ABSTRACT

Currently, today is the Information Era, with the typical symbol – Internet Technology. Any people can become the users of the Internet at any time. Internet is everywhere. The users can use internet to search, find or collect any information that they need. Nowadays, for sure that, any one of us heard about Web 2.0 technologies as well as applications. The development from Web 1.0 to Web 2.0 was considered like "break through step" of the information technology. Web 2.0 is really more efficient information sharing, collaboration and business processes. And, Mash – up is one of the outcomes of Web 2.0 paradigm that has been widely accepted and used for users over the world. The role and effect of mash-ups in modern life is obvious. At the moment, although mash – ups are mainly used for less fundamental tasks, such as customized queries and map based visualizations. But, compared to a few years ago, mash-ups' development and application are becoming popular and increasing day by day with higher demands. In the future, it has the potential to be used for more fundamental, complex and sophisticated tasks.

Finding, searching, collecting as well as using information in the Internet is one of problems about technology of Vietnam in general, and Hanoi in particular, where are the developing countries and be focused on the agriculture fields. Catch and combine two above events, the developers want to create *"Mash – ups of Promoting Information Services Institution for Higher Education in Ha Noi, Vietnam"* as Final Year Project. For this project, the users just need Internet route to access. And after this, they can find out, search, collect and compare all important and necessary information about universities in Hanoi, Vietnam. This way will useful for users, because of it will minimize the effort, time as well as money of the finders. Besides, it is also easy to understand and using.

CERTIFICATION OF APPROVAL

Mash-ups of Information Services for Promoting Higher Education Institution in Hanoi, Vietnam

By

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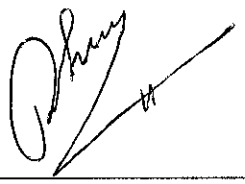
CERTIFICATION OF ORIGINALITY

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



LE PHUONG

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I hope that my project will contribute a part in promoting and developing the education in Hanoi in particular and Vietnam in general!

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ABBREVIATIONS AND NOMENCLATURES

UTP: Universiti Teknologi Petronas

CIS: Computer Information and Science Department

FYP: Final Year Project

APIs: Application Program Interfaces

CSS: Cascading Style Sheet

PHP: Hypertext Preprocessor

CHAPTER 1

INTRODUCTION

1.1 Background of Study

In today's information era, a large number of the organizations around the world currently are promoting knowledge management to make the best use of knowledge, acknowledgement and information. Nowadays, it is more easy and comfortable for the users to search and find out the knowledge, information and news they need in a very short time with the effective support of the modern technologies as well as the Internet. In spite of the fact that the information sources are abundant and approaching, they appear not to be completely satisfactory to all users. The question raised is that whether the information they found is sufficient and adequate or not, reliable and updated or not.

So, the motivation of the project is to be considered as one of the reliable and convenient sources for the users namely "*Mash – ups of Information Services for Promoting Higher Education Institution in Ha Noi, Vietnam*". The project aims to develop the system application which captures the information about reputable and prestigious universities' backgrounds in Ha Noi capital, Vietnam including their overviews, locations, courses, lecturers, accommodation, transportation etc.

It should be considered in current factual situation in Hanoi, Vietnam. If a person, for example, wants to find this information, they do not know where to find and collect updated and accurate data, or how to compare among these universities. Besides, the currently used ways like face to face meeting or volunteer students is seen to waste time and effort... With the support of Technologies and Internet, this system will be a useful tool to tackle these problems. Utilizing Mash-ups of information services for higher education application, a user can find any information regarding the university's background that he/she is looking for. Within the scope of this project, the system is developed focusing on Ha Noi capital, Vietnam with a full database of the universities throughout this city. For the system's

implementation, the methodology of prototyping is applied. The methodology will perform the analysis, design, and implementation phase concurrently, and all three phases are performed repeatedly in a cycle until the system is completed. The other tools and mechanisms for researching and gathering information as well as developing the system will be used including questionnaires, interviews, programming languages, open source code and especially mash-up technical applications.

1.2 Problem Statement:

Hanoi is known as the capital of Vietnam as well as the center of economics and politics, culture and education of the country. It can be seen a majority of political organizations and cultural monuments situated in Hanoi. Compared to others cities and provinces in Vietnam, Hanoi is also the center of education and training including so many educational institutions, universities and colleges. At this point, Hanoi is the destination of many students from other provinces to reach and study their undergraduates and graduates. The number of students gathering in Hanoi is very large, in which the amount of students from other provinces and cities account for 2/3 in total. And it is estimated to be continuing to increase highly annually, especially at the beginning of a new school year.

When the academic year starts, the issue which the Government and the universities have to deal with is how to guide and provide information effectively and accurately for the students, especially the students coming from other provinces who have been in Hanoi for the first time and everything is so unfamiliar to them. These new students are so concerned about accommodations, travelling and living conditions in a new city as well as courses, lectures and issues relating to their study in universities. There is a wide range of information sources, options and references that new students could search and receive. In order to ensure the accuracy and sufficiency of the information provision and support, however, the universities have responsibilities to bring the correct information to their students by different approaches. Currently, the popular method that most universities in Hanoi are applying is to mobilize volunteer students. The students from universities and colleges are used and hired to provide information and support for their juniors. Following they come to the bus stations, hotels or any public places in Hanoi to deliver, share and provide the information for the new

students, one by one. Thus, it is obvious that mobilizing students in this way does not work and contribute much to solve the problem in terms of wasting time, money as well as being impossible to cover all students who need this information.

At the same time, the main question is that how students can get these kinds of updated information correctly and adequately as mentioned above. If the question is taken into consideration, there could be two alternative ways for students to collect their necessary information. The first choice is that they can go to these universities straightly and ask for all of the information that they need by themselves, and then compare the information. But it can be seen to waste their time, effort and money. Besides, the other choice for them is to enter these universities' websites via Internet. Applying the approach, it could save time and more convenient for all if the websites could convey necessary contents. However, the information in the websites of Vietnamese universities appears to be not really adequate and satisfactory. Furthermore, students also have to come to many different websites to compare information, which leads to the mistakes, ineffectiveness as well as waste of time. With the technical aspect, the developer realized there are so many benefits from using mash-up application. Through mash-up, we can leverage the capability of Web 2.0 and APIs to consolidate and reuse of information into a single platform. Because of the reuse advantage (discussed later) for information and data, so, mash-up really helpful to create the application which need to combine the massive and segregated information.

This, to some extent, arouses me to carry out the research **"Mash-ups of Information Services for Promoting Higher Education Institution – Ha Noi, Vietnam"** - the system development as a solution to the issue. The system will use the Mash - ups application with the combination of Google Maps or Yahoo Maps to locate the locations of these universities, information background, their courses, lecturers, activities, accommodation... It will be combination of some kinds of Mash – up: Geo mash – up, service mash – up as well as consumer mash – up, using Application Programs Interfaces (APIs). According to *Mark Burdon (2009), Queensland University of Technology*, "APIs are largely responsible for the growing popularity of mash - ups as they are able to combine different sources of publicly

available data and provide an interface, either free or for a cost recovery charge, for different services based on data supplied by multiple providers".

Then applying the system, the users just need to use Internet, enter to this system and they will find all the necessary information they want more easily, fast and adequately. With the new system, the problems of time, money waste as well as misleading information or insufficiency will be solved. In the context of Hanoi, Vietnam, the system is highly recommended as the useful tool for students in particular and the universities and educational system in general.

1.3 Objectives:

When propose this project, the developer wants to achieve some objectives and goals for the system as well as the users:

- ✓ To study the strength of Mash-ups of information services to be applied in the education context to improve information quality and accessibility for all levels of users.
- ✓ To combine some applications as well as the data onto Internet such as Google Maps or Yahoo Maps to locate the places of these universities, hostel, food restaurants or transportations onto the maps;
- ✓ To classify information to create some different categories for the users to refer and compare:
    - o Courses: name, characteristics, information…
    - o Activities: clubs, sports…
    - o Lecturers: name, contacts, degree, expertise…
    - o Accommodation: hostel, lab, buildings, locations for living around the universities…
    - o Transportation: types and ways to use the transportation
    - o Food: restaurants around the universities
- ✓ To create the user – friendly application, make the users easier to access the needed information, avoid waste their effort and time.

1.4 Scope of the study:

There are many approaches concerning the useful ways to support students with necessary information on their universities. Due to the limitation of time and resource support, however, within the boundary of this study, the system only focuses on providing a database for information background of universities in Hanoi capital, Vietnam.

In order to bring out a profound understanding of the issues under the investigation in the study, a variety of selective factors to implement this work are taken into consideration. The first step is to collect all the information about the universities in Hanoi including background, courses, activities, lecturers... Besides, it also takes some time for researching the user's opinions and ideas through distributing, collecting and analyzing the questionnaires. The objects of this approach will be the students, universities in Ha Noi as well as anyone who is interested in this issue.

This first part of the project will be finished in 4 months, including collecting data for the database and identifying all the methodologies as well as tools, applications which will be used. The second part will focus on implementing and testing the system until it is completed. It will take around 9 months to complete the whole project. Due to the limitation of financial support, the developer has tried to make use of free sources on Internet so that the cost occurred can be minimized. And in this project, the developer will test with around 10 universities in Hanoi, Vietnam.

CHAPTER 2

LITERATURE REVIEW

2.1. What is Mash – up?

2.1.1 *Highlights of Mash – up*

The project's main function is to create the system which provides the necessary information for the users within the boundary of a city – Ha Noi, Vietnam. Utilizing this system, the users (students or any citizens) can find all of essential information about the universities which they are looking for. For example, supposed that a student wants to search the suitable course to study, he/she just needs to enter in this system. He/she will find information, requirements or subjects of this course. Or, a student is worrying about the hostel of his/her university before he/she studies in this university. So, the student can find all of information, maybe images of the hostel in accommodation category in this system... To implement the project, the tool will be used is the Mash – ups application. The question raised is what Mash – up is?

We can find easily some famous applications which were using the Mash-ups tools, such as Parkingcarma.com, Weatherbonk.com, Google Transit and even Facebook... The key desirability of mash-up is potential for self services that end – consumers can create. Mash-up also can perform composition in the browser as well as provides automatic version, security and software qualities. Mash – up application can be built in a few hours, as opposed to the old ways: budgeting, architecting, designing, project managing, testing and maintaining... It is waste too much time. Besides, mash – up application also is promoted by the organizations. It leads to the creation of software, exploit the information as well as data from the knowledge workers without training to use. So that, webs can be found as a model for best practices of mash-up, using widgets or APIs...

According to Zarandioon, S. Danfeng Yao Ganapathy, V. Dept. of Comput. Sci., Rutgers Univ., Piscataway, NJ 2008 "As mashups evolve into portals designed to offer convenient access to information on critical domains, such as banking, shopping, investment, enterprise mashups, and Web desktops, concerns to protect clients' personal information and trade secrets become important, thereby motivating the need for strong security guarantees. We develop a security architecture that provides high assurance on the mutual authentication, data confidentiality, and message integrity of mashup applications. In this paper, we describe the design and implementation of OpenMashupOS (OMOS), an open-source browser independent framework for secure inter-domain communication and mashup development."

2.1.2 *Definitions and Interoperability of Mash – up*

At this point, Bala Iyer and Thomas H. Davenport (*Reverse Engineering Google's Innovation Machine* report - 2008) gives the definition of Mash – ups as follows: "Mash-ups are information technology applications that combine data and program functionality from more than one external source into an integrated customer experience". Mash-ups allow the users to present their unending creative abilities by combining some web applications together. This terminology was mentioned for a long time ago but nowadays, it just was concentrated by the technicians.

According to Xuanzhe Liu Yi Hui Wei Sun Haiqi Liang Peking Univ., Beijing (2007), "Mashup is a hallmark of Web 2.0 and attracts both industry and academia. It refers to an ad hoc composition technology of Web applications that allows users to draw upon content retrieved from external data sources to create entirely new services. Compared to traditional "developer-centric" composition technologies, e.g., BPEI and WSCI, mash - up provides a flexible and easy-of-use way for service composition on Web. It makes the consumers free to compose services as they wish as well as simplifies the composition task."

Another definition of mush-ups is "Mashups are new Web 2.0 applications that seamlessly combine contents from multiple heterogeneous data sources into one integrated browser environment. The hallmark of these applications is to facilitate dynamic information sharing and analysis, thereby creating a more integrated and convenient experience for end-

users." (Zarandioon, S. Danfeng Yao Ganapathy, V. Dept. of Comput. Sci., Rutgers Univ., Piscataway, NJ 2008)

In the other light, Benslimane, D. Dustdar, S. Sheth, A. (2008) indicateds: "Web services are becoming a major technology for deploying automated interactions between distributed and heterogeneous applications, and for connecting business processes. Service mashups indicate a way to create new Web applications by combining existing Web resources utilizing data and Web APIs. They facilitate the design and development of novel and modern Web applications based on easy-to-accomplish end-user service compositions."

What is the mash – up interoperability? According to John Palfrey and Urs Gasser (2010) in *Mashups Interoperability and eInnovation*, "Interoperability specifically in the mash-up context must be defined broadly enough so as to be useful in discussing all relevant applications of the term, but not so broadly that it encompasses so much as to lose meaning and value as a limiting force. Because all mash-up inherently take advantage of interoperability, so that the mash-up interoperability is the set of conditions, including compatible technologies and willing participation by Web services and data providers, that permit developers to create mash-up." So that, quality of mash-up interoperability will allow users easier to convert their mash-up applications from using one data source to another. It also has some types of equivalence in communication skills, and further encompasses the demands for interoperability at the content level, like data portability.

Mash-up applications include 2 main components, data and Application Programming Interfaces (APIs). Nowadays, there is more than one billion of users surf Internet everyday all over the world. Thus, it is questioned that how to create facilitate greater levels of information sharing and culminated through the high – speed broadband. And using Web 2.0 is the answer. At the moment, the Internet users can use, find, create, store, share as well as publish more information online, for example: Facebook, Google Maps, Flickr, Youtube... They are called Application Programming Interface (APIs). Mash – ups are Web 2.0 pages or applications that use and combine data, presentation or functionality from two or more APIs and other data sources to create the new services. Or the formulation to create the mash – ups

is: API + API + ... + API = Mash-up, the web as platform. APIs provide an interface with which non – programmers can gain access to a flexible form of the data. Both of data and APIs can be public as well as private.

The following figure shows the famous APIs which are used broadly:

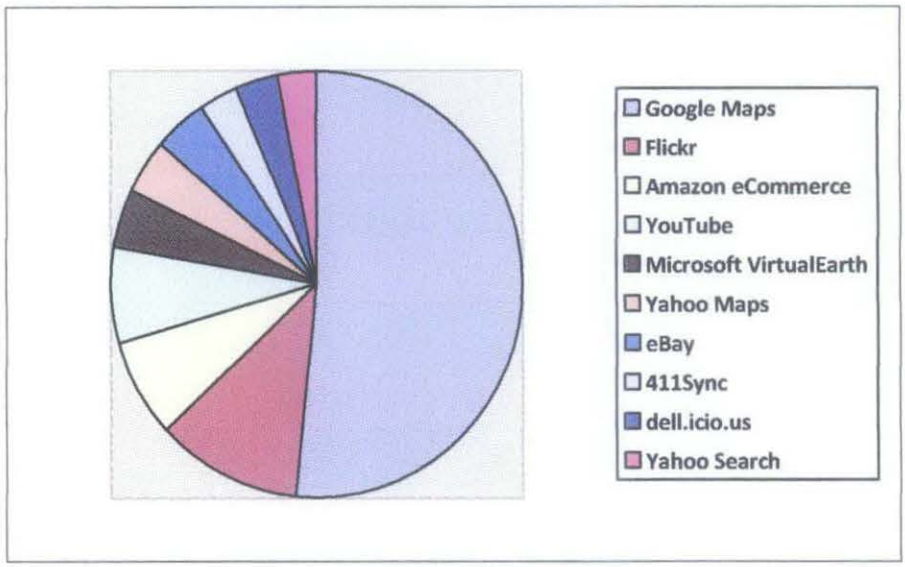


Figure 1: Top APIs used for Mash-up

Source: Mash-ups Interoperability and eInnovation

Mash-up application will be depended on the logical layer to support point to point communication. "Data is pulled from the content layer, greatly enabled by the APIs, and the final application influences the social interactions on the Internet. Nowadays, mash-up applications created the attention from a lot of people because of the creativity involved in their development and the functionality which they allow users. If the Internet is thought of in superseding layers – physical (the wires), logical (the protocols), content, and social – mash-ups fit between the content and social layers, changing the ways in which individuals relate to content." (According to the Mash-up Interoperability and eInnovation).

2.1.3 *Classification of Mash – up*

There are many types of mash-ups from different perspectives; however, it is indicated to be four frequently used types of mash – ups which are services mash-ups, consumer mash-ups, geo-mashups and enterprise mash-ups.

Consumer mash – ups or presentation mash – ups are the simplest group of mash – up. From the view of Amin Anjomshoaa, Gerald Bader, A Min Tjoa (2009) in *Exploiting Mash-up Architecture in Business Use Cases*, they said that: "Consumer mash-ups are used to facilitate the creation of information portals from different resources for presentation purposes. This kind of mash – up has the lowest degree of customization and is usually implemented as pre – built widgets that can be added to user interface". The example of consumer mash – up is iGoogle, that is a personal web portal with capability of adding web feeds and Google Gadgets, such as email, news, wether...

According to Mark Burdon, "Geo-mashups is defined as an information system that combines one or more data streams that is overlaid on an online geographical interface, to create original content." From the different view, Anant Jhingran defines enterprise mash-ups as "applications which combine their own resources, application and data with other external web services. They focus data into a single presentation and allow for collaborative action among businesses and developers." In fact, the enterprise mash-ups are secure, visually rich web applications which present the information from both internal as well as external sources.

Moreover, mash-up applications also were developed to services mash-ups which were defined by Djamal Benslimane and Schahram Dustdar: "Service mash-ups are the theme of new generation of Web applications, aim to design and develop novel and modern Web application based on easy on accomplish end-user service compositions."

2.1.4 *Development Process of Mash – up*

Therefore, it is obvious that the variety in mash-ups' applications is so useful and convenient for the customers. This explains the fact that why more and more people are using mash-ups and mash-ups are becoming more and more popular. The demand goes up in accordance with the increase in development, which leads to some new editors innovated to serve these demands.

In the first place, it is referred to be Microsoft Popfly which is used by the non – professional users. Based on the Silverlight, everybody can create the online services which are quite complex but there is no need to understand about HTML, XTML, CSS, AJAX... Popfly is free and compatible with Internet Explorer and Firefox.

The other one given to create mash – ups is Yahoo Pipes. It is one of the earliest mash-ups tools of the Web World. Therefore, it was utilized by the people who had a little knowledge about technologies. However, it is not really difficult to use if the users are patient enough. Moreover, Google Mashup Editor was considered to be the best innovative editor by a lot of people at the moment. Finally, Intel introduced Mash Maker at Web 2.0 exhibition in San Francisco, which supports for anyone wants to create personal applications.

2.1.5 *Applications of Mash – up*

With its usefulness and efficiency, the applications of mash-ups are becoming more and more popular in society. It can be seen in the example of Housingmaps.com which combines data from Craigslist with Google Maps to create an application that allows users to see apartments for rent or houses for sale plotted on a map of the local area. Another application is the case of Geopointe combining information of Google Maps, MapQuest and Salesforce.com to provide numerous ways for end-users, administrators and developers to take advantage of geo data and maps...

Approaching more different way of utilizing mash-ups is the KeepMore application which keeps track of the user's income and expenses. EBay Direct Import automatically imports all of the user's eBay transactions every hour. Finally, it will be the combination between Authorize.Net and eBay APIs.

2.1.6 *Benefits of Issues using/developing Mash-ups*

A good favor of using client presentation mash-ups is that they provide immediate benefit at little cost. For example, enhancing the Account detail page with a stock chart for the associated ticker symbol is trivial and provides obvious value. So, the users can still use the default click through on the ticker symbol to the Yahoo! finance page. With this

characteristic like this, the programmers in particular as well as the company in general will limit the cost to build the applications and programs in the minimum time to gain very useful advantages for the users.

Moreover, mash-ups applications have a strong flavor of reuse. Everyone realized and set a question why we have to reinvent the wheel when someone else has implemented it and provided an APIs? This advantage is really helpful for both programmers as well as the users. The people who want to build the mash-up application, they only need to take the information and data from other websites and applications, and then apply them into their own application. It will help to avoid wasting time and effort from them, also increasing the effectiveness and efficiently of this application. With so many people using mash-ups, it makes sense to make it easy for other groups to mash-up your data and services, when that's a viable option. Take for example the Google Gadget showing the Yahoo! stock chart. That's promoting Google and Yahoo!--even though it's providing value (the stock prices of a company). The users can have their own data and services similarly used and promoted by making it easy for others to access services. In effect, they will be making it easy for others to write applications for them.

The next benefit, mash-up allows everybody can show their never-ending innovative abilities by combining data or information from two or more websites and applications together. Mash-up presents the main characteristic of Web 2.0 which is personally information. For example, the developers can create their own website to share and contribute images and video by combining the YouTube and Flickr. Or, they also can merge the information about traffic in Kuala Lampur with Google Maps to create the maps about the places where always got the traffic jam in the city... The developers here do not include only the programmers. With mash-up tools and editors, the users can be the people who have a little bit as well as don't have any knowledge about technical also can create the mash-up application for their own. This is really extraordinary advantage because it will attract more and more users to use it. That why mash-up always is considered as the excellent member of the Web 2.0 movement.

2.1.7 *Challenges of Issues using/developing Mash-ups*

However, Mash – ups also can bring some disadvantages or risks for the users. The biggest problem with mash-up is the data. The users of mash-up can have to compete with some problems, one of which is data pollution. Many mash-ups solicit public user input. It can be quite strong because of it allows to open the contribution as well as the data evolution, yet it can be subject to unpredictable, incorrect, or deliberately confusing data entry. Besides, mash-up developers also have to face with the difficulties of deriving shared semantic meaning among the multi – source databases. They have to find out which data they want to integrate is not suitable, so it needs further process. Otherwise, one of problem of mash-up is when screen scraping techniques must be used for data received. As we know that, the deriving parsing and acquisition tools must be required significant reverse – engineering effort. Even in the best case, all it needs to take is a refactoring of how the source site presents its content to break the combination process, and it will make the application of mash-up to become failure. About the management problems, experts thought that the companies as well as the corporations need to control and manage the staffs to combine their applications, such as identifying clearly which internal information can be used and for what purposes?... to avoid leak out the important data.

In addition to the technical challenges described above, one of the biggest social issues facing mash-up developers is the tradeoff between the protection of intellectual property and consumer privacy versus fair-use and the free flow of information. Unwitting content and even content providers who expose APIs to facilitate data retrieval might determine that their content is being used in a manner that they do not approve of. The mash-up Web application genre is still in its infancy, with hobbyist developers who produce many mash-ups in their spare time. These users might not be cognizant of (or concerned with) issues such as security. Additionally, content providers are only beginning to see the value in providing APIs for machine-based content access, and many do not consider them a core business focus. This combination can yield poor software quality, as priorities such as testing and quality assurance take the backseat to proof-of-concept and innovation. The community as a whole will have to work together to assemble open standards and reusable toolkits in order to facilitate mature software development processes.

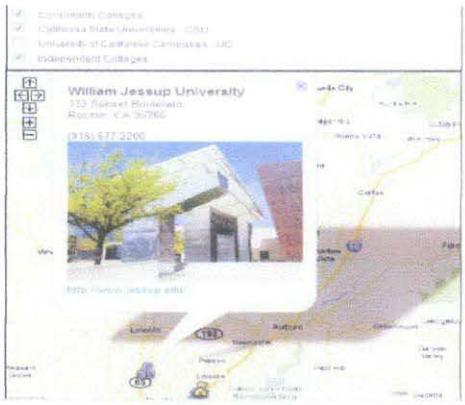
Before mash-ups can make the transition from cool toys to sophisticated applications, much work will have to go into distilling robust standards, protocols, models, and toolkits. For this to happen, major software development industry leaders, content providers, and entrepreneurs will have to find value in mash-ups, which means viable business models. API providers will need to determine whether or not to charge for their content, and if so, how to collect it. Perhaps they will provide varying levels of quality-of-service. Some marketplace providers, such as eBay or Amazon, might find that the free use of their APIs increases product movement.

2.3. Various Mash – up applications similar to this project:

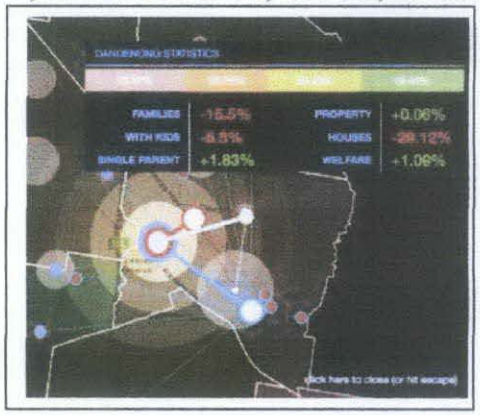
Nowadays, on the Internet, the users can very easily to find out mash – up applications with so many different topics as well as subjects, such as: traffic, education, social, travel, music, sports... So, with this project content is about information services for High Education, the users can seek various mash – up applications, but of course, they also have some different characteristics.

This application was called "Locate colleges in California on the Map". It is also quite the same with this project. This application located all of the colleges, includes universities of California – state universities, private colleges and community colleges on the map when the users click on the chosen universities. It used Google Maps as its APIs.

The interface will show the users some options to choose, such as: Community Colleges, California State Universities, University of California Campuses and Independent Colleges. When the users choose one kind of these universities, the Google Maps will show locations, basic information as well as the images about them.



However, this application only located the position of universities. It hadn't got any more information, such as: lecturers, courses, accommodations..., not like this project wants to do.



The next mash – up was called okSchool Explorer. It was the combination between Google Maps and OpenLayers APIs. So that, its functionalities would be a submission to the Australian Government's Mash – up Australia incentive.

It used Victorian schools, emergency services and 2006 Australian census data to visualize what a universities, its area and information might be like families, property... This system is quite similar with the project. The differences between 2 applications are about location and the project is more detailed information than okSchool Explorer.

One more mash – up is UK Schools. It was the browsable directory of schools in England. Because of the mash – up of APIs like Google Analytics, Google Maps and Google Maps Data, so that, this application's features include maps, street - view and graphs of number and age of the students.

When the users click to the website of UK Schools, the interface will ask them to select the city where got the schools they need information in UK. And then, they will find and choose in the list of whole schools in this city. The information about location (through

Google Maps and Google Maps Data) as well as the ratios about the students (through Google Analytics) will be showed for the users.

It focuses on the situation of students as well as the location of the universities. Its differences with this project are the same with the "Locate colleges in California on the Map" application. It has not enough and detailed information about universities like this project.

2.4. Mash – up versus Portal

One more concern of the technicians is the existing of the portal. Both mash – up as well as portal have the role to collect the information and data. While portal is the old method and less flexible, mash – up opens more and more opportunities for everybody to be creative. However, mash – up also can not end the existence of the portal. Otherwise, portal will work as the base to encourage the mash – up applications. In fact, both of mash – up as well as portal technologies are content aggregation technologies based on the applications on the Web servers. However, there are some difference points between them.

Portal is the older technology, and is extended to traditional Web server model using well defined approach. Its content dependencies are aggregated presentation – oriented mark – up fragments, such as HTML, WML, VoiceXML... While, mash – up is the newer technology, loosely defined "Web 2.0" techniques. And it can operate on pure XML content and also on presentation – oriented content, like HTML. With portal, its traditionally content aggregation

takes place on the server, but for mash – up, its content aggregation can take place either on the server or on the client.

One more difference is about the philosophy and approach to aggregate. For portal, its approach aggregation is splitting role of Web server into two phases: markup generation and aggregation of markup fragments. But, mash – up techniques uses Application Program Interfaces (APIs) provided by different content sites to aggregate and reuse the content in another way. Portal behavior is governed by standards JSR 168, JSR 286 and WSRP, although portal page layout and portal functionality are undefined and vendor – specific. While, relevant standards of mash – up are based on XML interchanged, such as REST or Web Services.

2.5. Conclusion:

In conclusion, the development from Web 1.0 to Web 2.0 was considered like "break through step" of the information technology. Web 2.0 is really more efficient information sharing, collaboration and business processes. And, Mash – up is one of the outcomes of Web 2.0 paradigm that has been widely accepted and used for users over the world. The role and effect of mash-ups in modern life is obvious. At the moment, although mash – ups are mainly used for less fundamental tasks, such as customized queries and map based visualizations. But, compared to a few years ago, mash-ups' development and application are becoming popular and increasing day by day with higher demands. In the future, it has the potential to be used for more fundamental, complex and sophisticated taskes.

In Hanoi - Vietnam, the demands of mash-ups are more and more urgent, especially when the number of students is rising rapidly. For the time being, the system will be functioning only at universities in Hanoi capital. And in long-term vision, the system may be expanded to meet requirements of other provinces as well as cities over the whole country, which will contribute much to encourage and develop the education and training in Vietnam.

CHAPTER 3

METHODOLOGY/PROJECT WORK

To develop a system, the methodology chosen is Prototyping. This methodology involves analysis, design and implementation phases to be performed concurrently and repeatedly in a cycle until the system is completed. The system will be developed by prototypes, and then reviewed by the users and the developers to change functionality if necessary to come up with new prototypes until the system is complete.

By using the prototyping methodology, the system will have some advantages when compare with the other methodology. It will reduce development time and costs. The developers also can receive quantifiable user feedback after each version. Consequences, it facilitates system implementation since users know what to expect and the results of the system will be higher user satisfaction. So, the prototyping will require user involvement. Besides, the application also exposes developers to potential future system enhancements.

The prototyping methodology also got some disadvantages. When the developers use this method, it can lead to insufficient analysis and sometimes leads to incomplete documentation because of so many steps, phases and versions. And developers can become too attached to their prototypes and cause systems to be left unfinished and/or implemented before they are ready. Besides, users also expect the performance of the ultimate system to be the same as the prototype.

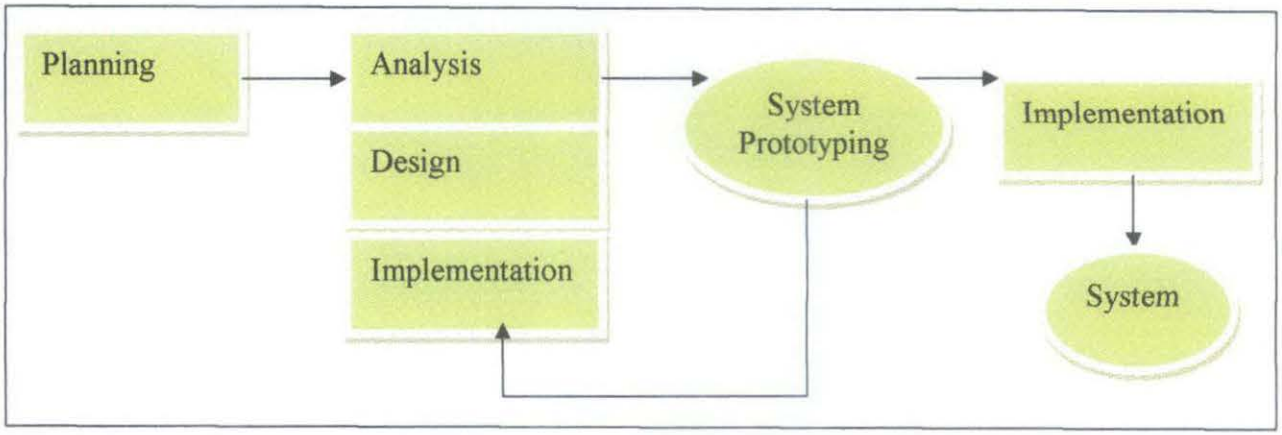


Figure 2: Diagram of prototyping

The project will need at least 2 versions of the system prototype to complete. In the first step, the developer needs to have good understandings of the operation, the users as well as the goals for the new system. This step will be used to create the sufficiently as well as detailed plan for the whole project. It will support for the next step, which include 3 parallel phases: analysis, design and implementation phases.

These steps will be implemented simultaneously. The developer will analysis the requirements of the new system as well as of the users. So that, it will become the base for designing and implementing the first version of the system. The users will be the tester of this version. After each prototype is completed, the user can use and give feedback to the system developer to enhance its functions. With this approach, there will be a better understanding between the users and the system developer. As a result, the users' requirements will be better refined and solved.

Prototyping methodology is chosen because it very quickly provides a system for the users to interact with, and it helps to more quickly refine real requirements. Rather than attempting to understand a system specification on paper, the users can interact with the prototype to better understand what it can and cannot do. Prototyping reassures the users that the system developer is working on the system (there are no long delays in which the users see little progress).

In the first version, second phase (analysis, design and implementation steps) of the project, research and gathering information will play a key role. The progress of gathering information maybe:

- Prepare a set of questionnaires and conduct the interviews for the users, include from the Universities, High Schools of Hanoi, parents of these students as well as others users who interested in this system.
- Gathering basic information about universities' background and
- How to develop the Mash – ups application by searching in Internet.
- Combine, discuss about all results

In the second version of the project, after received and collected the feedbacks as well as comments from the users, a complete system will be developed. Some of the tools that will be used are:

- Some tools to build Mash-ups: Microsoft Popfly, or Yahoo Pipes, or Intel Mash Maker, or Google Mash – ups Editor…
- Maybe some programming languages such as Java, PHP, mySQL
- Open source code

When this application is built by Mash-ups combined with PHP, mySQL… the result website will have advantages when compared with other programming languages, because of mash-up is basic as well as extraordinarily techniques to create applications and connect things together.

- *More reusable*: Mash-up is larger at the application level than the current service oriented architecture technologies. As mentioned above, each APIs or each mash-up building block has own content, images or business and it is also a combination of data, process as well as widgets.
- *Web – Based*: It means that mash-up will be developed by using site's software, Web services and feeds based directly on top of HTTP and JSON (JavaScript Object Notation), such as the websites of universities in Hanoi… for data retrieval. Besides, the application can get first real conventions for element interoperability in the browser.
- *Light Weight*: In additional, this mash-up website application also is a *lightweight* combination of many other sources as well as content of applications in only request. Because of mash-up uses data and services from the public Websites and programs, so it will be easy to implementation and built with minimum lines of code. This program will have the user to quickly meet tactical demands with reduced development costs and improve user satisfaction.
- *End user centric:* Mash-up application is used for supporting the end user, not for the developers, without the complex programming environment.

CHAPTER 4

MASH-UPS ARCHITECTURAL/FRAMEWORK

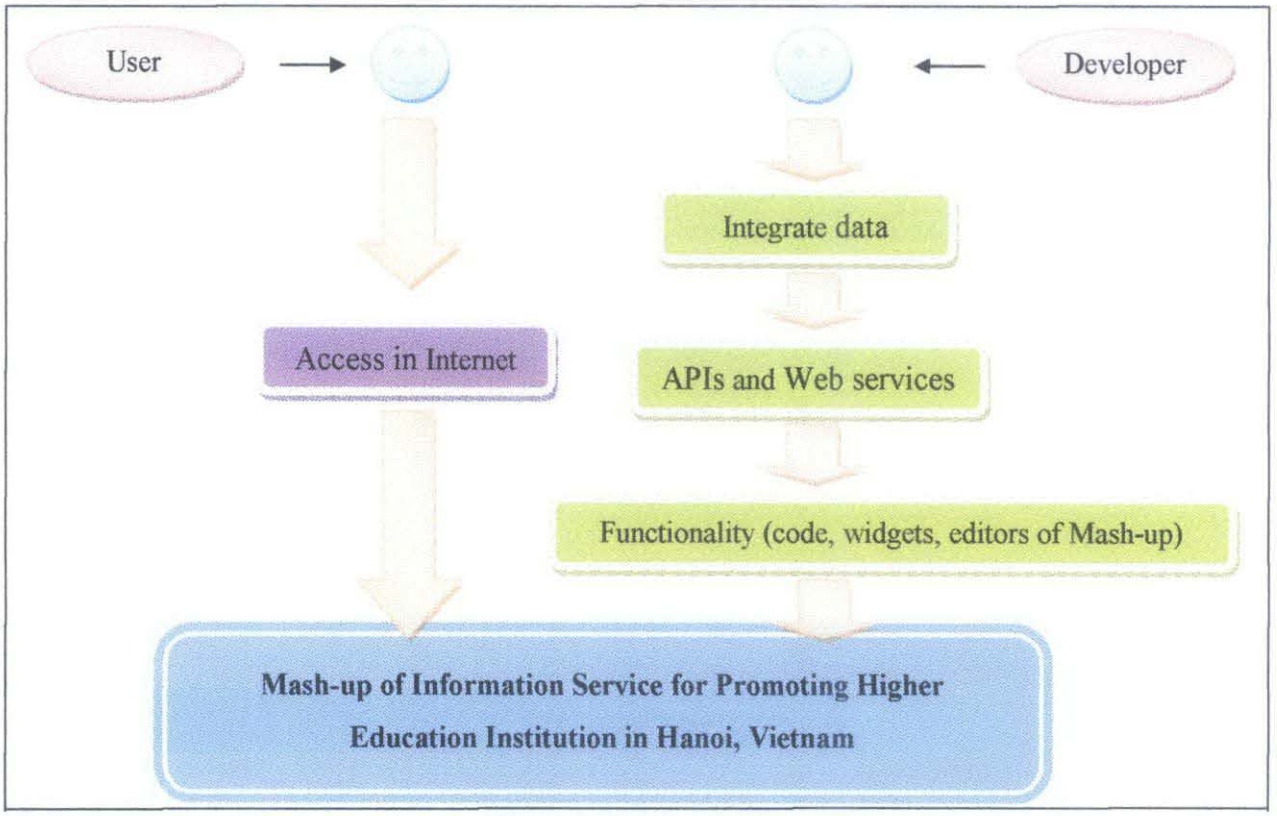


Figure 3: Mash-up framework

The user of this application can be:

- The parents of pupils as well as the pupils themselves who are preparing to choose or study in university or are living in other provinces, not Hanoi
- The parents of existing pupils as well as themselves to find out the necessary information about their university
- The international people who want to find out the information to study or work with the university
- Other people who have any concern with.

The developer will access to some separately Internet applications (APIs), such as Google Maps, universities' websites in Hanoi... to find out the necessary information for the system. And then, mash – up tools, like Intel Mash Maker, Yahoo Pipes... will help to extract out these data and combine them into one application. The application will be

presented on the devices of the users, like computers or mobiles... For this project, the developer will combine Google Maps with databases which contain all of information about these universities. After this, all of the users just need to enter in this application, they can find all of information that they want. So that, it will minimization the effort, time as well as cots of the users when they only need to come one address, replace for accessing into so many different addresses. The taxonomy will be categorized as following:

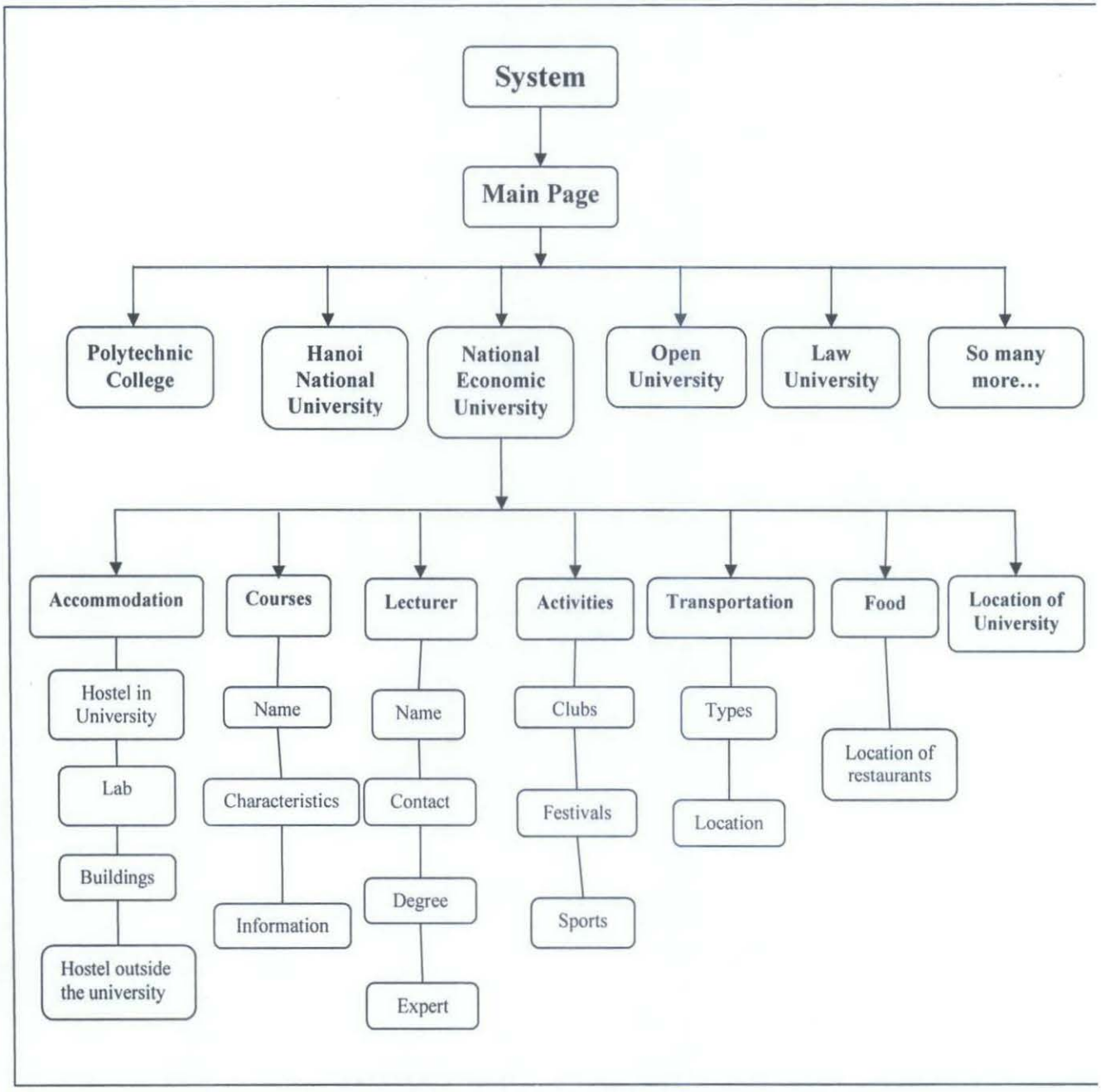


Figure 4: System taxonomy

When the users access to the system, they can see the main page. It includes some briefs introduction about the application with representative images. Besides, they can see the list of all universities in Ha Noi capital. The user can choose any university to find its information that they need. When the user access into the university, they can see some categorizes which the system got: accommodation, course, lecturer, activities, transportation, food and location. So that, if they have interested in any field, they just click onto it. The system will show the detail of this field with sufficient information that they need.

For example: if the user needs information about the hostel of the National Economic University. So that, he/she can accesses into the National Economic University, and then, clicks onto Accommodation field. After this, the system will show for he/she the list of information that related with accommodation, include hostel in University, lab, buildings and hostel outside the university. Finally, he/she clicks on hostel area to find any necessary information, such as if the user wants to know about hostel which can rent outside the university, the system will locate the locations of hostels around this university in the map (using APIs Google Maps). The process of other universities as well as of other fields is also the same.

This application is very user friendly and can provide the sufficient information for the users. So that, the users can so easy to understand and use the system, and minimize the effort of the users.

CHAPTER 5

RESULTS AND DISCUSSION

In the first part of the project, the purpose will mainly aim at gathering as much necessary information as possible that will be stored in the database, collecting wider range and more accurate information about the users as well as the system requirements by conducting a questionnaire to build all the useful functions for the system, and designing the interface for the application.

There were 100 questionnaire papers which were distributed randomly. In fact, there were only 84 of these papers which had answer and were returned back.

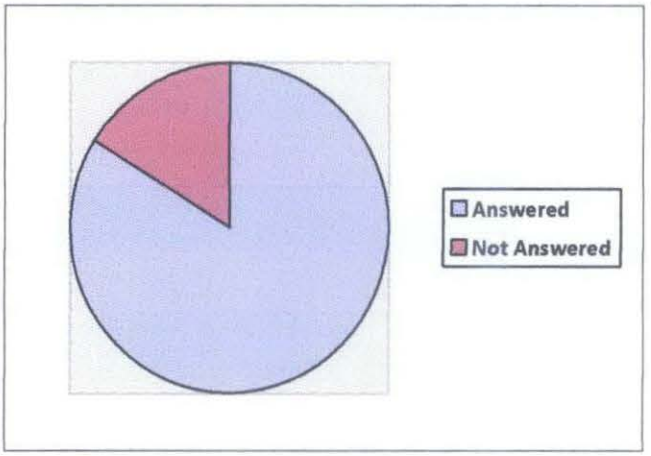


Figure 5: Number of people answered

Based on the observation by the developer, almost of the people, who was given the questionnaires, was willing to fill up this form. That indicates the fact of positive sharing about the education fields. It is really the seriously problem with Vietnam in general, and for Hanoi in particular. The rest, 16 people, who didn't want to answered. They refused to fill in the questionnaires form because of the lack of time, or thought that it was unnecessary. The information as well as knowledge about universities is not related to them. They can be the people who don't have the children or their children are above the education age... Or their work doesn't have any relation with universities...

We can see the ratio about job of the people who were surveyed:

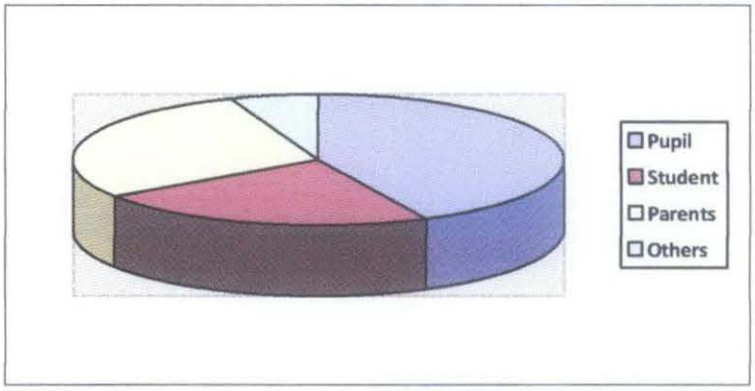


Figure 6: Statistic about job of surveyed people

From the figure, the pupils were 36 people who got the biggest ratio (approximate 43 %). This means that, they have the most interested in the university's information field. These people focus on the high school pupils, who prepared to study in the universities. So that, they really want to find the updated and necessary information about universities to choose the best suitable for themselves. And after this, parents of this kind of pupils who were the people got big ratio, 29% (19 people). They care for your children in choosing the comfortable universities. With the existing students who are studying in one university, there got 19 students, which occupied around 22%. These students will be focused on the people who take care about the information of their university, such as courses, lecturers... Or they are considering about scholarship of universities in Hanoi. The last one is the other kinds of people who were surveyed. There are only 5 people. They can be the lecturers, teachers or staffs of the university who want to find out the information. Or they can be the people who don't have any relationship to care about the education fields. Because of this questionnaires were distributed randomly, so that, the people will come from many different places.

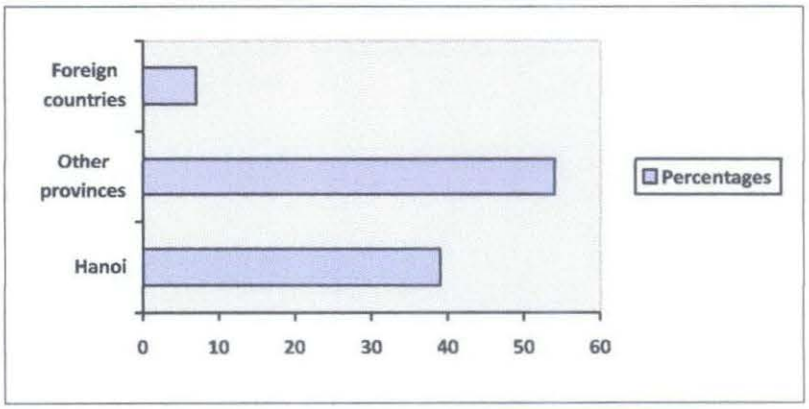


Figure 7: Percentages of people's location

Figure 3 shows clearly that number of the people who live at the other provinces cluster, with 54%. Besides, there got 33 people, approximate 39%, who live in Hanoi capital. The lastly only have 6 people who are the international people, around 7%. This ratio is so small, because of Vietnam in general, and Hanoi in particular doesn't develop in the international universities. So, it is rarely the international students.

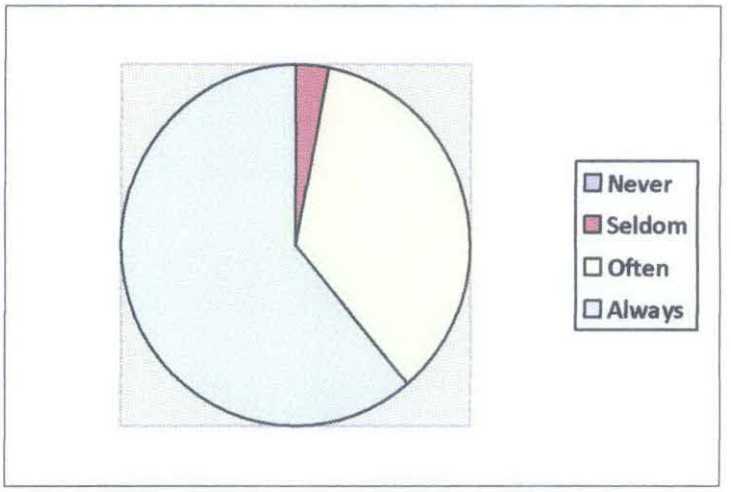


Figure 8: Percentages of frequency of finding information

Based on the figure 4, we can see that in the surveyed people, there don't have any one who never finds out any information about any universities in Hanoi. All of them have at least once time to search this kind of data. And, there are only 3% of people who seldom find out. These people are the people who don't have relations with the higher education fields. Besides, 36 % is often to search this kind of information. This number was focused on the pupils who are 10 or 11 classes. They are not graduated high school yet, so they still not care at that moment. Or, it can be the existing students who don't have much interested in. Finally, the number of people who always find out the information about universities is biggest, around 61%. It is pupils in 12 classes – graduated or nearly graduated high school, or parents of this kind of pupils. It is easy to understand that they usually find and search the necessary as well as updated knowledge about higher education to prepare for choosing the best university.

But, the question here is how they find out these kinds of information:

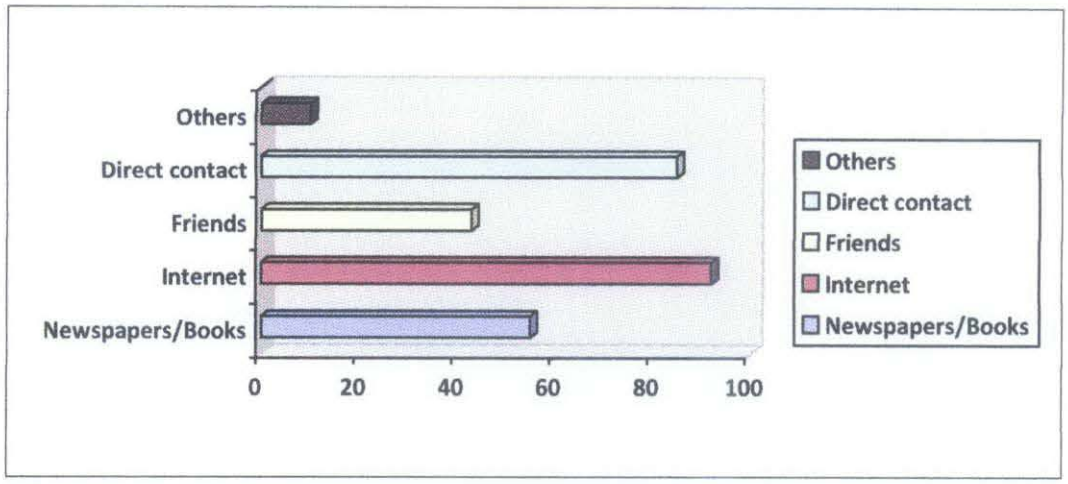


Figure 9: Percentages of ways to find out the information

To find out the information about universities, the users have so many different ways, such as: search through Internet, or read newspapers and books, or ask friends who are existing friends in universities or worked in the education fields, or other ways like come and ask at the universities... And the users can use one, some or all of these ways. In this questionnaire research, almost of asked people, 92%, used the Internet to find their needed information. This number is the evident result, because of today is the technical era, Internet is everywhere, and it is the best useful, fastest and easiest tool with unlimited resources to search any information in any field that the users need, specify with the international people. That why when they are asked do they know how to use Internet (question 7 – Questionnaire appendix), there are only 4 people who don't answer no. This number is focused on the old people who don't know how to use computer. Reading the newspapers or books, or asking and referencing the friend's idea are the normal way (55% and 43% correlative). But they also have some specific advantages when compare with the Internet. By using newspapers or books, the users can know the newest and most truth information, because it was published by the universities as well as by the Education Agencies. Otherwise, if they ask friends, they will be received the real or actually experience. Because of these people are studying in the universities already or they are working in the education fields, in fact. Finally, there are 85% surveyed people used the directly contact to the universities which they interested in. It is the large percentage because of it is the traditional and effective way. They thought they will not find enough necessary information when they use Internet, books or newspaper... Due to these ways can be not updated or sufficient information for their demand.

Catching this problem, the developer wants to develop this system to improve it. The application will provide the needed and required information of universities about the basic fields which the users always concern, such as accommodation, location, transportation, food...

The following figure will show the percentage of concerning of the users about them:

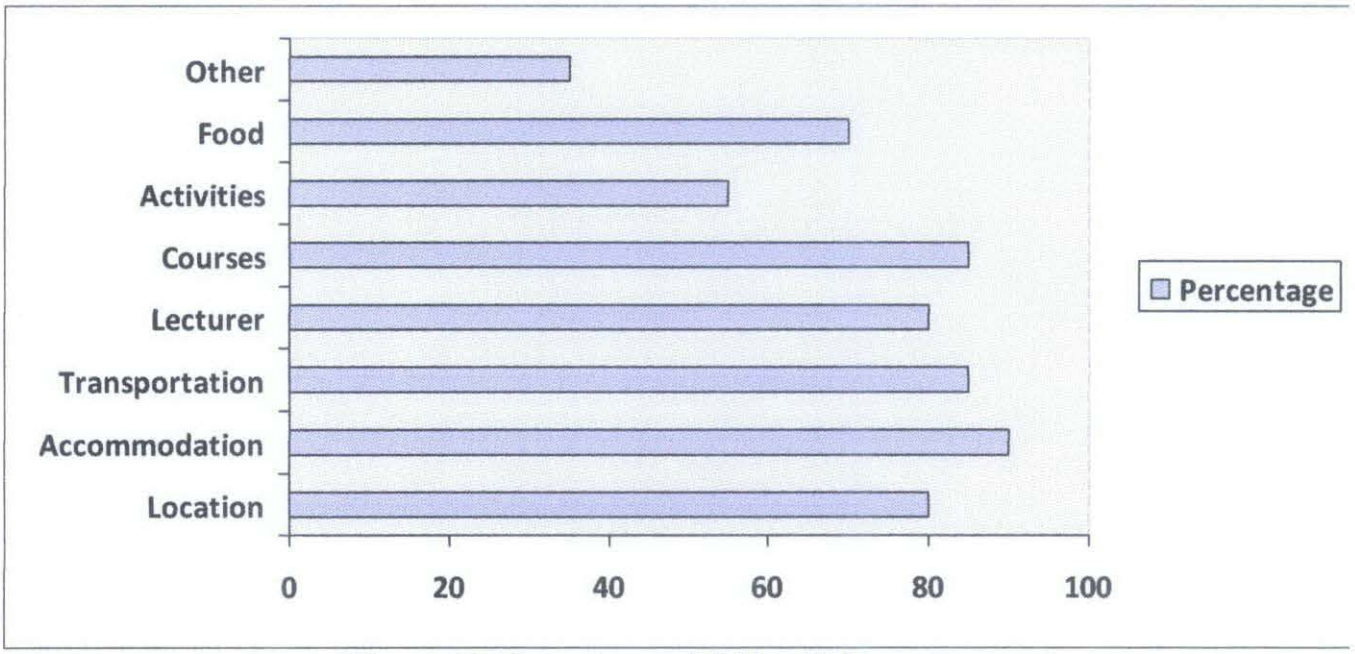


Figure 10: Percentages of fields which users concern

This system is built based on the interesting of the users about fields of the universities. The developer created the fields which the customers got most concentration, such as transportation, accommodation, location, courses... to help them find out the needed data. The figure 10 shows that, 90% of surveyed people concerned about the accommodation, 85% concern about transportation and 80% about the location of the university. It can be included the hostel, building, vehicles and address. The parents, students... always care about where they can live, inside or outside the university, near the university or not. Or how they can come to the university, by bus, by train or other public transportation, the place where they live whether or not convenient... There are so many questions are asked about these living conditions. The people who interested in these fields focus on the foreign country and other provinces. They are the people who don't know much about Hanoi and really need help for these problems. These are also points for the comparing when they had to make the decision. The next concern of the users is about the study problems. There are 85% people interested in course field and 80% about the lecturers. When compare among the universities to choose

the best one, in addition with the conditions, the first thing which the users concern is about study. They will find which courses the universities offer, who are the lecturers... This information will help them to catch the most suitable university. Actually, they can discover this information easily in the university website itself or guideline books... So, that is the reasons why the percentages of them is lower than accommodation, transportation's percentages (which don't have information on the website and books...). The last fields which the customers worry about are food and activities. These things are quite important but they are can be handle easily. Besides, to upgrade this application, the surveyed people also commented to add more functions, such as the ranking or awards of these universities... They are also the good ideas and the developer will expand the system later.

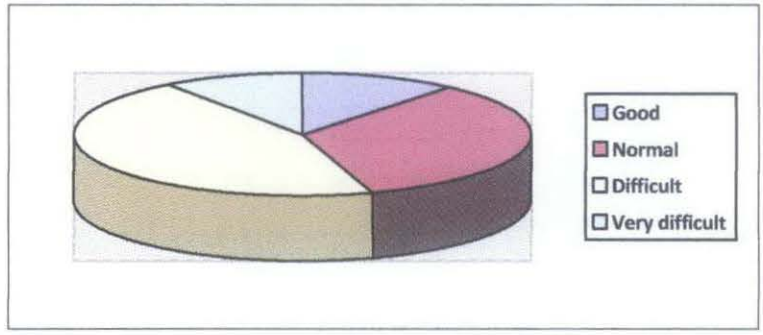


Figure 11: Percentages of feeling level when find and compare information

According to the figure 11, there are 11 percentage, around 9 people feel that they feel good and 34% (29 people) feel normal when find out and compare all of these above information. These people concentrated on the Hanoi citizens who knew quite enough about location, conditions as well as qualities of the universities in this area. But, opposite with this number, there are 45% (38 people) feel difficult and 10% (8 people) feel very difficult when they do this process. They are the people who live outside Hanoi, in the other provinces as well as foreign countries. So that, they don't have any information about universities in Hanoi. When they use the above ways, there got some disadvantages. If they use Internet, there are so many different information and they couldn't know which information is true and updated. Besides, if they read newspapers, books or they ask their friends, they also don't have enough information about these universities. They can use come and ask way, but it is really waste time, effort and money, specially for the other provinces and international people. In additional, when they know all of information about all universities, they will have

to face with problems to compare all of different data. They are also the results of the question 9 in Questionnaire about annoyances and inconveniences of the users.

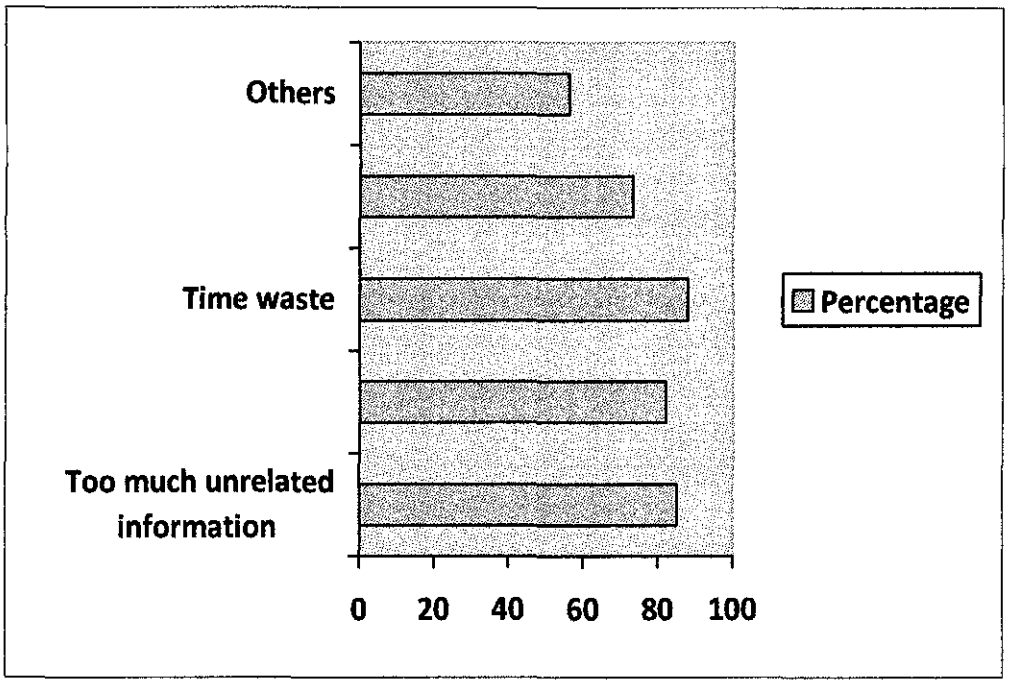


Figure 12: Percentages of ways to find out the information

The figure 12 presented the feeling of users when they need to find required information by using Internet. There are 85% people feel too much unrelated information, 82% about disorder of information, 88% of users suffer that too waste time when discovery data, 73% think that the information is unreliability, can not be trusted and 56% feels waste costs, tired, have not enough information... (identify in Others). Now, we can see there are so many problems with the ways to search the necessary information for people.

This project is built for solving these problems based on the Mash-up tools:

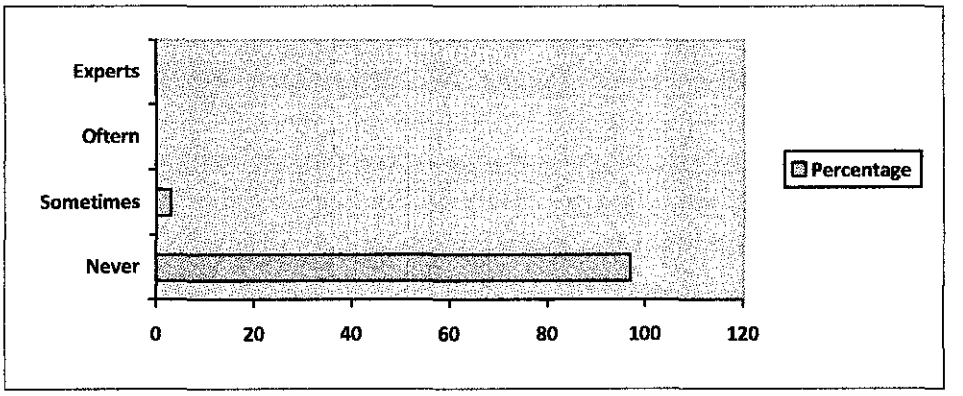


Figure 13: Percentage of understand about Mash-up

Mash – up is the new technical tool. So that, the number of people, who knows about Mash – up is rarely. Therefore, based on the figure 7, in the surveyed people, there don't have anyone who is expert or often heard about Mash – up. It only has 2 people who sometimes heard about mash – up. They can be the Information Technology students or the people who really interested in the programs. The rest, 82 people didn't hear about mash – up. So that, when be asked to use mash – up tool to help and support to solve problems about finding and collecting information, 100% of them wants to try it. It is the new technology as well as can assist effectively for them to search and aggregate their necessary information.

System function's test:

Functions	Description	Run
Location	- Locate the location of universities in the Google Maps	**X**
Transportation	- Locate the stations around the universities in the Google Maps to make the comfortable for students	**X**
Food	- Locate the restaurants around the universities in the Google Maps to help users find the suitable ones	**X**
Accommodation	- Locate the hostels with price around the universities in the Google Maps to help students can compare and choose the best one for their conditions	**X**
Activities	- List all activities of the universities to attract the students to enjoy	**X**
Lecturers	- List all lecturers of the universities with their contact, degree, expert to for students	**X**
Courses	- List all courses of the universities for users can find out the suitable major and minor with them.	**X**

Figure 14: System's functions testing

User requirement's test:

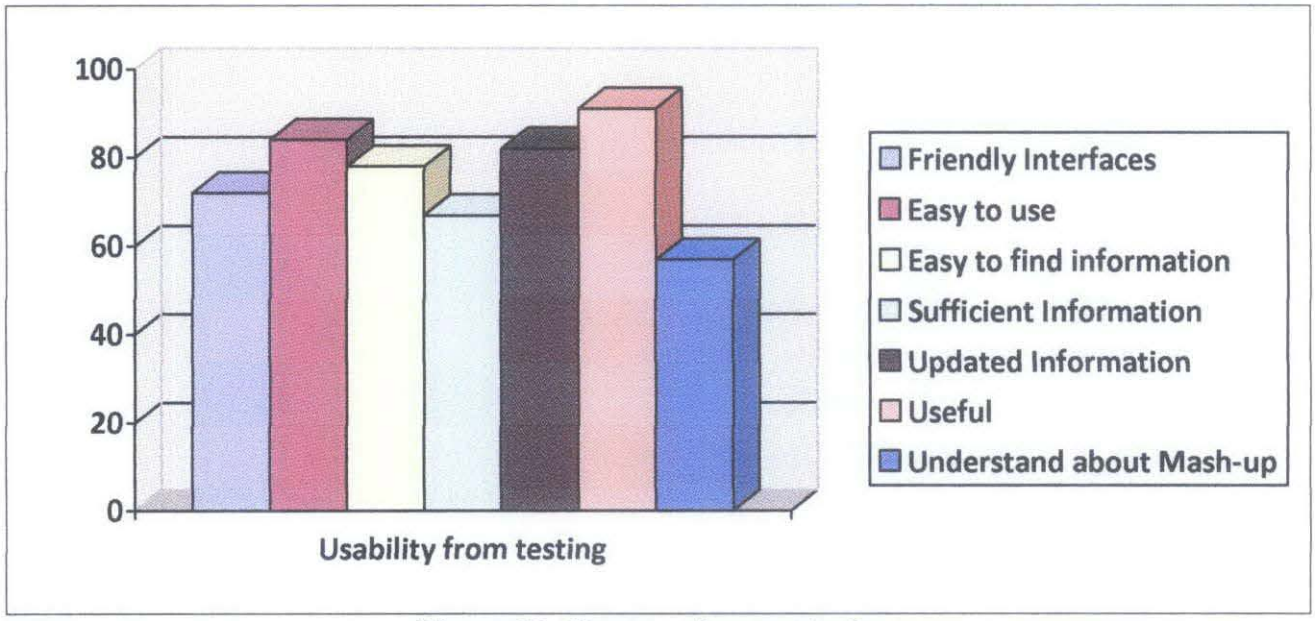


Figure 15: User requirement testing

From this test, the system was already completed with the whole functions were run. When the developer develops this project, there are some objectives want to achieve: create the unique application with the friendly interfaces. It will easy to use, to find the information which is sufficient, updated. And it is really the useful application to promoting the Higher Education in Hanoi, Vietnam. Through it, the users also can have the basic idea about mash-up tool. And through testing, the project's objectives are also quite met. But, after testing, the users also gave the developer some comments. The first thing, they want put more characteristics, such as ranking, fees of education or scholarship of the universities. Through it, they can evaluate this university and compare with the others. It will increase the effective of sufficient information. Otherwise, about the friendly-user interface, the users also want to develop the Vietnamese version in Vietnamese language. These people are focus on the old people and don't know English, maybe the parents of students. It will create the more friendly interfaces. These comments will become the future works.

This questionnaire survey indicated that nowadays, people of Vietnam in general and Hanoi capital in particular have the signification interested in the education fields, specially

Higher Education. They want to find, search, collect and compare all of necessary information about these universities to make their best choice. But the problem with them is how to do this? They got some ways, but some of them are wasting their time, effort as well as money or also not effectively, or not really trustworthy or too widely (newspapers, come-and-ask, Internet...). Moreover, Mash-up is the suitable tools to solve these problems. By using mash-up, the developer can extract out the updated and newest information from the universities as well as Education Agencies to put it in one application and bring it to the customers. So, because of this fact, the developer wants to develop this system, "*Mash-up of Information Services for Promoting Higher Education Institution in Hanoi, Vietnam*" to solve it. Besides, it also can be the useful and comfortable tool for users. The result of this survey shows that all of users want to try this application to discovery it.

CHAPTER 6

INTERFACES

After the second version of the project was finished, the developer built the completely system with the quite enough functions. And the testing for this system also performed (discussed above). The following is the interfaces of the application:

Figure 16: Interfaces

When the users move the mouse to the name of university which they prefer, the box with 7 categories will appear. It is list of functions in this application, include: accommodation, course, lecturers, activities, transportation, food and location. In the banner of the application, the developer set up some functions. When the customers click to the Home button, the system will back to the main page. Otherwise, some functions, such as HUST, FPT, VNU..., is the abbreviate words of the name of universities. When the users use these functions to choose one university, the system will automatically link to the official website of it. It will open the new tab in the user's browser. It is the function that helps users to get more information about this university.

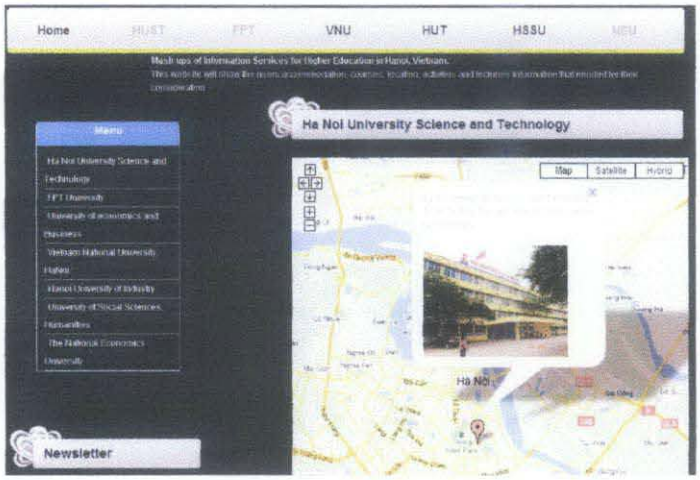


Figure 17: Interfaces

After choose the preferred university, if the users choose category Location in the list, the interface like figure 15 will be appeared. For example, here, Hanoi University Science and Technology was used as the sample. When HUST was chosen, the system will load the location of this university in the Google Maps. After this, it will return and upload the exactly this location to the system and appear for the users can see. The location of this university will be marked. The users also can zoom in and zoom out to see the detail with the street name, the direction to reach this university... Moreover, when the users move the mouse to the marked sign, there will appear a box. This box will show the detail of this university, include name, address, contact and image of it.

If the customer chooses the accommodation function, the interface will appear as the following figure:

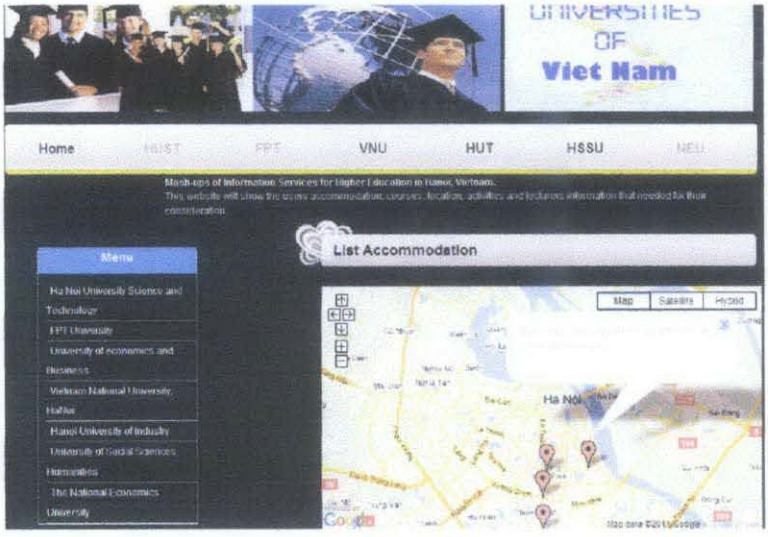


Figure 18: Interfaces

The interface of this function is quite similar with the interface of location function. But it locates the locations of university, it is List Accommodation. When the users want to know about the accommodation conditions, with the hostels around this university, they will use this function. This application will automatically connect and search into the Google Maps the locations of hostels which have the near addresses with the university. After this, it will send back to the system to appear for the user can see. The map will be directly extracting from the Google Maps with zoom in, zoom out functions. The hostel's addresses also are marked onto the maps. When the users move mouse to these marked signs, the information about these hostels will be showed. There are address, contact, person per room and price. So, for this function, the user can easy to see which hostels are the best suitable option for their demands and conditions. After this, they can contact with and hire it.

In additional with this function, in this system, there are more functions with the quite similar characteristics. They are transportation and food. When the user chooses the transportation function, the system will return the Google Maps with the location of all the stations which are around this university. With this benefit, the users can know how they can come to the university as well as go somewhere from this place by using the public vehicles. Otherwise, the last but not least, it is about the food function. Its purpose is used to locate the restaurants around the universities on the Google Maps. The map will show the name, address and kind of food of the restaurants create more options for the users. It will helpful for the users who want to go out for lunch or dinner as well as people don't have time to cooking by themselves. We can see that, the accommodation, transportation and food are the basic and fundamental out-of-education which the students and their parents are really to anxious about. They always care about conditions about how they live, how their transportations and how they eat. So, the users really interested in these functions. These things are the essential needs of the life.

Besides the data which located onto the maps, the system also shows the information about the other aspects of universities for the users to reference, such as courses, lecturers and activities. When you choose the function List Courses, for example, the interface will appear as the figure 17. The application will list whole courses of this university. After this,

the user can choose any course they interested in by clicking to its name. And the system will show the short description of this subject. So that, the customers also can understand and compare among these universities to choose the best choice for their demand. For the lecturers and activities functions, they are quite the same idea. When the users choose List Lecturers, the system will show all of the lecturers of this university with their name, expert, degree and contact. Besides, if they want to know about the extra – curricular activities, the users can choose the List Activities. It will show all events in one year of this university to attract the students to enjoy. These activities will help the students and staffs feel relax and entertain after the stressed time for studying and teaching. The courses, lecturers and activities problems are also the important points which the students will concern when they want to choose their best suitable university.

Figure 19: Interfaces

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Recommendation for the system

- Extend the scope of the project to all universities in Hanoi as well as for other provinces
- Other features to be added into the system: ranking, fees, scholarship...
- Combine Telco based services (SMS, MMS and location) with the map service provided by Yahoo! to new mash-up service for mobile devices.
- To illustrate and integrate photographs and videos from Flickr and YouTube

6.2 Conclusion

Nowadays, mash-up applications are certainly an exciting new genre of Web 2.0. The combination of data modeling technologies stalking from the Semantic Web domain and the maturation of insecurely-coupled, service-oriented, platform-doubter communication protocols is finally providing the infrastructure which needed to start developing applications that can leverage and integrate the massive amount of information that is available on the Web. As mash-up applications gain higher visibility, it will be interesting to see how the genre influences social issues such as fair-use and intellectual property as well as other application domains that integrate data across organizational boundaries, such as grid computing and business-to-business workflow management.

During the first part of the project, the purpose focused on information collection and developing methodologies and interface design.

In the second part, the complete system was implemented and tested before being used. If the system is proved to be useful, it should be extended the scope of to be applied for all

universities in Hanoi as well as other provinces in Vietnam, not only in Hanoi City to enhance effectively and efficiently in using Internet in Vietnam.

Education is always the first concern of Vietnam in particular as well as over the world in general. The demand of information about the schools and universities for the parents, students... usually is very high. But the question is how we can collect them? The information technology now in Vietnam is not really developed. So, the users always had to face with difficult to search the needed information, such as: waste time and money, unreliability, too much unrelated information or information disorder and updated... For these problems, the developer proposed the idea to build this system with some special characteristics to solve them. "*Mash – ups of Information Services for Higher Education in Ha Noi, Vietnam*" will be the good tool for searching, collecting and finding any needed information about universities in Hanoi, Vietnam.

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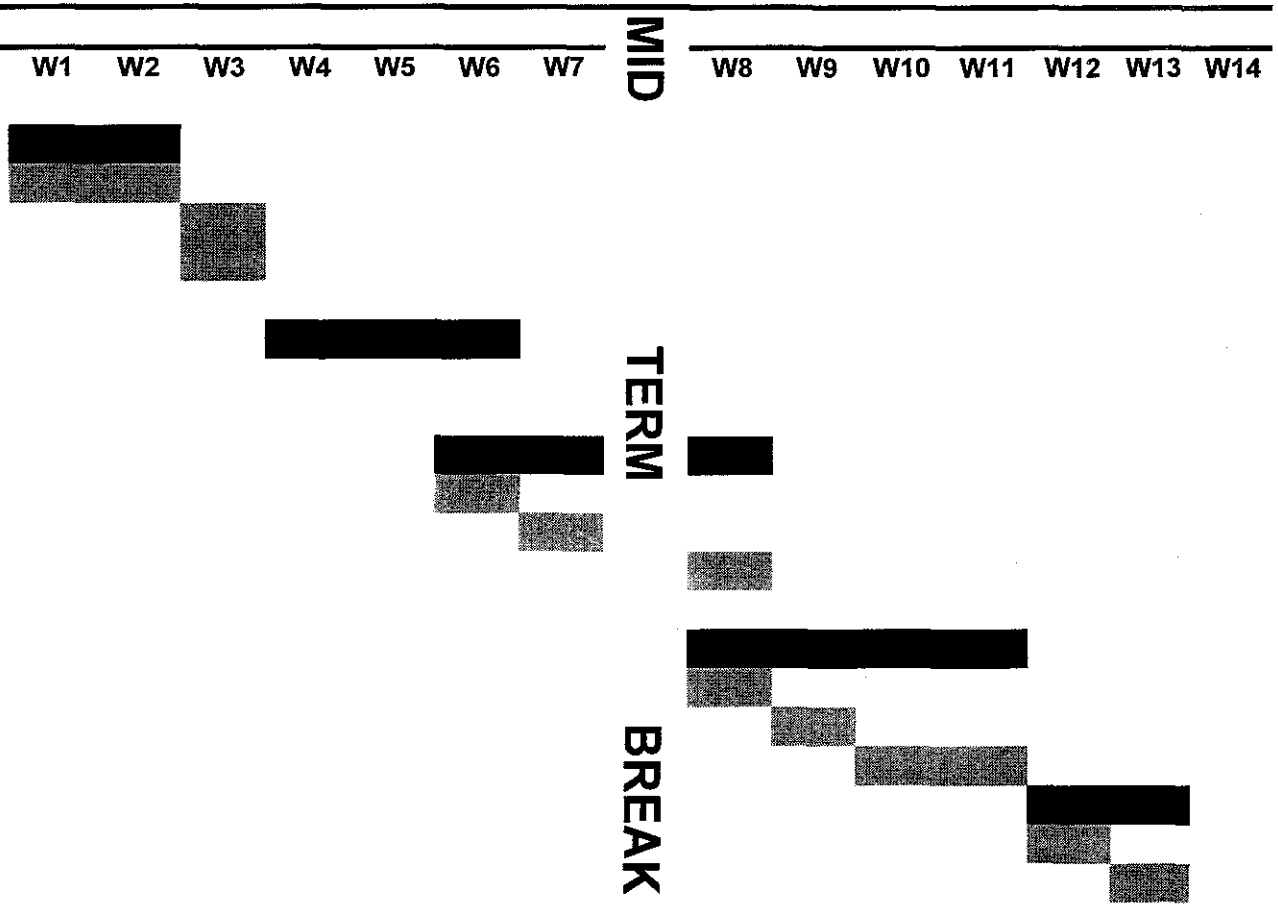
Appendix 1

Grantt Chart for FYP I

TASK	DURATION	RESPONSIBLE
Select topic	2w	LP+Supervisor
Select topic	2w	LP+Supervisor
Write proposal	1w	LP
Topic selected	1w	Supervisor
Planning		
Set up the whole plan	3w	LP
Version 1		
Analysis phase	3w	
Research	3w	LP
Search on Internet	1w	LP
Draft the functions	1w	LP
Finalise the functions	1w	LP
Design phase	4w	
Gather information	4w	LP
From Hanoi's universities	1w	LP
Prepare questionnaire	1w	LP
Combine results	2w	LP
Implementation phase	2w	
Design the architecture	1w	LP
Design the first interface	1w	LP



APPENDIX 2

GANTT CHART FOR FYP II

TASK	DURATION	RESPONSIBLE	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Work on the progress report	5 weeks	LP+Supervisor														
Write the programming code for the system	7 weeks	LP														
Submit the progress report	1 week	LP														
Work on the final draff report	2 weeks	LP+Supervisor														
Prepare for the Pre - EDX event	1 week	LP														
Prepare the poster	1 week	LP														
Attend to the Pre - EDX event	1 week	LP														
Prepare the dissertation	2 weeks	LP+Supervisor														
Prepare the Final Report	1 week	LP+Supervisor														
Prepare the Technical Report	1 week	LP+Supervisor														
Prepare and attend to EDX event	1 week	LP+Supervisor														
Prepare for the Oral Presentation	1 week	LP														
Oral Presentation	1 week	LP														

APPENDIX 3: DATA GATHERING TECHNIQUES

SURVEY QUESTIONNAIRES

"Mash – ups of Information Services for Higher Education in Hanoi, Vietnam"

Please (X) for the correct answer:

Age: **Gender:** **M** ☐ **F** ☐

1/ Your occupation is:

a/ Pupil ☐ b/ Student ☐

c/ Parent ☐ c/ Others ☐

2/ Where do you live:

a/ Hanoi capital ☐ b/ Other provinces ☐

c/ Foreign countries ☐

3/ Have you ever tried to find out any information about any university in Hanoi, Vietnam?

a/ Never ☐ b/ Seldom ☐

c/ Often ☐ d/ Always ☐

4/ By which ways you often utilize to find this information?

(You can choose more than one answer)

a/ Newspapers/Books ☐ b/ Internet ☐

c/ Friends/Relatives ☐ d/ Direct Contact ☐

e/ Others:.....

.....

5/ Can this information found by the above ways satisfy your demand?

Yes ☐ No ☐

If your answer is **No**, please specify the reasons:

.....

.....

.....

6/ What kinds of information do you want to find about any university in Hanoi, Vietnam?

(You can choose more than one answer)

a/ Location ☐ b/ Transportation ☐

c/ Courses ☐ d/ Activities ☐

e/ Lecturers ☐ f/ Accommodation ☐

g/ Food ☐

g/ Others:.....

.....

.....

7/ How do you feel when you compare all of your necessary information among universities?

a/ Good ☐ b/ Normal ☐

c/ Difficult ☐ d/ Very difficult ☐

8/ Do you know how to use Internet?

Yes ☐ No ☐

9/ **When you use Internet to find information about universities in Hanoi, what are your annoyances and inconveniences?**

(You can choose more than one answer)

a/ Too much unrelated information ☐

b/ Information disorder ☐

c/ Time waste ☐

d/ Unreliability ☐

e/ Others:

.....

.....

.....

10/ **Are there any websites / technology applications you ever utilized which contain all necessary information about universities in Hanoi, Vietnam?**

Yes ☐ No ☐

If your answer is **Yes**, please specify the websites / technology applications:

.....

.....

.....

11/ **Do you have any suggestions on a new application which could contribute to find out the necessary information about universities?**

(You can choose more than one answer)

a/ Gathered information ☐

b/ Easy to find and compare ☐

c/ Reliable information ☐

d/ Regularly update ☐