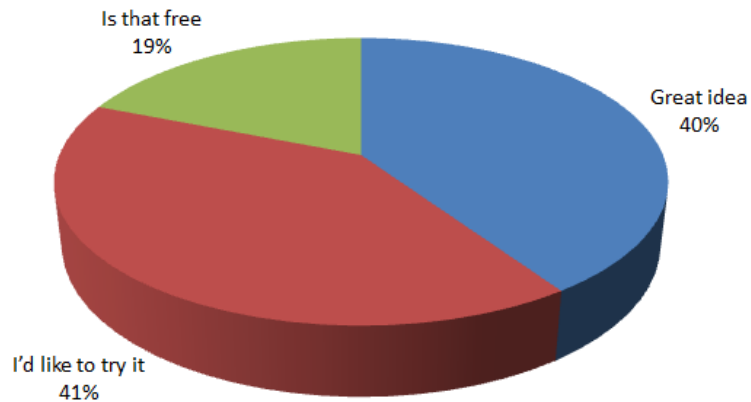

Figure 4.10: What do you think, if we create a mobile application for UTP HSE ?

Respondents' answer for creating a mobile application for UTP HSE was "Good idea" and "I'd like to try it", which together represented 81% of the survey reponses – "I'd like to try it" 41% and "Good idea" 40 %.

Since all the findings have been analysed, the key subject is the design, which includes appearance, navigation, simplicity, functionality and availability. Therefore, I shall provide amazing interface and navigation buttons in helping the user to observe and use UTP HSE Mobile Application easily, which allows them to feel comfortable. Their requirements are more important in order to state out what the mobile application will do in order to help and satisfied the user. Another main step is the training part for the users, because as Information Systems' growth and development these days are at extraordinary rates and they need to be explained and understand the features.

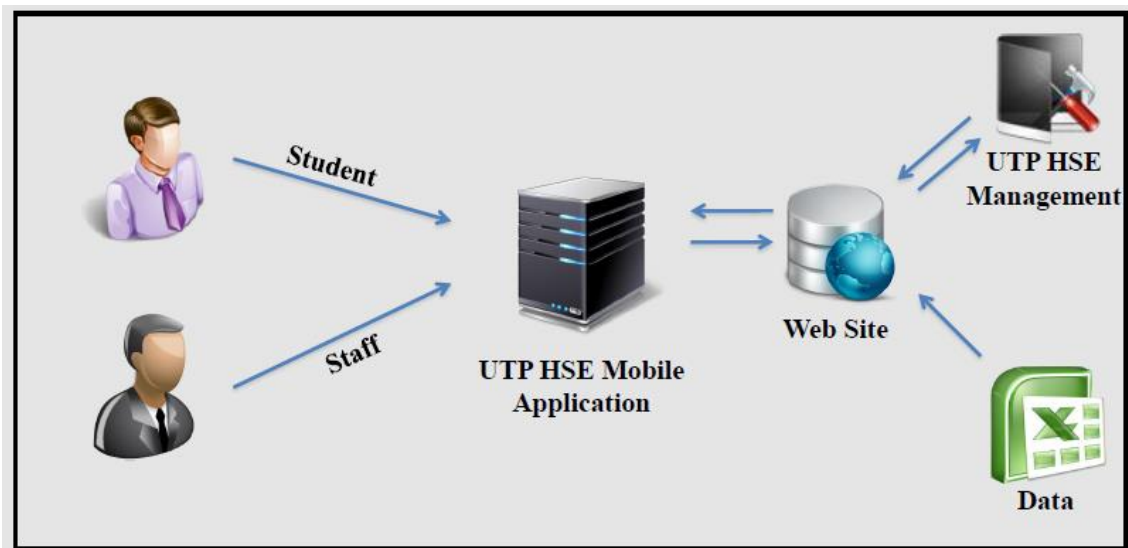**4.2 System Architecture and UTP HSE Mobile Application**

Figure 4.11: System Architecture

By using all the information retrieved from the users and Information Systems, especially from UTP HSE Management and Android Mobile Application Developer, the

project would be able to experiment the complete flow of the mobile application development process. The project should be delivered to user by the time, after completing all the development process phases.

Up to date we (project team) have completed these following movements:

- Numerous meetings with UTP HSE staff
- During the meetings planned phases discussed with them
- Then the first draft layouts for UTP HSE Mobile Application has been developed
- The following meeting has been conducted with UTP HSE staff
- Analyzed survey about the mobile application
- Developed UTP HSE Mobile Application based on requirements
- Learned all available information

The real product has been developed based on the requirements and specifications made in the design phase.

Figure 4.12: UTP HSE Mobile Application Main page

The fist and main page is **Landing** or **Welcoming** page. Upon lunching this application user has a full access to the following functions, and each functions in the menu will act different type of activities

- Home

- ZeTo Rules

- News

- Report

- Report List

- About Us

The following function, **ZeTo Rules**, represents of PETRONAS ZeTo Rules and it gives to user much clear information about ZeTo Rules. This is one of the main important of all functions included as it helps users to get more familiar with ZeTo Rules.
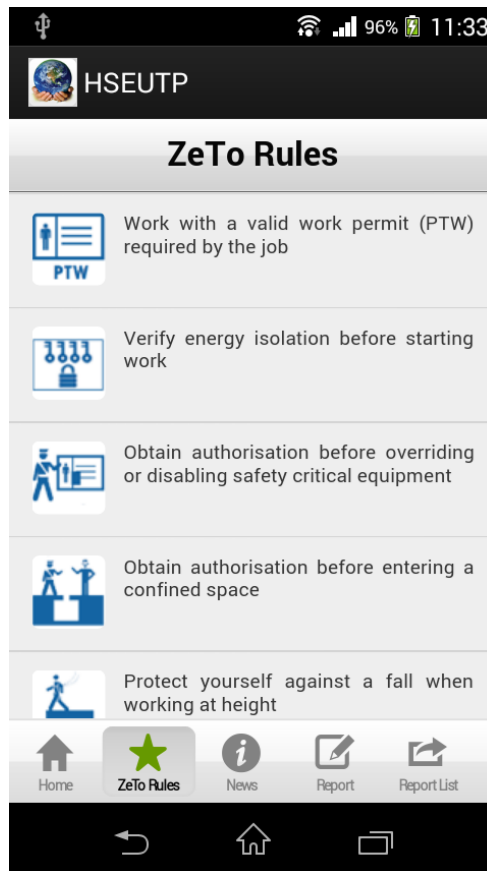

Figure 4.13: UTP HSE Mobile Application ZeTo Rules

The next function is **News** button, which will show HSE related announcement, events and information by UTP HSE Department. It will list down all the available news, and easy to refresh any time by just pulling down the **News** page.

Figure 4.14: UTP HSE Mobile Application News

Another main function is **Report** page, where user may enter about his or her report details, its location and date as well. Figure below shows us how the Report page looks like and its fully functioning.
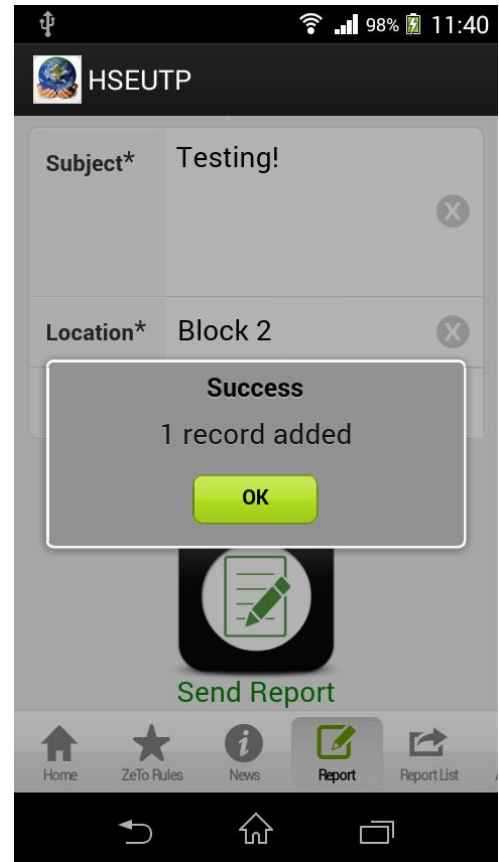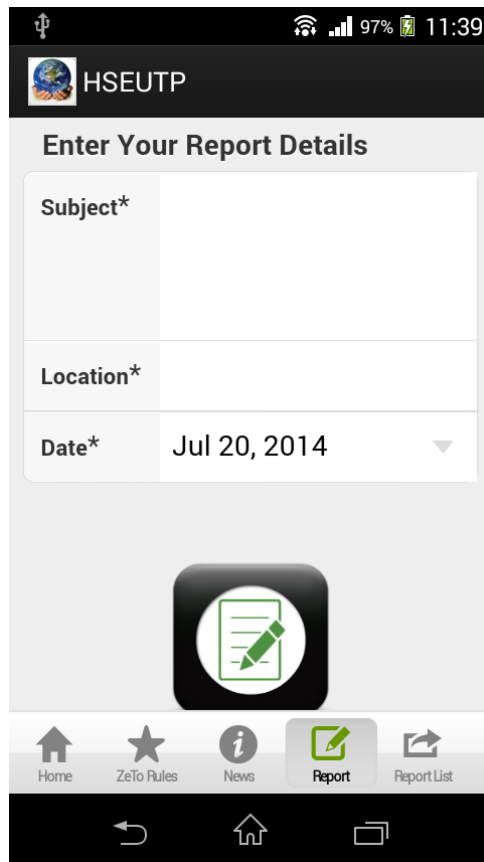
Figure 4.15: UTP HSE Mobile Application Report

The following page is about **Report List**. Any user may see the list of reported incidents or alerts and their current status. And they may also search Reports according to their Locations as well.
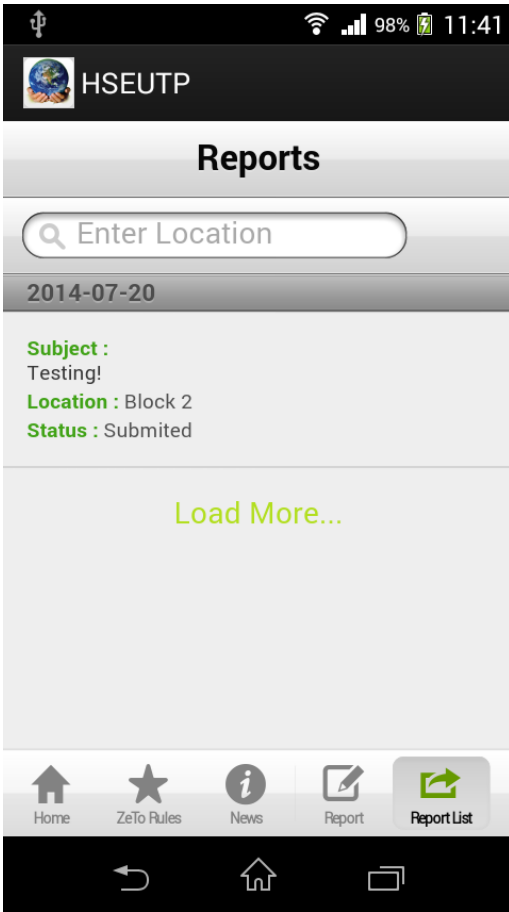
Figure 4.16: UTP HSE Mobile Application Report List

The last page, **About Us**, consists of Mission Statement of UTP HSE and the page provides the full map of UTP. In addition, in case of emergency and if you do not have any access to Internet, you may use Emergency Number provided there. Hence, it will take you directly to the person in charge.
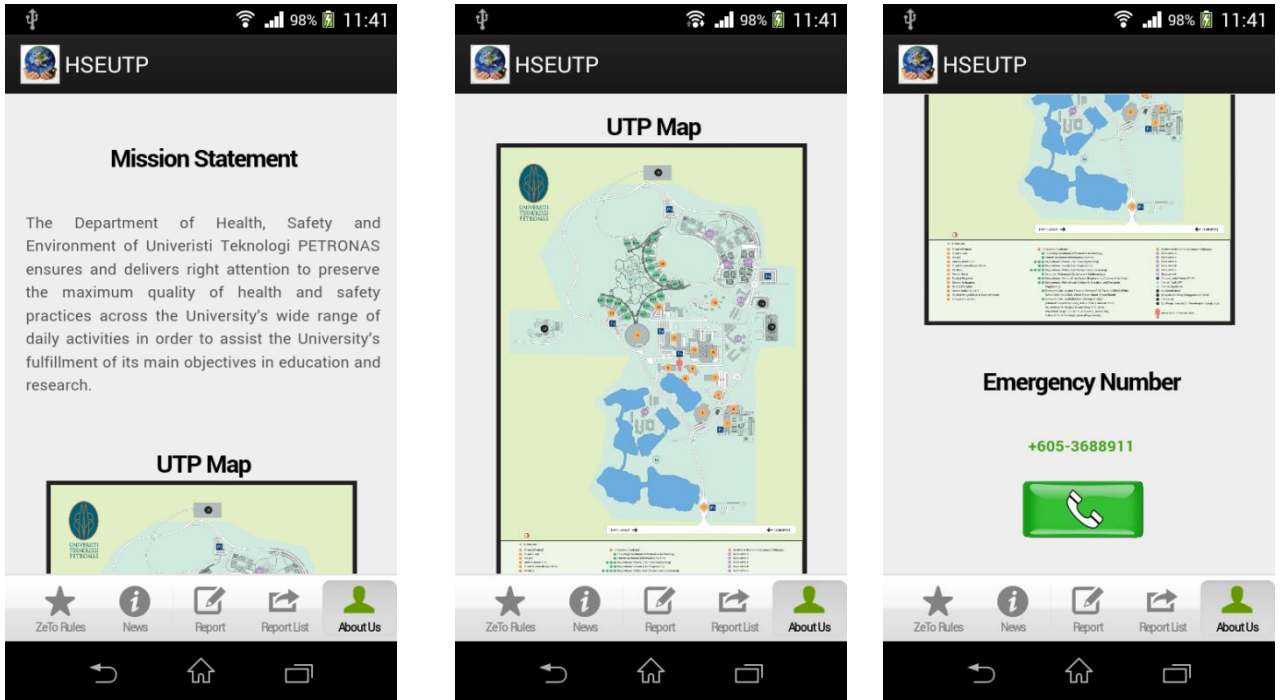
Figure 4.17: UTP HSE Mobile Application About Us

After developing UTP HSE Mobile Application, now I have developed Admin web page also, in order to manage UTP HSE Mobile Application.
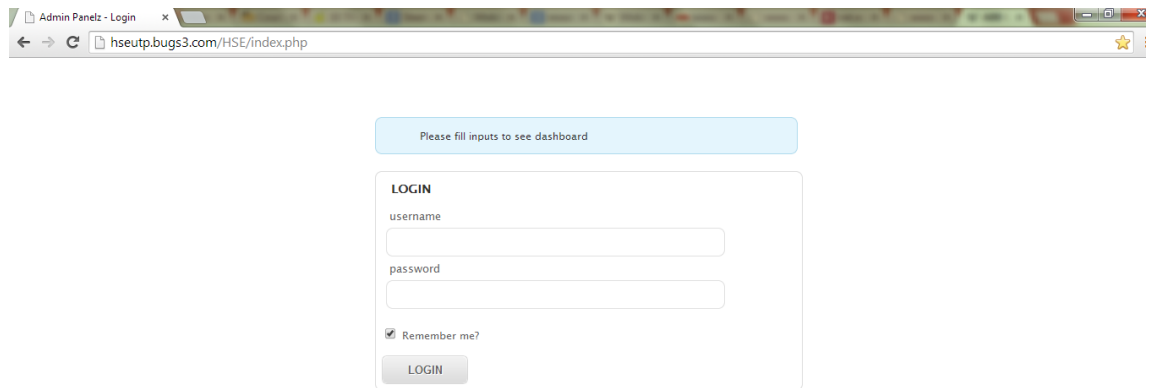

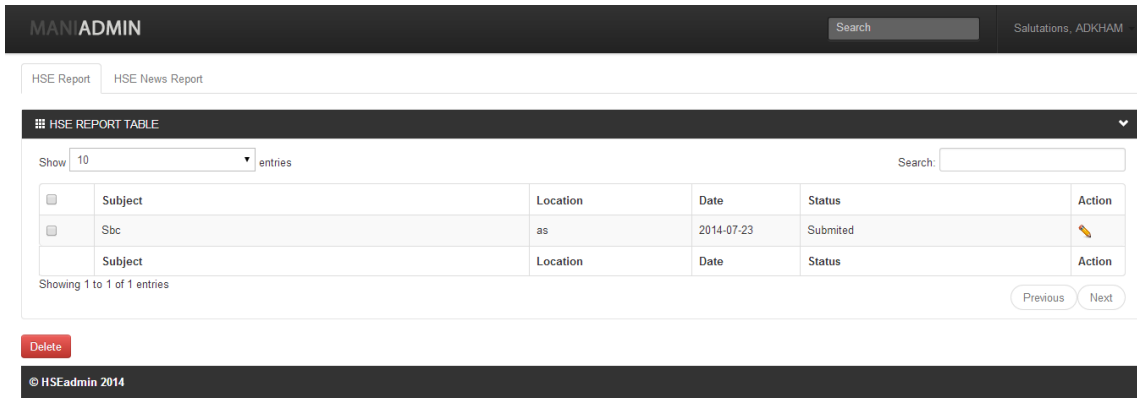*Figure 4.18: UTP HSE Mobile Application Admin Web Page*

Figure 4.19: UTP HSE Mobile Application Admin Web Page: Report Table

This Admin Web Page gives admin fully function to control about HSE news and Reports any time. Once any news or reports have been updated or uploaded, the user of Mobile Application will receive immediately by refreshing their News Page in their Application. Furthermore, once the report will be received, UTP HSE will take immediate action depending on incident type. Here is the figure, which will display us the process of workflow.
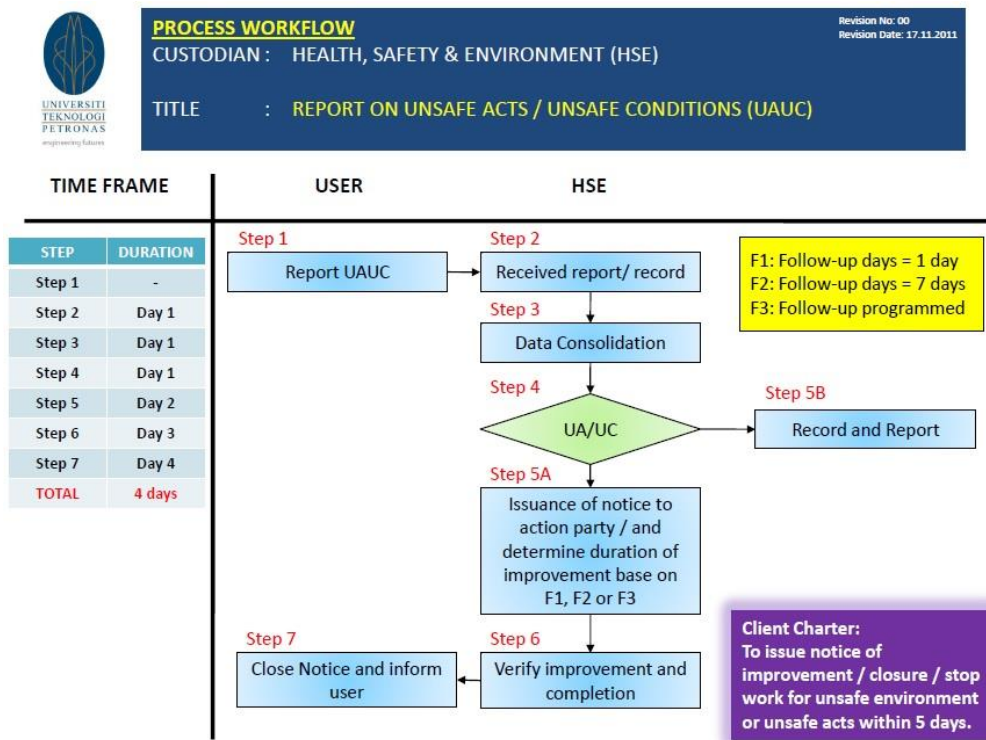

Figure 4.20: Process Workflow

4.3 User Testing and its results

The main part of developing a mobile application is the testing part. It helps you to find the bugs and unwanted events as well as to realize the limitations of the system itself. For UTP HSE Mobile Application, testing has been done online at http://hseutp.bugs3.com/package/ and manually user testing as well.

Functional Testing is to ensure that the main functions of the UTP HSE Mobile Application and Admin Web Page are working properly. Main functionalities of the system are tested and verified:

- Login
- ZeTo Rules View
- Report Submission and View
- Report Status View and Edit
- News: viewing, deleting, updating and adding of records to UTP HSE

In addition, as it was mentioned earlier, user testing was conducted with several users, including my Final Year Project Supervisors, UTP HSE Management and some students. Here, is the figure, which displays user testing results.
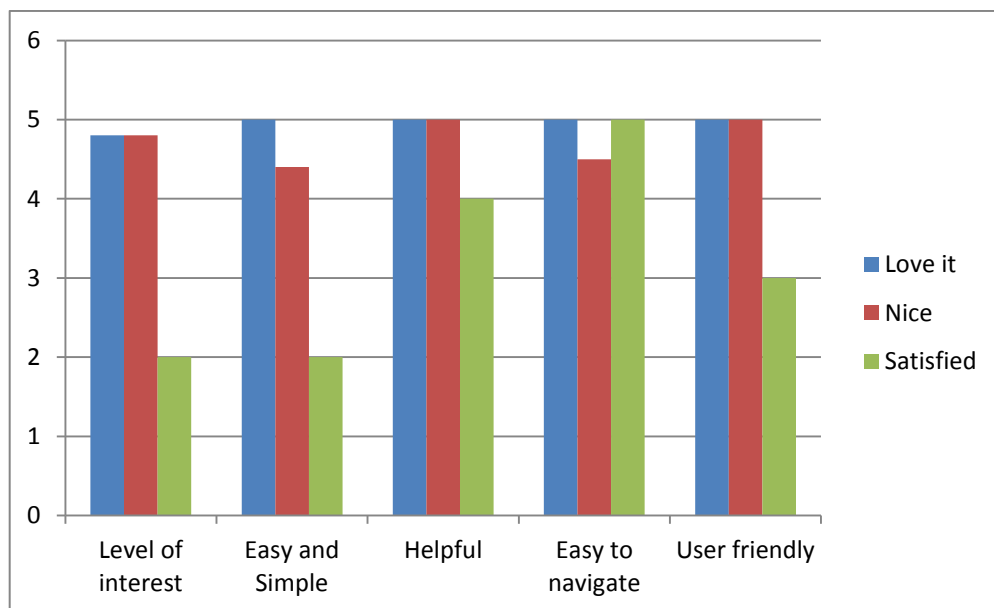

Figure 4.21: User Testing Results

Chapter 5

Conclusion and Recommendation

5.1 Conclusion and Recommendation

In this project it was intended to explore how students and others use their smartphones and its applications to prevent from any incidents and share information by using their mobile applications. Many of us who own smartphones have their own biases about the best ways to consume information and the best applications to achieve their desired goals. This understanding and creating of new services might influence and it may help to deliver right attention to preserve the maximum quality of Health and Safety practices across the University's wide range of daily activities.

There will be recommendations in order to improve the UTP HSE Mobile Application, such as promoting UTP HSE more at UTP and attract students and employees of UTP.

As always most of the requirements are quite challenging and it is difficult to measure how perfect the system can be within the time frame in order to complete the project early and more effective. In fact, the development phase needs to be done within the time frame as what has been planned so that this project can be completed at least to the minimum requirements.

For recommendations and upcoming plans, the UTP HSE Mobile Application has to be developed in iOS and BlackBerry application version so that it might get high demand from the users. In addition it needs future enhancements, in other words continuous improvement.

This Final Year Project was very fruitful to me because I had a chance to acquire undoubtedly irreplaceable new knowledge and experience. It has introduced me new world, has strengthened my knowledge base and enabled me to integrate theory with practice. Besides from the technical part, I also had the chance to develop various soft skills and non-technical skills.

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APPENDICES

Appendix 1: Survey Questions

Appendix 2: Technical Paper

Appendix 3: Universiti Teknologi PETRONAS area

Appendix 4: Road Accident Analysis FY 2014