**Location-based Social Network for Cities & Neighbourhood Sustainable
Development**

by

Wan Nor Adilah Bt. Wan Zamry

Dissertation submitted in partial fulfilment of

the requirements for the

Bachelor of Technology (Hons)

(Information & Communication Technology)

SEPTEMBER 2011

Universiti Teknologi PETRONAS

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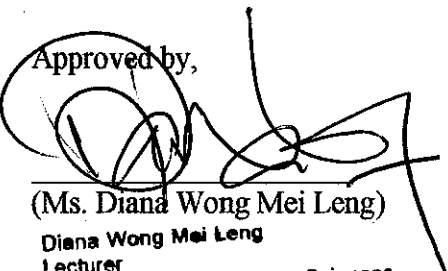
CERTIFICATION OF APPROVAL

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TRONOH, PERAK

SEPTEMBER 2011

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.

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WAN NOR ADILAH BT. WAN ZAMRY

ABSTRACT

Online Social Network (OSN) is categorized as Web 2.0 which is defined by O'Reilly in 2004, is the idea of mutually maximizing collective intelligence and added value for each participant by dynamic information sharing and creation. Current trend shows that the next big thing in OSN is Location-based Social Networking (LBSN) which is the composite of OSN and Location-based Service (LBS). The goal of this paper is to study on Malaysian online social behaviour and to explore what are the key technologies of LBSN to support the development of neighbourhoods where residents feel a sense of connection to their local community and ability to engage in that community. Problems and opportunities identified are: 1) Lack of research has been done to understand Malaysian online social behavior in the context of cities & neighbourhood development, 2) Modern societies are said to lives in a condition of individualism and 3) Malaysia has strong networked community and there are a number of social Application Programming Interface (API) which provide a great opportunities for developers to create an application which can support the idea of smart, liveable and sustainable cities. The objectives of the research are: 1) To study on Malaysian social behavior in using Location-based Social Network (LBSN) , motivation for participation and pattern of use, 2) To identify and understand key technologies of LBSN, and 3) To design an engaging LBSN which leverage on key technologies for neighbourhood and cities' sustainable development. Survey instrument is used as data collection tool to investigate the Malaysian online social behaviour and gauge their views on civil issues such as crime in their residential. Interview also is carried out to the owner of existing crime mapping system to identify the gaps and opportunities for improvements. This research discovers that Malaysians are socially active in online community network and have strong civic conscious to make our neighbourhood works better. Government should look forward into open data for beneficial of public. With proper neighbourhood planning, it will contribute to sustainable community which can help country's development.

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CHAPTER 1

INTRODUCTION

1.1 Background Studies

The advent of Online Social Network (OSN) has revolutionized how we interact with each other. The term social network was introduced 1954 [1] and describes a social structure made of nodes connected by edges that represent one or more specific types of interdependency. In this social context node represent individuals, groups or organizations while the connecting edges can be common relations like values, ideas, friendship, trade or other. Being connected and updated with what happening to the world around has never been easy and accessible that it is today. It did not start out that way. From the advent of email, bulletin board systems, to current social networking sites, technology has been integrated with communication to become a prominent focus of the new digital age.

OSN is categorized as Web 2.0 which is defined by O'Reilly in 2004, is the idea of mutually maximizing collective intelligence and added value for each participant by dynamic information sharing and creation [2]. The emergence of technology enables a huge list of OSN being created to serve different purpose and different audiences. Some of them are competing with each other to gain large number of users to attract investors for their businesses to survive. EbizMBA provide a list of Top 15 Most Popular Social Networking Sites latest by July 2011 [3] which listed Facebook as the first one, followed by Twitter, LinkedIn, MySpace, Ning, Tagged, Orkut, Hi5, myyearbook, Meetup, Badoo, bebo, mylife, Friendster, and Multiply. The notion of these websites being established is to enable people to socialize and keep in touch with each other, reconnect with old friends or create real life friendships through similar interest or groups. Besides establishing social relationships, members can share their thoughts, opinions and their interests with other members by joining groups or forums. There are also a number of niche online social networks that provide service for niche market, for example ResearchGate, a social network for scientist and researchers; Ucubed, a social network for unemployed; Couchsurfing, a social network for budget travelers; Care2, a social network for healthy and green lifestyle; italki, a social network for language lovers where they can learn different language from different members, and many more.

Another form of OSN, location-based social network (LBSN) is growing in popularity due to ubiquity of smartphone users. LBSN is the composite of Online Social Network (OSN) and Location-based Services (LBS) [4]. Examples of LBSN are Foursquare [5], Gowalla [6] Yahoo! Koprol [7], Facebook Places [8] and many more. More and more people are connecting to their mobile phones to share experiences with each other. Basically LBSN allow users to share real life experiences via geo-tagged user generated multimedia content, identify nearby friends, exchange recommendation about places, and setup on-the-go meetings with business contacts.

According to ABI Research report, location based mobile social networking revenues will reach $3.3 billion by 2013 [9]. This shows that location based services is bringing next wave in social networking. This research is studying the Location-based Social Network (LBSN) for sustainable development of cities and neighbourhood. The goal of this paper is to explore what are the key technologies of LBSN to support the development of neighbourhoods where residents feel a sense of connection to their local community and ability to engage in that community.

1.2 Problem statement

Based on research, these are the problems exist which can also be viewed as opportunities to support the idea of sustainable development of cities and neighbourhood.

1. **Lack of research has been done to understand Malaysian online social behaviour in the context of cities & neighbourhood development**

   A lot of projects have been initialized in developed countries to encourage engagement among citizens towards development of their countries. There are a number of websites which discuss about the ideas on how social media and technologies can make cities work better for sustainable development. Among of them are Planetizen.com, Planningpool.com, DIYcity.org, and EngagingCities.com. These website become thoughts repository and incubator for all things related to urban development. What is highlighted here is that there is a strong need for collective ideas and collaborative participation towards

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cities' sustainable development. It would be great to see that our cities being shaped by truly engaged citizens. In Malaysia, location-based social network is growing into popularity. Lack of research has been done to understand Malaysians online social behaviour in the context of cities and neighbourhood development. Are they keen to participate with neighbourhood social activities to make their residential a better place to live? How they interact with neighbours? Do they care about what's happening in their neighbourhood? What are the impacts of social technologies towards the network capital? So these are among the questions that require answers from this research which is to study Malaysian social behaviour in the context of cities and neighbourhood development.

2. **People nowadays do not even know or care about their neighbours**

Studies show that modern societies lives in a condition of individualism [10] where they do not even care about others. Some people even said that they do not know how their neighbours look like. However, current trend shows that social technologies have reconnect people into a networked community. Online relationship and online communities have developed their own strength and dynamics. Participants in online groups have strong interpersonal feelings of belonging, being wanted, obtaining important resources and having shared identity. These attributes are important in building social capital of a networked community.

3. **Malaysia has strong networked community and there are a number of social Application Programming Interface (API) which provide a great opportunity for developer to create an application which can support the idea of smart, liveable and sustainable cities**

In Malaysia, online social networking has infiltrated significantly throughout the country. According to Accenture Press Release in March (2010), 85% of respondents in Malaysia use social networking at least occasionally followed by India (83%), Singapore (81%), United States (75%), China (73%), Germany (52%) and Japan (28%). Among the eight countries, Facebook was found to the used most often by respondents [11]. These statistical inputs have strategically positioned Malaysia amongst the fast developed Asian countries from the

context of networked community. Furthermore, Social API such as Google Maps, Google Places, Facebook Places, Foursquare, are promising tool to create engaging application which can foster network capital of communities for sustainable development.

1.3 Objectives

The objectives of this paper are:

1. To study on Malaysian social behaviour in using Location-based Social Network (LBSN) , motivation for participation and pattern of use
2. To identify and understand key technologies of LBSN
3. To design an engaging LBSN which leverage on key technologies for neighbourhood sustainable development.

1.4 Scope of Study

1. Relevancy of Location-based Social Network (LBSN) in supporting sustainable development in cities and neighbourhood
2. Related work of LBSN
3. Motivation of participation in LBSN
4. Key technologies in designing LBSN

1.5 Significance of the project

An in depth understanding of Location-based Social Network is necessary to evaluate current systems, to identify gap of opportunities and challenges, to design future system and to understand the impact of online social network on the communities, cities, and neighbourhood development.

Imagine you just move in into an apartment in a neighbourhood. You are new there and have no idea about the place. Having a location-based social network (LBSN) that connects communities into an online network enables you to view places that people have shared. Nearby gas station, groceries shop, nearest gym for you to go for work-out, nearby police station, nearby hospitals and other facilities, special deal offered in the place, join events and causes organized by the communities, and meet-up new friends. You can even ask expert of the places for opinions and reviews. This grows your network circles. You are no longer alone.

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Now imagine as business entity, having LBSN enable you to promote special deal that your business can offer to the local, say 25% discount for early bird who purchase cupcakes in your bakery shops. This is an effective way to market your business to the local people and thus increase customer traffic which can make you happy. This shows that LBSN promotes economic development in your residential. Another example, say you are good in tailoring, having LBSN enable you to promote your service to local neighbours who might not know they have tailoring service nearby.

Users can also make their neighbourhood a better place to live. For example, someone has reported there are suspicious guy who is believed to be a drug dealer staying in a house nearby. This issue is reported through geolocation and forwarded it to local enforcement agencies to take appropriate action. For local governments or enforcement agencies, they can use the neighbourhood network for purposes of community engagement. Police agencies can provide crime statistics in the neighbourhood and notices to the local people to take preventive measures.

CHAPTER 2

LITERATURE REVIEW

There are four broad areas of study: (1) relevancy of Location-based Social Network (LBSN) in supporting sustainable development in cities and neighbourhood, (2) related work of LBSN (3) motivation of participation in LBSN, (4) key technologies in designing LBSN

2.1 Relevancy of LBSN in Supporting Sustainable Development in Cities & Neighbourhood

A lot of researches evolve around the notion of sustainable development. The importance of sustainable development is supported by Donato [12] in research paper tittled *'The Smart City Vision: How Innovation and ICT can build smart, liveable, sustainable cities'*. Donato main advocacy is explained in the quote:

> *"The city is a core paradigm for the mankind, where trade, technology, art and culture converge in designing and building the solutions to the civilization risks. Most people on the earth already live in bigger cities and urbanization is accelerating: it is growing demand for more efficient, sustainable, 'liveable' model for cities.*

> *We can better face new threats, by looking at innovation and best practices, in reinventing the city organization, leveraging ICT enabled nervous system, building smarter cities. In fact we know that human population growth cannot be stopped, nor the expectation of better life, that makes people moving to bigger towns and pressing local government and all stakeholders to get involved."*

One of Donato's dimensions that describe the scope of smart city involve "ICT network that leverage ... mobile advanced location based service, social networking and collaborative crowd sourcing ...."[12]. Donato stressed that ICT and innovation are the enabling components of new paradigm of sustainable, ICT empowered city, on multiple dimensions: economical, environmental, social and cultural. This paper

later will look into existing online social network systems which support these dimensions.

Other study by Marcus [13] stated that nurturing the development of residential network will foster the rise of network capital, social capital, and cultural capital, which give people and their cities, both a sense wellbeing and competitive edge in doing business.

In realizing the idea of sustainable development through technologies, one of the proposed taxonomy involves developing social capital [12]. The term social capital differs from different perspective of social sciences. According to Youth Partnership, social capital consists of civil society norms and networks that enable citizens and their institution to perform productively [14].

Another definition by Quantum3, social capital represents the active connections between people; including trust, mutual understanding, shared values, and behaviours that bind together the members of groups, networks, and communities and make cooperation possible; or, comprises the norms and relations embedded in social structures that enable people to coordinate action to achieve desired goals [15]. Other resource stated that social capital yields a flow of mutually beneficial collective action, contributing to the cohesiveness of people in their societies [16]. Although there are a number of related definitions, they tend to share the main idea that social network have value. The concept of social capital highlights the value of social relations and the role of cooperation to get collective or economic results. We will look into existing systems which foster community engagement, thus bring sense of wellbeing in economical, environmental, social and cultural dimensions.

2.1.1 Peek into online networks that foster community engagement

Existing systems which bring sense of wellbeing in term of environmental and social such as SeeClickFix [17], CitySource [18], CrimeReports [19], Carticipate [20] encourage civic engagement among the communities to make their neighbourhood and cities better place to live. One practical definition of civic engagement is: individual and collective actions designed to identify and address issues of public concern. [21] According to Thomas [22] civic engagement means working to make a

difference in the civic life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference. From economical point of view, Facebook Deals [23] is one of the existing systems which promote development of economic activities in residential and cities. Business entities can promote their products or special deals to local customers while customers can enjoy benefits for their regular visits or loyalty. In term of cultural, EveryBlock [24], is a good example where people can cultivate the network capital by fostering sense of belonging to their neighbourhood.

1. SeeClickFix.com

SeeClickFix [17] is an application that empowers civic engagement. The user can visit the site and search for their town. This will reveal a list of items posted by other users. Items can include anything from dangerous pot holes to drug dealing and other civic issues. The idea is that if enough people see these problems on SeeClickFix, they will vote on them and encourage a change. If enough people speak out about the issue, then those with the power to correct the issue will be more willing to take action. This shows that the power of collaborative will make changes for a better living in neighbourhood. See Click Fix uses Google Maps to help users see geographic locations and what is going on in those places. Users can also read through previous issues that were fixed.

Figure 2.1: SeeClickFix webpage [17]
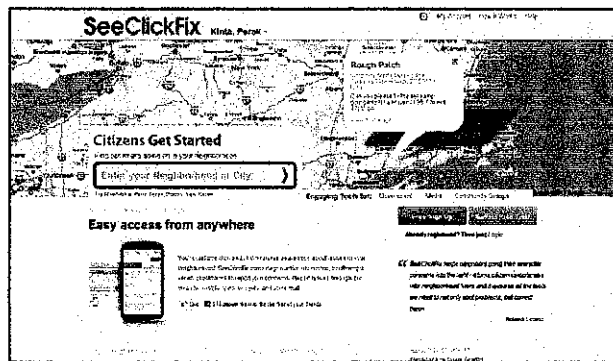
SeeClickFix has been encouraging citizens to constructively communicate with governments since 2007 and is active in thousands of communities around the United States and abroad. Through mobile web, web, iPhone, Android, and Blackberry application, the platform is the most widely distributed citizen reporting tool in the country and fully connected to 311 System, a number to

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report non-emergency issues [25]. Figure below illustrates on how SeeClickFix.com work on these three basic principles: [17]
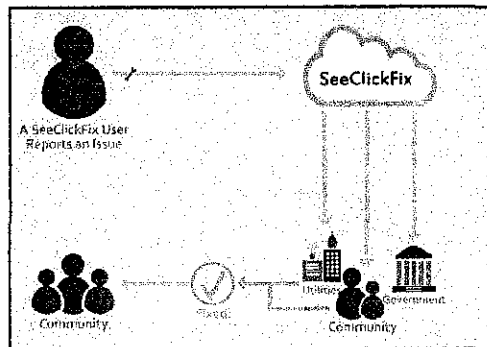
Figure 2.2: How SeeClickFix works [17]

i. **Empowerment.** SeeClickFix allows anyone to report and track non emergency issues anywhere in the world via the internet. This empowers citizens, community groups, media organizations and governments to take care of and improve their neighbourhood.

ii. **Efficiency.** In computer terminology, distributed sensing is particularly powerful at recognizing patterns, such as those that gradually take shape on a street. Besides, the government can't be in all places at all times. SeeClickFix make it easy and fun for everyone to see, click and fix.

iii. **Engagement.** Citizens who take the time to report even minor issues and see them fixed are likely to get more engaged in their local communities. It's called a self-reinforcing loop. This also makes people happy and everyone benefits from that.

SeeClickFix also has effectively being used by media as a tool to broadcast community issues. For example, Charlotte's local CBS station WBTV added a SeeClickFix widget to their website in mid-February of 2010, and began featuring SCF issues on morning news. [26] Since then WBTV has carried out a number of short investigation based on SeeClickFix, ranging from issues of traffic light timings, to broken water pipes, to garbage heaps in the woods. The investigation has led to fixed issues.
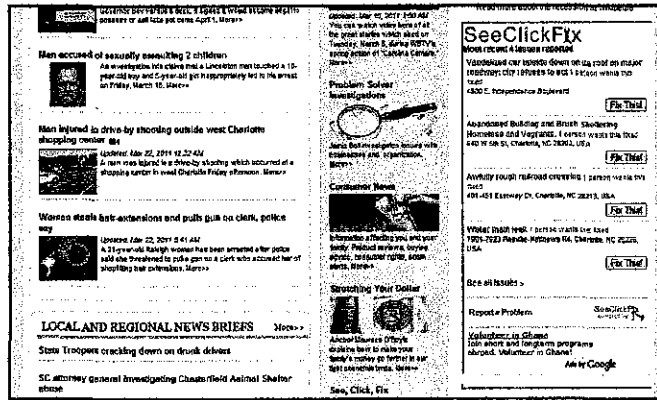
Figure 2.3: SeeClickFix widget at the right side of WBTV homepage.

SeeClickFix can be seen as a successful tool for an effective, efficient and responsive neighbourhood planning as it connects to government, media and community into a unified system.

2. **CitySourced.com**

CitySourced is a real time mobile civic engagement platform which is mainly used in United States neighbourhoods. It provides a free, simple, and intuitive platform empowering residents to identify civic issues which cover public safety, quality of life, and environmental issues. Users can report them to city hall for quick resolution and this provide an opportunity for government to use technology to save time and money plus improve accountability to those they govern [18].
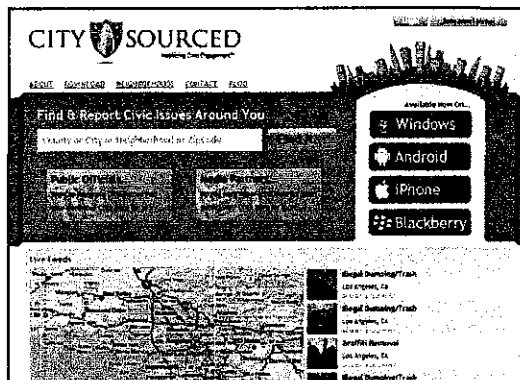
Figure 2.4: CitySourced.com, an application to report civic issues on mobile

CitySourced takes the advantage of mobile phone technology which allows users to find and report civic issues around them. This application helps the public to easily connect with government and in turn helps government better understand

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the citizenry it serves because this application allows government to receive immediate feedback from citizens including reports of incidents, suggestions, and general comments.

3. **CrimeReports.com**

CrimeReports.com is one of the crime-mapping website which is mostly used by law enforcement agencies throughout North America [19].
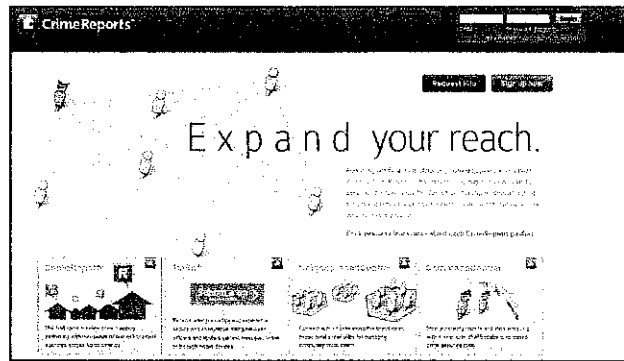
Figure 2.5: CrimeReports.com, a community policing & neighbourhood crime statistics web application [19]

CrimeReports works with law enforcement agencies across North America to publish official crime information online. Computer programs will analyze electronic dispatch records and crime reports for common characteristics to create charts and maps which are useful for the enforcement agencies. For the citizens, they can sign up as member and create email alert to receive crime information for the areas they choose.
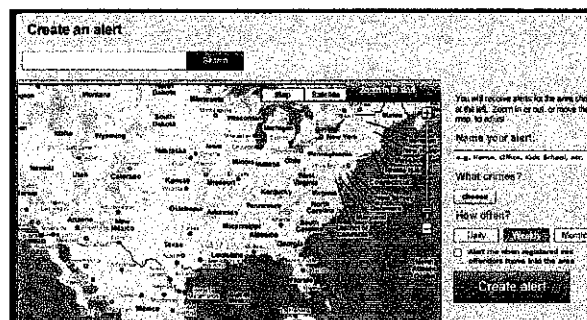
Figure 2.6: CrimeReports is free to all citizens to sign up and receive alert for crime issues

According to CrimeReports, public crime mapping helps citizens keep informed about crime in their areas and helps them be more vigilant and implement crime prevention efforts in their homes, workplaces, and communities. This kind of collaboration and sharing will enable people to foster more trust in local enforcement.

Figure 2.7: Users can view based on categories of crime
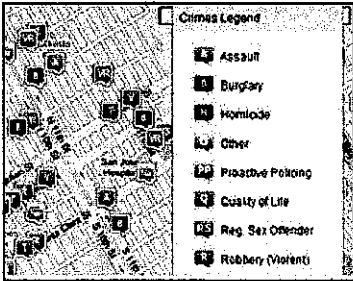
"The more people understand what's going on in a neighbourhood, the more they can respond to it," says East Palo Alto Police Chief Ron Davis, who began using one such mapping program, CrimeReports.com, in early 2009 [27]
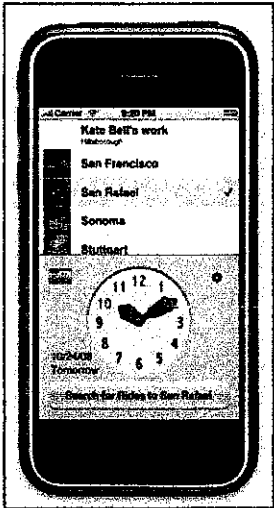
4. Carticipate.com

Figure 2.8: Carticipate – An experiment in Social Transportation [20]

Carticipate [20] is a free iPhone application which is developed by a company based in San Francisco. The company developed a location based mobile social network for ride sharing, ride combining, and car pooling, an activity which the company refers to as 'carticipation.' According to Carticipate, environmental concern and the price of fuel is changing behaviour where 'carticipating' is becoming a necessity for an increasing number of people. Ride sharing and car pooling has been, up to this point, opportunistic since it is not practical to call or

email several people every time one wants to share a ride, especially on short notice.

Carticipate is an experiment in social transportation, the first and only rideshare application on a location aware mobile platform [20]. Users can coordinate driving plans by indicating where they are going, when, and post the ride. Carticipate will match up to local 'carticipants' who are going on the same way. The scheduler feature allows users to create and manage multiple trips where you define the "From" and "To" locations. Carticipate comes with a list of pre-loaded default destinations which user can edit, delete, or add their own custom locations.

Carticipate is seen as a promising tool to foster residential network while promotes environmental friendly. We might never talk to our neighbours who live next door, but this kind of application bring us together into a friendlier neighbourhood.

5. Facebook Check-in Deals

Facebook is moving forward by offering Facebook Check-in Deals for users in the end of 2010. This feature is only available in United States at the moment [23].

Local businesses will be able to offer deals when people check in to their place on Facebook. Check-in Deals are offered by individual businesses, not Facebook, and may be available in limited quantities. User can discover nearby deals through Facebook Places on the latest version of iPhone application
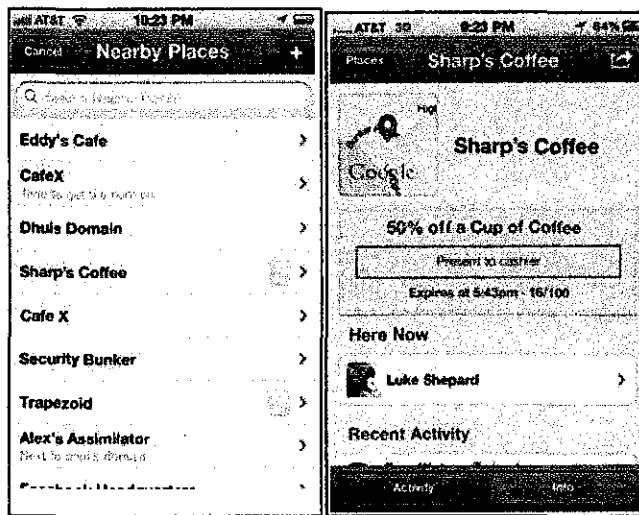
Figure 2.9: Facebook Check-in Deals [23]

Yellow or green ticket indicating that a Place is offering a deal. When users click on a Place's name they will see the details of the Deal being offered. They can chek-in to that place and redeem the offer.

This kind of feature is seen as a good one which promotes the business development in local areas. It can be said as effective way to engage with local people while business owner can learn to generate awareness, encourage in-store traffic and increase repeat business by offering deals.

6. EveryBlock.com
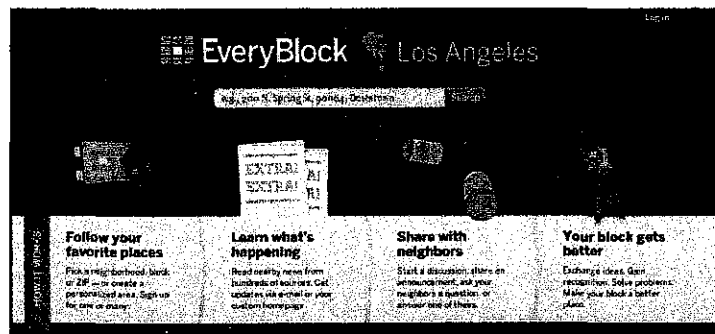
Figure 2.10: EveryBlock Website [24]

EveryBlock [24] is a web application which allows users to follow neighbourhood news and connect with the neighbours in 16 United States cities.

The goal is to help communities make their block or neighbourhood a better place, by giving them frequently updated neighbourhood news, plus tools to

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have meaningful conversations with neighbours. According to EveryBlock, there are two problems that it solved. First, there's no good place to keep track of everything happening in the neighbourhood, from news coverage to events to photography. EveryBlock try to collect all of the news and civic issues going on that have happened recently in the city, and make it simple for users to keep track of news in particular areas. Second, there's no good way to post messages to neighbours via online. Facebook lets users post messages to their friends, Twitter lets users post messages to their followers, but no well-used service lets them post a message to people in a given neighbourhood [24].

EveryBlock is good application for communities to get updated with what's happening to their residential which can cultivate sense of belonging of people to their neighbourhood thus build strong network capital.

2.2 Related work of Location-based social networking (LBSN)

Location-based social networking (LBSN) is quickly growing in popularity. The massive popularity of social networks has spurned a new wave of research in various areas, including sensing systems, mobile computing, data mining, security and privacy. Listed here are the related works of LBSN research field.

1. **People sensing:** Many top end mobile phones such as Nokia N Series, iPhone, Blackberry now come with GPS, WiFi and cellular localization and embedded sensors for example digital compass, proximity sensors, and accelerometers. These mobile devices are leading to the emergence of new applications in health care, gaming, social networks, and recreational sports – enabling people-centric sensing applications such as, Mobiscopes [28], and MetroSense [29] proposed the idea of using mobile phones to perform people-centric sensing. People-centric sensing systems have been designed for various tasks, such as the CenceMe system [30] for activity sensing, ICartel [31] for sensing road traffic using mobile phones, and Micro-Blog [32] for sharing multimedia content in real-time.

2. **Leveraging social interactions:** The Reality Mining project showed how mobile phone interactions can be used to learn about social connections of humans [33]. The Senseable City project [34] is investigating how digital

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traces of human activities can be used to better understand how a city functions. For example, aggregate mobile phone network activity can help estimate the presence of visitors [35, 36]. Researchers have started looking at user activity in social networks as another source of social interactions which can be leveraged [37].

3. **Crowdsourcing:** Crowdsourcing has emerged as a powerful model to problem solving by outsourcing tasks to a large group of people, as engagingly articulated in [38]. PeopleNet [39] was an early system that answered queries by leveraging social networks. Crowdsourcing has been used for various tasks such as image search [40], mining to identify significant events [41], tourism [42], and improving product reviews using social networks [43].

4. **Privacy issues in location sharing:** The act of sharing the current location by users of mobile social networks can potentially raise several privacy concerns. In [44], the authors describe useful guiding principles for creating a location-sharing service based on their pilot study. More recently, [45] explains how social-driven sharing (such as FourSquare) is fundamentally different from purpose-driven sharing (such as Google maps).

2.3 Motivation for participation in LBSN

The emergence of online social network is changing human social behaviour. In an article by Deresiewicz [46] claimed that online social networks are contributing to the isolation of people in the physical world. While Pew Internet and American Life report argues that online social networks have a positive impact on social relations in the physical world [47]. A lot of people have been debating about the emergence of online social networking, does it really makes us unsociable in real life? A relationship expert, Borer [48] stated that technology has connected people but has also become more harmful to people's social live than helpful. He reminded that "as human being we still need to communicate face to face, without that we lose what is connected". Despite the negative view, social technologies are proven that they have values for sustainable development [49]. Now, current trend shows the next big thing in social network is Location-based Social Network. Before 2010, location-based services (LBS) were mostly restricted to simple tools for finding locations on a map via Google Maps or Mapquest [50]. Maps and location were used to learn more

about where one was going to be or become familiar with a new town. Over the years these services became more social. Services like Foursquare, Facebook Places and others relied on texting to "check in" to a location and keep friends in the know about what was going on. The questions are what motivate people to join in LBSN? It is important to understand in depth before designing an engaging LBSN which serve the purpose of connecting communities in neighbourhoods.

Other study stated that there are two main motive for location-sharing application which are purpose-driven and social-driven [45]. Purpose-driven is define as motive that emphasize a more utilitarian perspective of location sharing and focuses on activities like coordination and planning such as Reno [51] WatchMe [52] and the Whereabouts Clock [53].

These purpose-driven are in distinct contrast from those that support location sharing within social networks like Foursquare, Facebook Places, Loopt, BrightKite. This is what we called social-driven. These latter location sharing application have motivating scenarios that emphasize the social aspects of location sharing, where users might announce their arrival at a location not because others *need* to know but because it is simply interesting or fun to do so.

Study by Location Based Marketing Association (LBMA) [54] discovers that the 9 top reasons why people used LBSN to check-in into places.
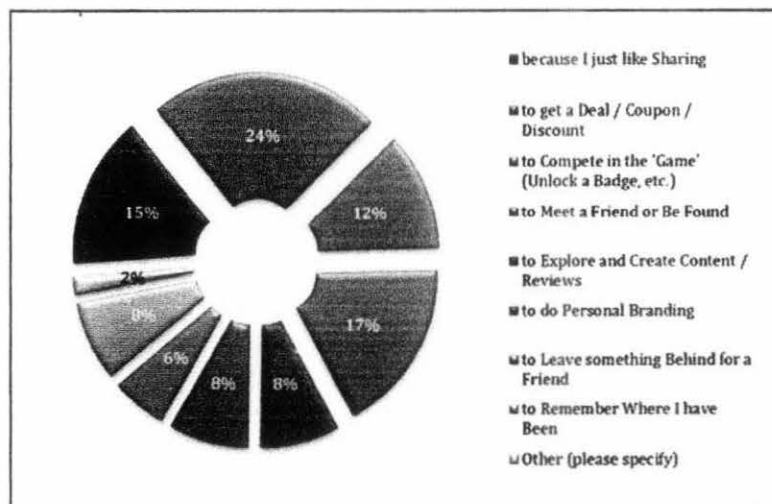
Figure 2.11: Pie chart – Reasons why people check-in using LBSN

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Most of respondents (24%) participate because of rewarding motive to get deal, coupon or discount. This followed by 17% of them participate because of social motive which is to meet a friend or to be found. Then 15% of them participate because they just like sharing and 12% record that they participate for the motive of competing in the game for example to unlock a badge. This feature can be seen in Foursquare, where users can gain badges such as mayorship badge which declare he/she is the mayor/king/queen of the place because of regular check-in.

Figure 2.12: 7 F's check in motivation [55]

BDNooz provide framework of 7 Fs of check-in motivation in LBSN [55] which include Fun, Friends, Fancying, Freebies, Following, Fame and Flirt.

From these studies, it is found that current trend shows that people are keen to participate in the location-sharing online network because of social-driven. Previous research disclosure behaviors on social networks sites like Facebook reveal that users generously share their information [56]. Prior work has shown that this information exchange helps build up social capital [57].

2.4 Key technologies of Location-based Social Network

A recent global Microsoft study found that 76% of Internet-using males age 18-34 in the US, UK, Japan, Germany and Canada had heard of location-based services and 70% had used them at least once. People who use location-based service considered them as valuable, and location-based sharing is not widely used. [58] The are a big potential of Location-based Social Network to be tapped on. With more than 49 million mobile users expected to access social networks like Facebook and MySpace from their phone in 2011, the potential for location sharing catching on is high

especially now that Facebook's location-based service, Places, has been rolled out to almost every smartphone platform [59].

Location-based social networking (LBSN) is all around us. While some might perceive it as creepy, others see it as the key ingredient to move online social networks into the real world. It is important to understand the key technologies in designing engaging LBSN. Listed below are among of the technologies being used in developing web application which have social features.

1. OAuth (Open Authrorization)

Oauth website [60] define Oauth as an open protocol to allow secure API authorization in a simple and standard method from desktop and web applications. Oauth provides a method for clients to access server resources on behalf of a resource owner (such as a different client or an end-user). It also provides a process for end-users to authorize third-party access to their server resources without sharing their credentials (typically, a username and password pair), using user-agent redirections [61]. OAuth is a realistic choice for a web application that itself uses another web application's API on behalf of the user. For example, consider a web application that integrates with Twitter. Say it is a geolocation application like Foursquare that offers the ability to tweet what you are doing and where you are. It is unacceptable for such a web application to store its users' Twitter passwords. Oauth was designed precisely for this use case, it gives the web application a secure way to get an access token for Twitter, which the user can revoke at any time, without ever revealing that Twitter password to the web application. Roy [62] has outlined the advantage and disadvantage of Oauth from end-user point of view and the owner of the application /organization point of view.

From the end user's point of view:
Advantages:
- Don't have to create another profile on the net.
- Fewer passwords to remember.
- Do not have to submit a password to your application if he / she does not completely trust us.

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- User can prevent access to the application from the Oauth Provider.
- Allows for exciting extra functionality and synergies when taking advantage of the social graph and other data and features made available by the Oauth provider. This may provide much added value.

Disadvantages:

- User can not tailor the profile for your application (would require additional development).
- Can be a bit confusing for the user having to create an account with Oauth providers if he / she does not have an account there already.

From the organization's point of view:

Advantages:

- Save time on developing authentication, display of user profile and social interaction as friends' lists, status updates, profile, photos, etc.
- Do not need support for password renewal, forgotten password, authentication of users, and support to let users remove themselves from the service, etc.
- Lower risk and fewer bugs in connection to authentication when using a ready-made proven API.
- Low-risk for ID theft, etc. The service already has good support to prevent this. Authentication takes place at provider, the Oauth tokens is encrypted and not in our application.
- If the Oauth standard is extended with support for info cards or other functionality in the future, it would be supported in your application automatically.
- Easier to manage / maintain / configure than forexample extranet login models with mixed authentication (form based saml etc)
- Less data to store on your servers.

Disadvantages:

- No connections to existing user accounts e.g. in Active Directory if needed.
- If the remote service is down you have no login (unless the users authentication cookie is valid).

- Requires some logic if you will allow the user to log in with multiple Oauth providers.
- Maybe you (or your company or brand) do not want to associate your self with certain Oauth providers.
- Maybe the end-user do not want to share his Oauth provider data (LinkedIn / twitter / facebook / Yammer, etc) with your application.

2. Open Social

Open Social [63] is a standard API for social networks, established by Google which serve as technologies for the web as a whole become more social. It is a set of two APIs, for Javascript and REST [64]. The Javascript API is for applications that are "web gadgets" written in Google's gadget architecture. The REST API is for other types of applications; desktop, mobile, and server. On the backend, the social network must implement the service provider interface (SPI), which according to the documentation [65] means implementing operations for:

- Adding and removing friends
- Adding and removing applications
- Storing activities
- Retrieving activity streams for self and friends
- Storing and retrieving per-app and per-app-per-user data

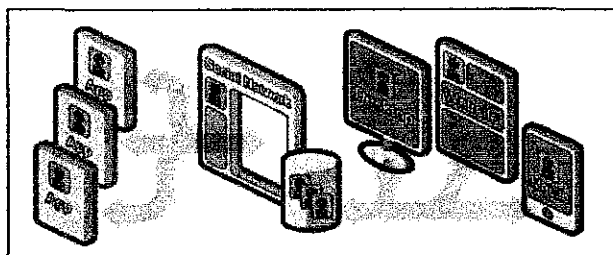Figure 2.13: OpenSocial enables applications, containers, and other clients to collaborate and move the social web forward. [63]

How Open Social works? [66]

The OpenSocial REST and RPC protocols can be used to transmit user data, friend lists, and activities from a social site to your application. Oauth allows the user to authorize access to his or her data stored in social networks. The basic flow is:

1. A user logs in to a website and performs some action that requires social data.

2. The website directs the user to a web page hosted on the social network's domain.

3. This web page asks the user if the external website should to be able to access his or her data.

4. If the user agrees, the website will receive an Oauth authorization token.

5. The website can then include this token in requests made with the OpenSocial REST and RPC protocols.

3. Sharing API

ShareThis [67] enables site publishers a simple one-button solutions for users to share site content with others through social bookmarking destinations. ShareThis promotes sharing of interesting content among users connected by a social graph and shared interests. Publisher's benefit from insights on how their content is shared and disseminated among the user community. The Sharing API can be integrated with any JavaScript, Flash, or mobile application which accesses the Internet. ShareThis allows users to authenticate using their social identity, access their address books, and link these social identities. Presently, users may login using Facebook, Twitter, Google Buzz, and Yahoo through Oauth and link multiple accounts to their primary login. Oauth is an open standard for user authentication (see Oauth Overview) and is now adopted by most major social networks. A primary benefit of this approach is allowing 3rd party applications to leverage user credentials to access social network services without requiring login/passwords from users. Users permit selective access to data on these social networks (e.g. list of friends, address book) based on opt-in. Once logged in, ShareThis maintains basic user information such as their connected services, and identity strings as provided by these services. This information is accessible by client applications to customize the user experience. An example of usage is to allow users to directly post to their social stream without leaving the client application (e.g. video player) through ShareThis provided APIs. Applications focus on delivering personalized user experiences leaving ShareThis to manage access to various social credentials of the user. ShareThis returns a unique token for each such user along with a list of social

identities (e.g. facebook, twitter, etc) that user has already linked. Client applications may store this token locally and use it in subsequent requests. Applications can request additional information about users (through token) so long as that user has agreed to make that data available to ShareThis (and 3rd party applications in general).

4. Mashup

Mashup is a webpage or application that uses and combines data, presentation or functionality from two or more sources to create new services. In designing LBSN, map mashup is commonly used using Google Maps API. Mashable provide list of 13 Must See Google Map Mashup which are beneficial for the communities. [68]

In May 2011, Google introduce Google Places API is a service that returns information about Place which is defined within this API as establishments, geographic locations, or prominent points of interest, using HTTP requests. Place requests specify locations as latitude/longitude coordinates [69].

Four basic Place requests are available:

- Place Searches return a list of nearby Places based on a user's location.

- Place Details requests return more detailed information about a specific Place.

- Place Check-ins allow you to report that a user has checked in to a Place. Check-ins are used to gauge a Place's popularity; frequent check-ins will boost a Place's ranking in your application's Place Search results.

- Place Reports allow you to add new Places to the Place service, and to delete Places that your application has added.

5. Geolocation

Geolocation refers to the identification of the geographic location of a user or computing device via a variety of data collection mechanisms. Typically, most geolocation services use network routing addresses or internal GPS devices to determine this location. In designing web Location-based Social Network, it is important to understand how we can detect their location with their consent. According to Google [70] currently, several ways exist to detect the user's

location within a browser. None of these methods are part of the Google Maps API; instead, they are common industry standards.

- Newer browsers are starting to support the W3C Geolocation standard. This standard is part of HTML5 and will likely become the de-facto standard going forward. All applications that wish to perform geolocation should support this standard.

- Some browsers with Google Gears can use Google Gears Geolocation API.

- Some browsers use IP addresses to detect a user's location, though this provides only a very rough estimate.

6. Geotagging

Geotagging [71] is the process of adding geographical identification metadata to various media such as a Geotagged photograph or video, websites, SMS messages, or RSS feeds and is a form of geospatial metadata. Geotag [72] an open source program that allows you match date/time information from photos with location information from a GPS unit or from a map. The main features are:

- **Portable:** Geotag is written in Java and runs on most popular operating systems.

- **Graphical user interface:** The user interface makes adding location information to your photos easy.

- **Intelligent matching:** The algorithms in Geotag automatically match GPS data to your photos. For photos taken when your GPS didn't have a signal you can let Geotag make a guess based on the closest available GPS information.

- **Fine tune location using Google Maps:** You can show a photo's location in your web browser using Google Maps. The map contains a marker you can drag on the map to change the location associated with a photo. The location the GPS records for your photo is the location where you took the photo, not the location of what can be seen in the photo. By simply dragging the marker you can correct this. The change is immediately reflected in Geotag.

- **Fine tune locations using Google Earth:** You can also show a photo's location in Google Earth, if it is installed on your computer. As you move the

map in Google Earth a marker for your photo's location is constantly moved to the centre of the map and its new position sent back to Geotag.

- **Assign location names to photos:** For photos that already have a location, Geotag can lookup location names nearby and store them with the image.

- **You don't need a GPS to use Geotag:** Even if you don't own a GPS unit (or it wasn't switched on when you took a picture) you can still assign a location to the photo. Geotag will show a default location on the map and you can drag the marker and zoom in to give the photo a location. This is a bit more awkward than using a GPS, but not too difficult. You can also enter location coordinates manually and save them to your photos.

- **Many file formats supported:** Geotag supports JPEG/JPG files and many RAW camera vendor specific files. The RAW file types currently supported are ARW (Sony), CR2 (Canon), DCR (Kodak), DNG (Adobe), ERF (Epson), MEF (Mamiya), MRW (Minolata), NEF (Nikon), NRW (Nikon), ORF (Olympus), PEF (Pentax), RAF (Fuji), RAW (Panasonic), SR2 (Sony) and SRF (Sony).

- **Open source:** Geotag is open source. It is published under the GPL (GNU General Public License). This means its free to use and you can even get the source code and modify it and redistribute it.

- **Easily translatable:** Geotag can easily be translated to different languages. The program recognizes the language used on your computer and if a translation for that language is available, Geotag will use it automatically. Currently the program knows English,German, Danish, Dutch, French, Brazilian Portuguese and Czech. Volunteers for other translations are always welcome.

CHAPTER 3

METHODOLOGY

For this project, Prototyping Methodology is used as system development framework because it allows for rapid development and suitable for online interactive systems, in this case is social network. In the case where changes needed, its iterative nature allow developer to refine the system to meet the requirements and goals of the system.

3.1 System Development Framework
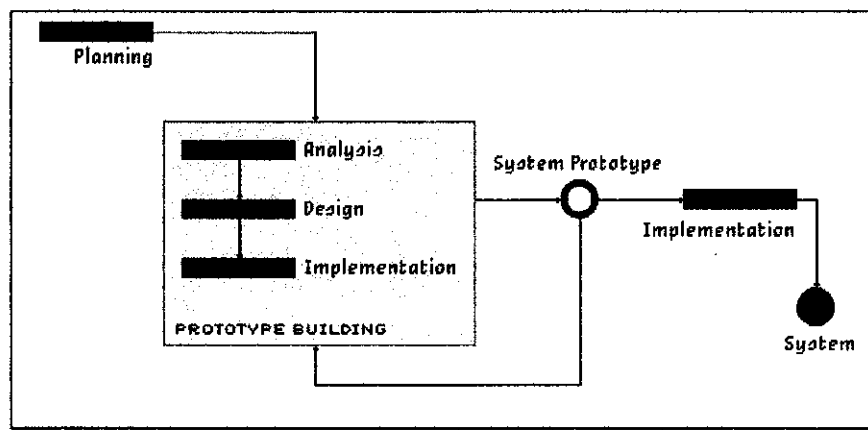
Figure 3.1: System Development Framework

- **Planning**. It is the process of understanding why the system should be built and defining its requirements. It also includes feasibility study from several different perspectives, technical, economic, and organization feasibility aspects. From the early beginning of this research, the relevancy and feasibility study is carried out to better understand how Location-based Social Network is supporting sustainable development for cities and neighbourhood. Fostering residential network has potential to rise social capital, network capital and cultural capital as discussed earlier. Based on the study of existing systems, an engaging application can be built on top of location-based services and online social network features with the right key technologies being leveraged.
- **Analysis**. This phase includes activities such as problems identifying and analysis. The deliverables / products of this phase will drive how the system will be built and guide the developers' works. In the beginning, problem statements

are identified and clearly explained. Then idea of Location-based Social Network (LBSN) in supporting sustainable development is explored through literature review. Previous works related are discovered to identify gap of opportunities and challenges. Research also discovers the motivation for participation in LBSN which guide the development process later on. Data collection method which include survey and interview are carried out to study on Malaysian online social behavior embracing online social network in the context of neighbourhood. Interview with Malaysian developer on crime mapping tool MalaysiaCrime.com is carried out to gauge opinions and identify opportunities and challenges which are useful for developing future location-based application.

- **Design.** System analysis leads to design decision, which exactly determines how the system operates in terms of process, data, hardware, network infrastructures, user interface, and other important factors in the system environment. In this phase, system architecture is developed which serve as a conceptual model that defines the structure, behavior and view of the system. Swim lane diagram is used as the best practice because it has the ability to clearly illustrate responsibilities of functional area in a specific workflow.

- **Implementation.** This is when the system is actually built, tested, and finally installed. It also includes activities such as user training and system maintenance. In this phase, a series of system prototype are developed. The last prototype will then be called the system.

3.2 Data Collection Methods

For data collection method, questionnaires instrument is used and conducted to public people May to June 2011. The survey are delivered through online social networking and also handed to the residents. Total of 200 respondents answered the questionnaires. The objective of the questionnaires is to study the online social behaviour of Malaysians in the context of neighbourhood. Interview is also conducted through email with Malaysian developer of MalaysiaCrime.com, a mapping tool which record crime data in a map mashup. The objective of the interview is to gauge his opinions and to identify gap of opportunities and challenges in designing Locatiion-based Social Network for communities.

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3.2.1 Questionnaires

Objectives:

To study on respondents' demographics

✱1. How old are you?

- ◯ 15 to 19
- ◯ 20 to 25
- ◯ 26 to 30
- ◯ 31 to 35
- ◯ 36 to 40
- ◯ 41 to 45
- ◯ > 46

✱2. I am ...

- ◯ Male
- ◯ Female

✱3. My ethnic origin is ...

- ◯ Malay
- ◯ Chinese
- ◯ Indian
- ◯ Other (please specify)

✱4. My hometown is in ...

- ⚬ Selangor
- ⚬ Johor
- ⚬ Kedah
- ⚬ Kelantan
- ⚬ Kuala Lumpur
- ⚬ Labuan
- ⚬ Melaka
- ⚬ Negeri Sembilan
- ⚬ Pahang
- ⚬ Perak
- ⚬ Perlis
- ⚬ Pulau Pinang
- ⚬ Putrajaya
- ⚬ Sabah
- ⚬ Sarawak
- ⚬ Terengganu

Objectives:

To study social behaviour of Malaysians in using the internet which include:

- Average online hours
- Social media accounts' ownership
- User's online activities

✱5. I spent approximately ... hours online in one day

- ⚬ 1 to 5
- ⚬ 6 to 10
- ⚬ 11 to 15
- ⚬ 15 to 20
- ⚬ 21 to 24

6. Social network accounts that I have are:

☐ Facebook

☐ Twitter

☐ Foursquare

☐ Flickr

☐ Youtube

Other (please specify)

```
┌─────────────────────────────────┐
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```

9. Activities that I always do when I am online:

☐ Lurking

☐ Chatting

☐ Blogging

☐ Searching for information

☐ Reading online news

☐ Listening to online radio

☐ Tweeting

☐ Sharing news/information with friends

☐ Playing online games

Others (please specify)

```
┌─────────────────────────────────┐
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```

Objective:

To investigate technological ownership of Malaysian in using their mobile phone to browse the internet

✱7. I use mobile phone to go online

◡ Yes

◡ No

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Objective:

To look into Malaysian's awareness of existing tool to report crime issues

8. Do you know any tool/system/platform for you to report crime issues?

◯ No

◯ Yes (please specify)

[   ]

Objective:

To study on Malaysians' perspectives regarding crime issues which are happening in their neighbourhood, their behaviour to respond to the issues, their community ownership, their ownership to existing system to report crimes, and their perception on new system which makes their neighbourhood works better.

10. Tick answers that best represent your views.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I believe my neighbourhood issues especially crimes are worrying	◯	◯	◯	◯	◯
I need an effective, efficient and responsive tool/platform to report crime issues	◯	◯	◯	◯	◯
I need to know what are happening in my neighbourhood so that I can take precautions for security	◯	◯	◯	◯	◯
I am active in online social network	◯	◯	◯	◯	◯
I am concern about crime issues in my neighbourhood	◯	◯	◯	◯	◯
I will report to authority if I saw crime is happening	◯	◯	◯	◯	◯
I am willingly to participate and engage with the community to make my neighbourhood works better	◯	◯	◯	◯	◯

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I know what is Rakan Cop	◡	◡	◡	◡	◡
I am registered user of Rakan Cop	◡	◡	◡	◡	◡
I actively participate using Rakan Cop	◡	◡	◡	◡	◡
I believe current system to report crime issues are not efficient, effective and responsive enough	◡	◡	◡	◡	◡
I believe a responsive system which integrate communities and authority (Eg: police, media) is important for my neighbourhood	◡	◡	◡	◡	◡

3.3 Tools/Equipment required

For system development, the requirements needed as listed below:

Software/ API/ Framework:

No.	Software/ API/ Framework
1	Joomla CMS
2	Jomsocial
3	Google Maps API
4	Google Geolocation API

Languages:

No.	Language
1	HTML
2	PHP
3	mySQL
4	Javascript
5	AJAX

Hardware:

No.	Tools
1	Server for hosting

3.4 Project Milestone
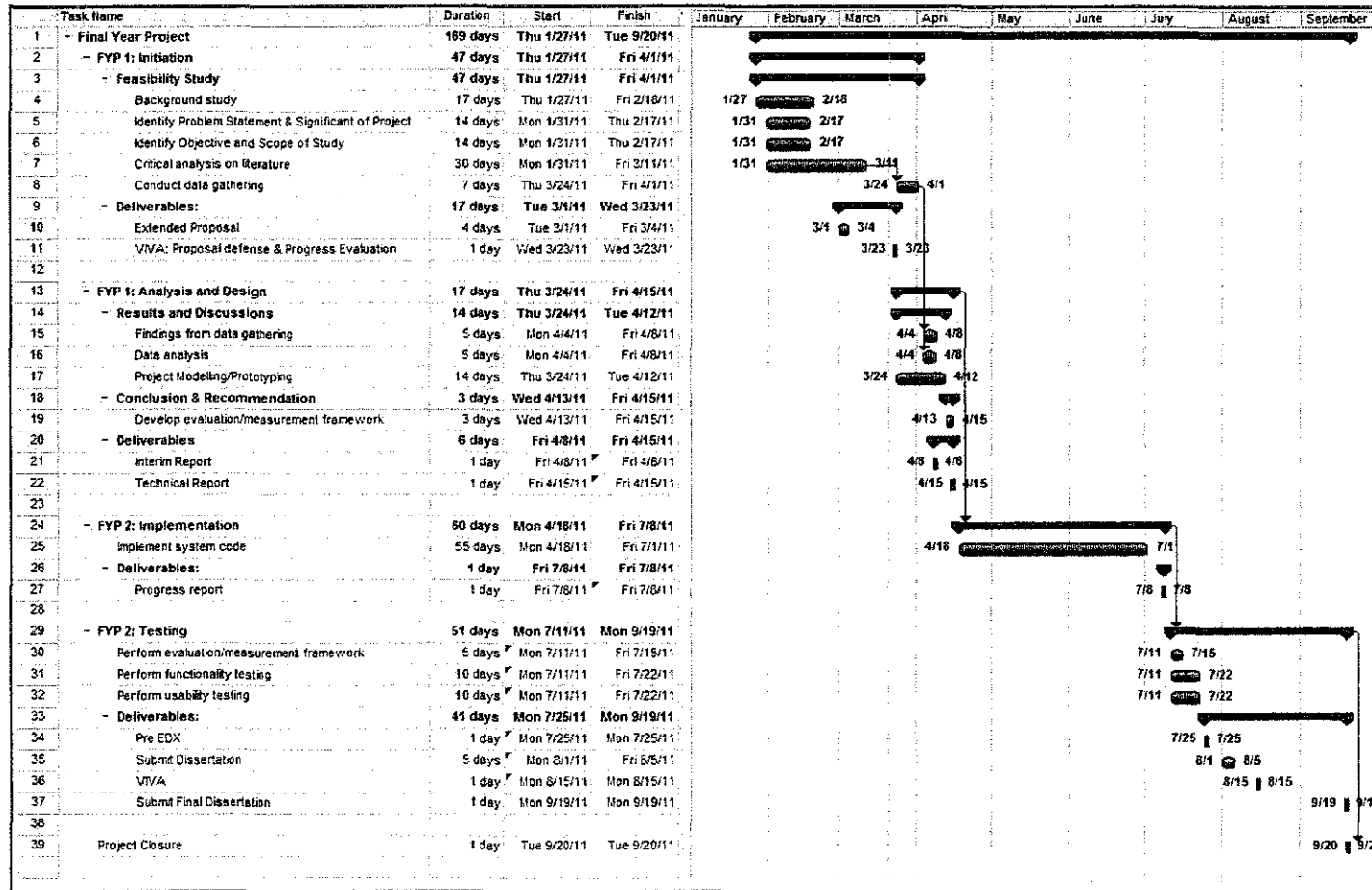
Figure 3.2: Project Gantt Chart

CHAPTER 4

RESULTS & DISCUSSIONS

4.1 Survey Analysis

An online survey using a web tool; SurveyMonkey.com is distributed to Malaysians through email list and social network which include Twitter and Public Facebook Groups. There are 200 respondents turn up to answer the questionnaires. The results further discussed below.

Demographics of respondents

Respondents are asked about their age, gender, and their hometown.

Figure 4.1: Age distribution bar chart

Most of the respondents are within 20 to 25 years old which record 93.6% from 200 people answered the questionaires.
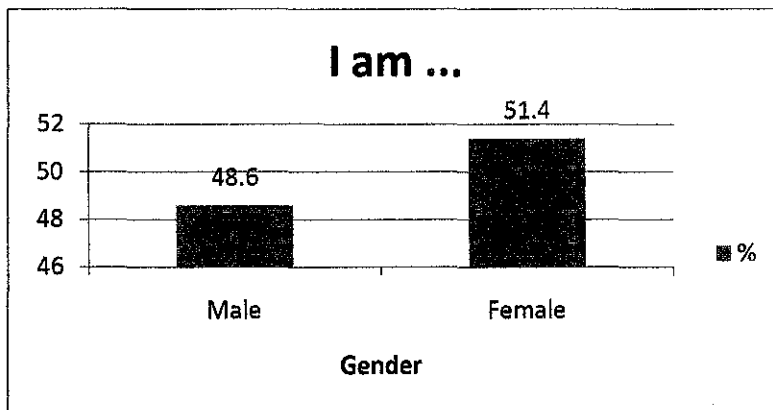
Figure 4.2: Gender distribution bar chart

Female respondents are higher than male with 2.8% differences. The survey is distributed without bias to gender. This can show that female spend more time online

compared to male. A global report from reliable digital market measurement company, comScore also prove that women spend more time in online network. comScore claimed that no matter the region, women are consistently more social on the Web than their regional, male counterparts [30].
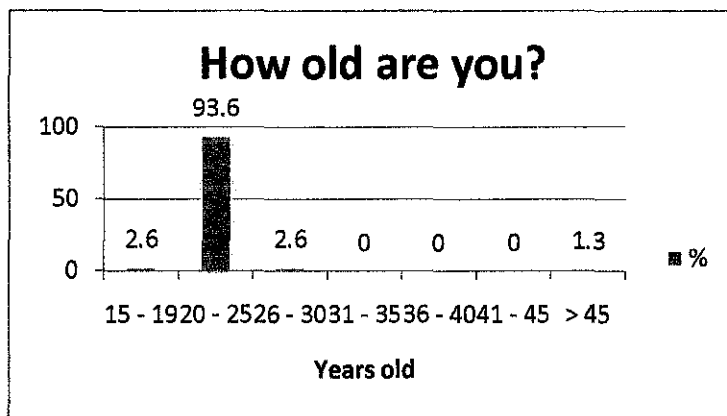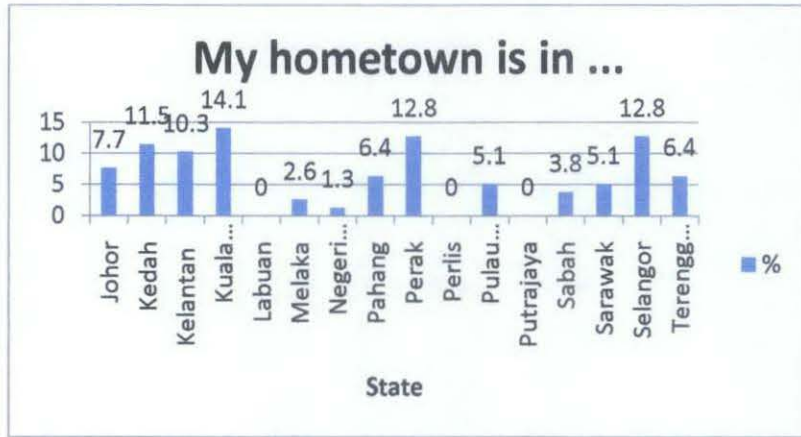

Figure 4.3: State distribution bar chart

Result for respondents' hometown varies. Bar chart above shows that highest respondents are from Kuala Lumpur which record 14.1%, followed by Perak and Selangor which have same records of 12.8%, then Kedah with 11.5%. No respondent from Labuan, Perlis and Putrajaya are recorded.

Online Social Behaviour

Respondents are asked about their social accounts ownership, and the activities they always do when browsing the Internet.
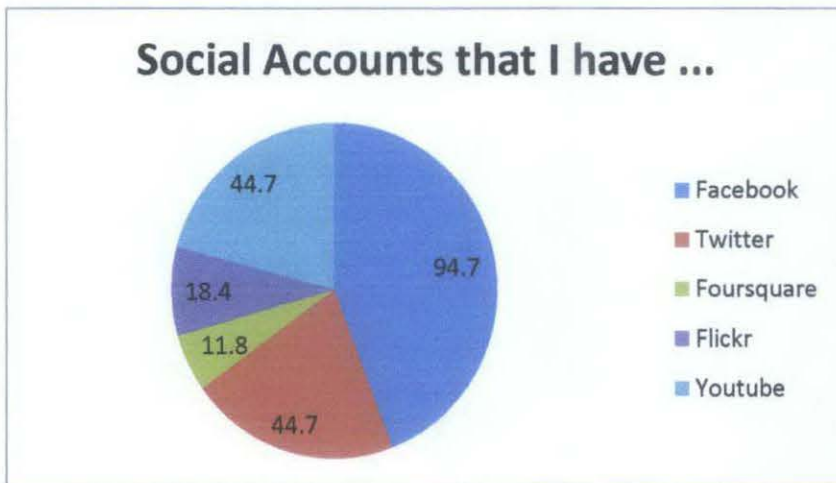
Figure 4.4: Social account ownership pie chart

Most of respondents have Facebook accounts which record highest percentege of 94.7%. Followed by Twitter and Youtube which have the same record of 44.7%. Flickr with 18.4% and Foursquare with 11.8%. Facebook is a the most popular social media which enable users to socialize by sharing thoughts, ideas, comments, photos, videos and links. Twitter is also a type of social networking site and enable users for microblogging which allow users to send and read text-based posts composed of up to 140 characters, called tweet. Youtube is a video sharing website which allows users to upload and share videos. Flickr is an online community website which users can upload and share photos and videos. Foursquare is a location based on software and mobile devices. Apart from these five popular social media, respondents also answered Blog; a space for blogging, Tumblr; also a blogging platform that allows users to post text, images, video, links, quotes, and audio to their tumblelog, Myspace; a social networking site, and Kolony; a social networking site through Short Messaging System (SMS). This result shows that Malaysians are socially active in online network. This is supported by more than half of respondents (shows in 4.1.3 section below), 59.8% agree and strongly agree that they are active in online social network.

Figure 4.5: Types of online activities

Bar chart above shows types of online activities usually do by respondents. Most of them are searching for information when they are online which record highest

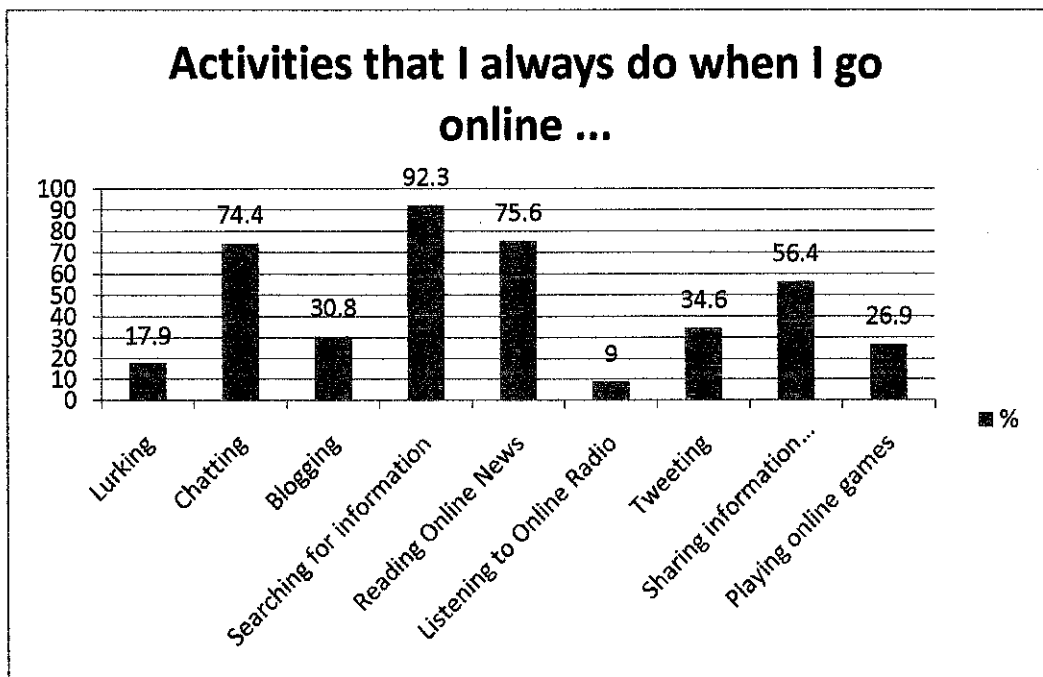percentege of 92.3%, and reading online news with 75.6%. Apart from that, they are also socializing with others, this is shown by 74.4% of them are chatting and 56.4% sharing information with friends. Respondents also prefer for blogging which sum up to 65.4% recorded for blogging through blog platform and microblogging through Twitter. These trends shows that Malaysian keen to find information through searching and reading online materials. It is also concluded that Malaysians are socially active interacting and sharing information with others in online network.

Respondents' Views

Rating scale type of questions are asked to respondents to gauge their perspectives. Respondents tick the scales that best represent their views.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Rating Average
I believe my neighbourhood issues especially crimes are worrying	2.6%	14.3%	24.7%	41.6%	16.9%	3.56
I need an effective, efficient and responsive tool/platform to report crime issues	1.3%	5.2% (4)	14.3%	57.1%	22.1%	3.94
I need to know what are happening in my neighbourhood so that I can take precautions for security	0.0%	3.9%	9.1%	46.8%	40.3%	4.23
I am active in online social network	2.6%	9.1%	28.6%	29.9%	29.9%	3.75
I am concern about crime issues in my neighbourhood	1.3%	2.6%	32.9%	42.1%	21.1%	3.79
I will report to authority if I saw crime is happening	0.0%	5.3%	18.7%	60.0%	16.0%	3.87
I am willingly to participate and engage with the community to make my neighbourhood works better	1.3%	3.9%	23.4%	54.5%	16.9%	3.82

Figure 4.6: Respondents' views about crime issues

More than half of respondents (58.5%) agree and strongly agree that the neighbourhood issues especially crimes are worrying.

79.2% of respondents agree and strongly agree that they need an effective, efficient, and responsive tool/platform to report crime issues. This shows there is a strong need for communities to engage with authority such as police to report crimes happening in their neighbourhood.

More than half respondents (59.9%) claimed that they are socially active in online social network. Majority of respondents (63.2%) are very concern about crime issues happening in their neighbourhood and there is strong need for them to access crimes data so that they can take precaution for security. This supported by record of 87.1% of them agree and strongly agree that they need to know crimes information which is close to them. 60.16% of them have strong initiative to report to authority if they see crime is happening. Majority of them (71.4%) agree and strongly agree to participate and engage with community to make their neighbourhood better place to live.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Rating Average
I know what is Rakan Cop	4.0%	4.0%	18.7%	48.0%	25.3%	3.87
I am registered user of Rakan Cop	36.4%	28.6%	18.2%	9.1%	7.8%	2.23
I actively participate using Rakan Cop	38.2%	31.6%	22.4%	3.9%	3.9%	2.04

Figure 4.7: Respondents' views on Rakan Cop

Respondents are asked about existing tool to report crime which is Friends of Cops or also known as *Rakan Cop* in Malay. Friends of Cops is the Malaysian community police cops which was launched by Royal Malaysian Police in Kuala Lumpur in 2005 to help combat crime in Malaysia. Anyone can register to be Friends of Cop members and helping out police in tracking crimes through Short Messaging System (SMS) report. 73.3 % of respondents agree and strongly agree that they know what is Friends of Cops but only smaller percentage of them (7.8%) are registered members. Majority of them (69.8%) disagree and strongly disagree that they are actively participate in using Friends of Cops. These trends show that, even existing system is well-known by the communities but it does not draw attention of communities to participate. Authority bodies (police) should actively and consistently educate the communities regarding Friends of Cops. Among important things they need to know about Friends of Cops are, how it works, how to register, how to use and the success stories.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Rating Average
I believe a responsive system which integrate communities and authority (Eg: police, media) is important for my neighbourhood	1.3%	2.6%	22.4%	53.9%	19.7%	3.88

Figure 4.8: Respondents' views on current system and future system to report crime issues

Half of the respondents which record 50.6% of them answered neutral when asking about efficiency, effectiveness and responsiveness of current system (Friends of Cop) to report crimes. Quite a number of 36.4% respondents agree and strongly agree that it is efficient, effective and responsive enough. On the other side, only smaller percent of 13% respondents disagree and strongly disagree with the statement. This shows that current system somehow is good but still has a lot of space for improvements to better serve the communities. Many (73.6%) agree and strongly agree that a responsive system for crime prevention which integrate communities and authority (Eg: police, media) is important for their neighbourhood.

Conclusions and Findings from Survey

Majority of respondents within the age of 20 to 25 are socially active in online network. This support by the result of activities they usually do when they are online. Majority of them are very keen looking for information and reading online materials. They are also actively socializing with others through online chatting and information sharing.

When asked about crimes, it is shown that the communities are very concern about crime issues happening in their neighbourhood and these issues are worrying. With more than half of respondents are socially active in online social network, there is strong need for them to access crime data for prevention initiative. It is shown that majority of communities have high civic awareness because they are willing to participate and engage with others to make their neighbourhood works better. They are also aware and willing in helping out police to track crimes because they will be proactive to report crime to police if it is happening. To enable effective actions from authority, many believe that they need an efficient, effective and responsive system

to report crimes. Even there exists a well known system (Friends of Cops) for communities to report crime issues, many does not participate. Majority of respondents agree and strongly agree that a responsive system for crime prevention which integrate communities and authority (Eg: police, media) is important for their neighbourhood.

4.2 Interview Analysis

An interview with Mr. Kegan Gan, a web developer for MalaysiaCrime.com has been conducted through email. The purpose of this interview is to gauge his views and opinions related to Malaysia Crime and government open data concept. He is pleased to answer all the questions asked. Below are the email attachments of the interview.

---

from **dila zamry** <dilazamry@gmail.com>
to kegan@kegan.info
date Sun, Apr 10, 2011 at 4:47 PM
subject Interview regarding MalaysiaCrime.com
mailed-gmail.com
by

Hi Mr. Kegan,
I am Dila Zamry, a final year student from Universiti Teknologi PETRONAS *(may refer the acknowledgement letter in the attachment below)*.

The purpose of writing this to you is to seek your time to answer my questionnaires which are important for my research. Currently I am doing my project research titled *"The Study of Online Social Network in Empowering Civic Engagement for Sustainable Community"*.

The motivation of this research actually inspired by the other country web technology such a SeeClickFix.com, a web tool which drive civic engagement among the communities. SeeClickFix has been encouraging communities to communicate with the government and media. People report any non-emergency issues such as potholes, pollution etc. and soon get responsive engagement from authority parties and media. The tool is also fully connected to 311 System, a number to report non-emergency issues in US.

Back to my project research, my concern is about urban problem specifically crimes. People demand to live in safe city where we can live in more comprehensive and secure environment.

My project focuses on:

- People - study of Malaysian online social behaviour, how people behave in online networked community, how people perceive online information and the impact social behaviour change
- Online social network technologies - study on incentives/motivation of participation, how social network can drive civic engagement towards sustainable community

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There is a need for our cities to better able to respond to problems, friendlier and generally accessible to communities. Even there exist reporting tool for our communities to report crime issues such as Rakan Cop, it seems to have a few limitations. Based on my survey to Malaysians, there is a big percentage of users who are not registered to Rakan Cop even they are aware of crime issues. Plus, they do not know where to access information regarding crime issues. Nevertheless, I can see **MalaysiaCrime.com** is a promising tool for Malaysian to report crime issues for betterment of community. I believe with Web 2.0 technologies such as Online Social Network, we can drive civic engagement for sustainable community

Here are my questions:
In what ways do you think Malaysia Crime is useful to citizens?

Malaysia Crime also provides iPhone app which can ease users to report while they are on mobile.What is the percentage of download and usage? Is it overwhelming? What about Android users?

What do you think about Malaysians technological ownership in form of smart phones which also contributes to data population in Malaysia Crime map.Are they participative through mobile?

From which city, the most frequent crime issues has been reported?

For reported crimes issue, do they get response from responsible parties (eg: police) ? How Malaysia Crime channel the issues to the authority?

Malaysia Crime is based on crowd sourcing model where people can populate the information on the mapping. How do you control spam information which is untrue?

What are the incentives/motivations which drive users' participation in Malaysia Crime?

The success of web tool such as SeeClickFix.com is based on collaboration with government and government open data. What do you think about the importance of open data? Did Malaysia Crime have successfully initiated collaboration with the government agencies - police? How do they respond to this idea?

What are the next plans of Malaysia Crime to bring the tool to the next level?

Thank you in advance.

from Kegan Gan <kegan@kegan.info>
    to dila zamry <dilazamry@gmail.com>
    date Sun, Apr 10, 2011 at 7:28 PM
subjectRe: Interview regarding MalaysiaCrime.com

Hi Dila,
I am glad to complete the answers for you.

In what ways do you think Malaysia Crime is useful to citizens?
Malaysia Crime was created to bring awareness.

We read about crimes all the time in the newspaper. But it's always like something that happened to people you do not know in places you do not care. The crimes reported are not archived. We don't get a perception of how many, or how frequent the crimes are happening. We only feel a sense of urgency when there's a big crime reported in the newspaper, and after a few weeks or months later ... nobody remember it. Is the crime solved? Is our street safer? Who knows?

We don't feel the urgency of our safety. Malaysia Crime purpose is to archive these reports and more importantly to plot it on a map. This helps people gets a perspective on how close the crimes are happening to them. And the data in Malaysia Crime are never deleted.

Malaysia Crime also provides iPhone app which can ease users to report while they are on mobile.What is the percentage of download and usage? Is it overwhelming? What about Android users?

Malaysia Crime iPhone app can only view the report. It does not have a reporting feature. I think the download is around a few hundreds per month when it was first launch. Now could be less. Sorry, I do not have immediate data on it. The iPhone app was developed by a friend, who is now my business partner. There is no Android version.

What do you think about Malaysians technological ownership in form of smart phones which also contributes to data population in Malaysia Crime map.Are they participative through mobile?

I do not have the data because Malaysia Crime can only be reported using the web version.

From which city, the most frequent crime issues has been reported?

From my observation, mostly in Selangor.

For reported crimes issue, do they get response from responsible parties (eg: police) ? How Malaysia Crime channel the issues to the authority?

Currently there are no linkages between Malaysia Crime and the authority. Myself and many other people/friends have tried many ways to make the linkages. But unfortunately there is no success so far. Most probably because we do not have access to the right people. Plus, authority may not see how crowd sourcing and other Internet phenomenon can help to solve these types of issues.

6. **Malaysia Crime is based on crowd sourcing model where people can populate the information on the mapping. How do you control spam information which is untrue?**

Currently I am the person who do spam control. Spam is not an issue. There just isn't much of it.

7. **What are the incentives/motivations which drive users' participation in Malaysia Crime?**

From my observation, it's because they are the victims or knows the victims. They just want to share and warn fellow Malaysians!

8. **The success of web tool such as SeeClickFix.com is based on collaboration with government and government open data. What do you think about the importance of open data? Did Malaysia Crime have successfully initiated collaboration with the government agencies - police? How do they respond to this idea?**

Again, myself and many others have tried to promote the concept of open data to the government. Unfortunately we have not achieve any significant result. To share with you, this is our pitch:

Our country has many resources. Like oil, gas, gold, etc. We harvest these resources to turn them into wealth for the people of Malaysia. Now, data is also a type of resources that can be harvest and turned in to wealth. And there are tremendous amount of data lock inside many many government department. If government can somehow open up these data, then entrepreneurs will find ways to turn them into wealth. And unlike oil, gas, or gold ... the "data" resources will never be depleted. Government should have all the incentives to open up the data.

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9. **What are the next plans of Malaysia Crime to bring the tool one to step further?**

Currently I am too busy with work to do much with Malaysia Crime. If you have any ideas or know anyone that would have any motivation on this, do tell them to keep in touch!

Well, all the best to you for your project! If you have any other questions, or just want someone to discuss. Please feel free to drop me email. But just beware that I may not be able to respond immediately.

Good luck!
cheers,
~KEGan

from **dila zamry** <dilazamry@gmail.com>
to kegan@kegan.info
date Mon, Apr 11, 2011 at 9:12 AM
subject Re: Interview regarding MalaysiaCrime.com
mailed-gmail.com
by

Hi Mr. Kegan,

I'm glad to hear response from you :)

I've read news article about your effort to present the proposal for crime data sharing
to government.
It's poor that M'sia gov have not yet realize the importance of open data. Maybe
someday in future it will be a positive move

I'll keep in touch with you if i get to know anyone who have motivation to bring this
one step further.

Thank you.

---

from Kegan Gan <kegan@kegan.info>
to dila zamry <dilazamry@gmail.com>
date Mon, Apr 11, 2011 at 9:17 AM
subject Re: Interview regarding MalaysiaCrime.com

Hi Dila,

I think mostly because the government organization is top down. Things only happen
if the top decides that it happen. There is very little innovation that happen from
bottom up.

Anyway, I am sure one day we will get there!

By the way, do add me on Facebook at kegan@kegan.info.

cheers,

~KEGan

from **dila zamry** <dilazamry@gmail.com>
to kegan@kegan.info
date Mon, Apr 11, 2011 at 9:41 AM
subject Re: Interview regarding MalaysiaCrime.com
mailed-gmail.com
by

Hi Mr. Kegan..

yeah..so true..
well, im just curious what ministry respond to you after you propose the concept?
What are the limitations? is it because the security of data?

--
Regards,
dila zamry

---

from Kegan Gan <kegan@kegan.info>
to dila zamry <dilazamry@gmail.com>
date Mon, Apr 11, 2011 at 9:51 AM
subject Re: Interview regarding MalaysiaCrime.com

Well, they don't feedback.

At one point we presented to one of the special advisor to PM. He said good idea.
They will consider. And that's it.

I think it's just not in their priority list.

I guess we have to just keep pushing and pushing the concept. But along the way,
we all got busy with our own things. And we can't do these full time.

---

from **dila zamry** <dilazamry@gmail.com>
to kegan@kegan.info
date Mon, Apr 11, 2011 at 9:59 AM
subject Re: Interview regarding MalaysiaCrime.com
mailed-gmail.com
by

I see..
I also believe we'll get there soon, maybe it need some time.
Anyway, congratulations for your effort Mr. Kegan.
Thank you very much for spending your time answering my questions.

Conclusions and Findings from Interview

MalaysiaCrime.com is based on a crowd-sourcing model where people can post information about crimes and is mapped using Google Map display. According to Mr. Kegan, the main goal in setting up the website is to fight crime with information through free access for the public to have accurate and timely crime data on the website. He said showing crimes on a map helped people to keep track the number of crimes occurring in their neighbourhood or even in the vicinity of their homes so that they would be aware and take appropriate measures. His vision for Malaysiacrime.com is for it to become the catalyst for awareness among the public about the crime situation in the country.

Opportunities

From the interview and analysis on the website, there are a few gaps for opportunities to be addressed:

i. MalaysiaCrime.com does not link with any authority parties. The question here is how far the reported issues are addressed by responsible party to take action? To enable effective, efficient and responsive system, all the key stakeholders for sustainable community; citizens, authority (Eg: police) and media must be unified and engaged in the system.

ii. MalaysiaCrime.com is just static webpage where people post information there and view other's posts. Web 2.0 features can be utilized in the website to make it more useful and engaging. These are the possible features to be implemented to offer rich interactivity:

    a.   Searching:

       Crime reports posted by users are mapped into Google Map and they are scattered on the map. The problem is it is hard for viewers to view crime data at certain location. Search function should be enabled to make it easier for users to search a location and view the pattern of the crime reports at that location.

b. Tagging:

To make it easier for searching, tags feature should be implemented. This kind of metadata helps describe an item and allows it to be found again by browsing or searching.

c. Sharing

Current trend shows that most of the websites which engage with the crowd implement social media sharing such as share through Facebook, and tweet through Twitter. There are a lot of social media sharing platform apart from Facebook and Twitter. They are Digg, ShareThis, StumbleUpon and many more. Sharing features can be enabled through these platforms to empower engagement with the community. People can get informed and updated on crime issues in their neighbourhood.

d. Signals:

The use of syndication technology such as RSS to notify users of content changes. User can opt to subscribe and receive updated crime reports in their neighbourhood so that they can take appropriative preventive measures.

e. Comment:

To allow interactivity within the community of a neighbourhood, comment feature should be enabled so that people can comment and speak out their thoughts on certain crime issues. This is where collaborative ideas can be collected to enhance neighbourhood planning.

Challenge: Access to Government Open Data

In moving forward Malaysia Crime to the next level, there are a big challenge that we need to look into, which is government does not realize yet the importance of government open data.

As mentioned by Mr. Kegan, further development of the website with police date would make the website more useful. "Including police data in the crime map would

enable the development of filters so that crimes can be categorised by type, location, and other ways to spot trends and identify crime-prone areas" he said to The Nut Graph [73].

Late 2009, Mr. Kegan used to propose the idea to ministry regarding open data which enable crime data sharing between governments with web developer for the benefit of the public. Home Minister Datuk Seri Hishammuddin Hussein responded to the idea positively. When asked about the progress of the work, Mr. Kegan said that nothing much has move. At one point, he has presented the idea to special advisor of Prime Minister. However, none of green signal received to enable police-citizen data sharing. Mr. Kegan added that this may result because it is not the priority list for the government. The concept of open data is very new in Malaysia, the developers need to explain to different level of governments because many people may not understand why it is important.

Mashable has a good article on *"How Open Data Applications are Improving Governments"* [74]. The idea of open data is to promote transparency. Open data has become a big trend in developed countries especially in United States. People talk about Government 2.0, a concept to create more engaging relationship between government agencies with citizens in form of delivering better service, drawing participation, and thus enhancing the country's development.

In U.S, the government agencies are collaborating with the application developers to foster citizenship. There are a number of applications developed which used open data from the government. People get informed, get engaged and build trust for the governments.

Data.gov is one example of U.S government initiative that Malaysia government should employ. The purpose of Data.gov is to increase public access to high value, machine readable datasets generated by the Executive Branch of the Federal Government.

Figure 4.9: Data.gov is used by application developers to access to governments open data

Primary goal of Data.gov is to improve access to Federal data and expand creative use of those data beyond the walls of government by encouraging innovative ideas (e.g., web applications). Data.gov strives to make government more transparent and is committed to creating an unprecedented level of openness in Government. The openness derived from Data.gov will strengthen U.S Nation's democracy and promote efficiency and effectiveness in Government. [75]

"Government's role really should fall on the 'enabler' side when it comes to apps, by releasing all their public data online and in real-time. Once data is released, citizen developers and designers — 'civic hackers' — can go to town with the released data, innovating and creating utility for the public." *Jake Brewer, Engagement Director for engagement director for the Sunlight Foundation in Mashable 2010* [74]

As the conclusion, the idea of open data has proven to be valuable and provide vast opportunities for the country's development. The success stories of developed countries in employing collaboration of governments and web developers to create useful applications using open data should be seen as a great example by Malaysia government to engage with citizens, provide responsive service and build trust from

the citizens. With the power of social media, it is believed that web application which utilized the government open data is beneficial to empower civic engagement for sustainable communities.

CHAPTER 5
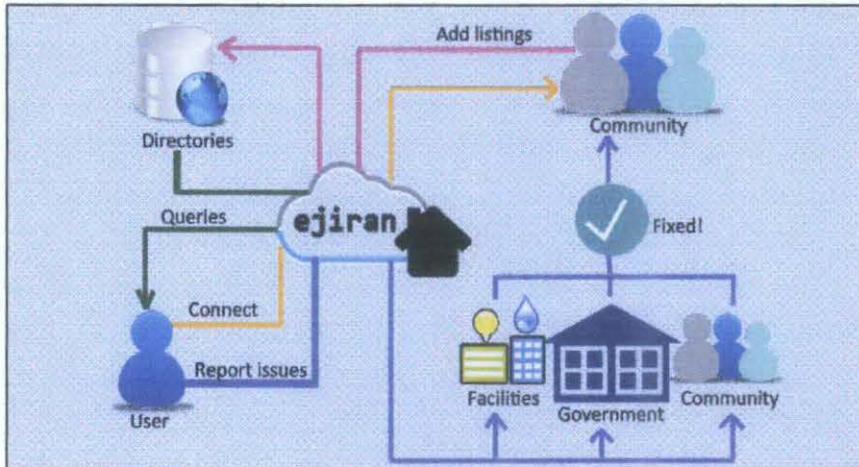
SYSTEM DESIGN

5.1 System Architecture

Figure 5.7: Ejiran system architecture

Figure 5.7 explains the Ejiran system architecture. Upon signing to the system, user location is detected based on the IP address, then the IP address is translated to longitude and latitude to track the user location. The detected location is then map into the Google Map to identify which neighbourhood that user belongs to. The neighbourhood is within 5 miles of detected locations. Upon detected neighbourhood, user can view available places listings nearby, query for the listings in directories, and add new listings through checking-in. User can connect to the system to socialize with the communities who are within the neighbourhood. User can also report any civil issues to registered enforcement agencies. These agencies will be notified and they take further actions to solve the issues.
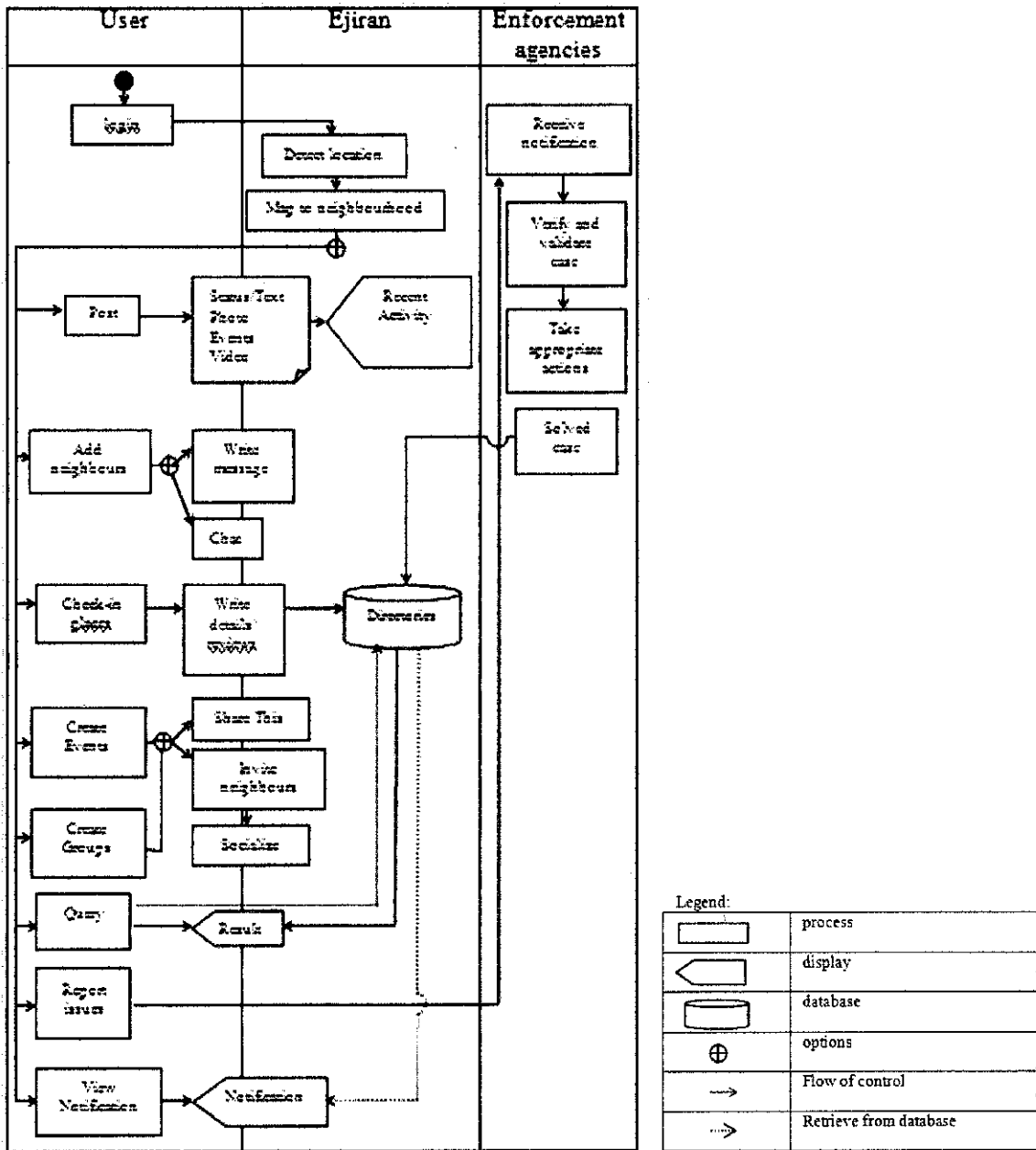
Figure 5.8: Ejiran swimlane diagram

5.2 System Interface

Homepage

This is the homepage of ejiran.com. This homepage is design this way to quickly engage with users. They will know what the application is all about and they can know what they can experience with this system. User needs to register or they can just login using their Facebook account with single click. Facebook Connect is utilized which Facebook authentication enables ejiran to interact with the Graph API on behalf of Facebook users, and it provides a single-sign mechanism.
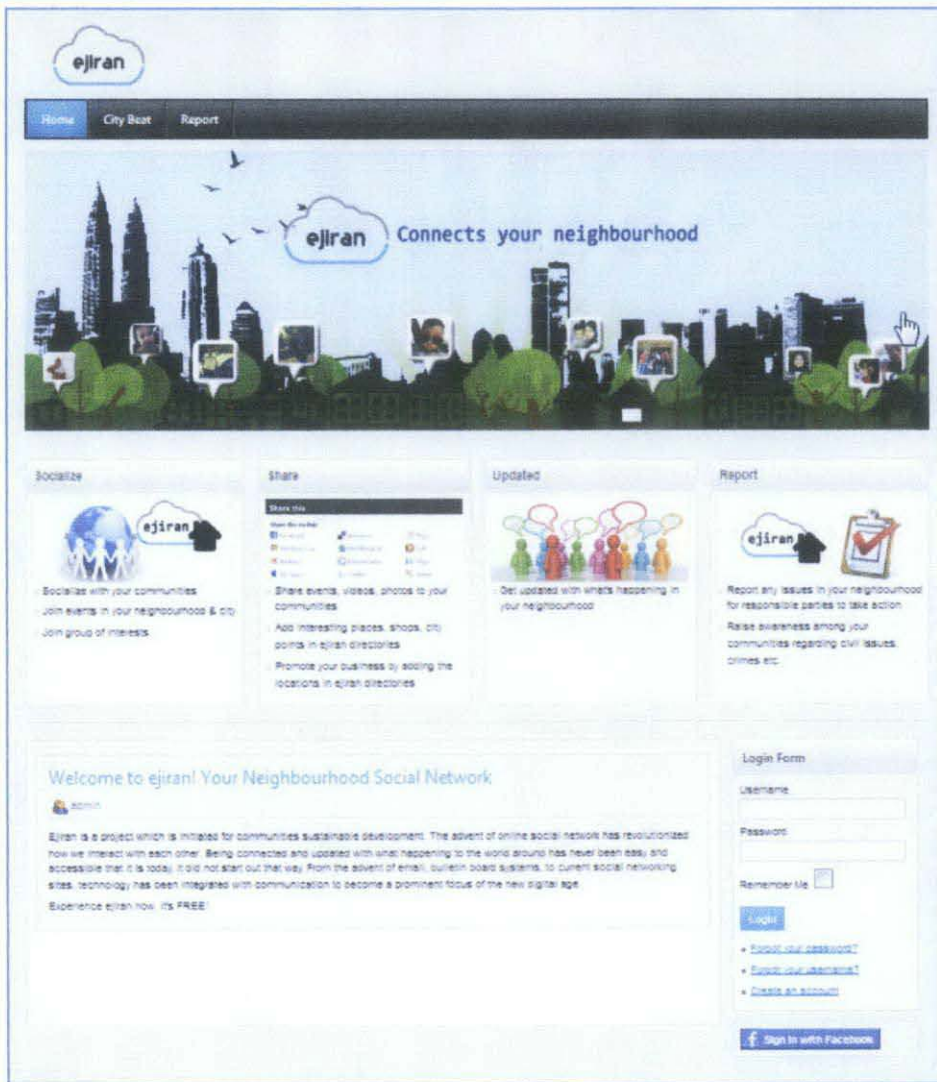

Figure 5.1: Ejiran.com homepage

City Beat page

Upon successful login, user can view city beat – a page where they can know what are the available listings of shops, facilities, interesting places, or other places that people have shared nearby their location. Before that user will be prompted with the Geolocation API dialog box saying that "ejiran.com wants to know your location". This API will get user current position based on the IP address detected.
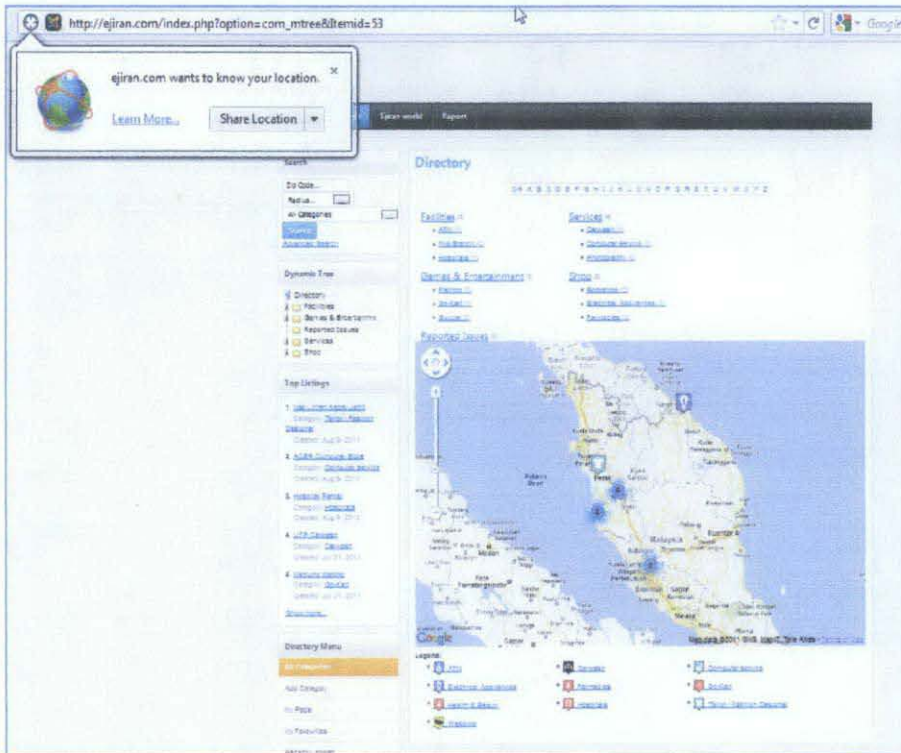

Figure 5.2: User will be given option whether they want to allow or deny their location to be detected.
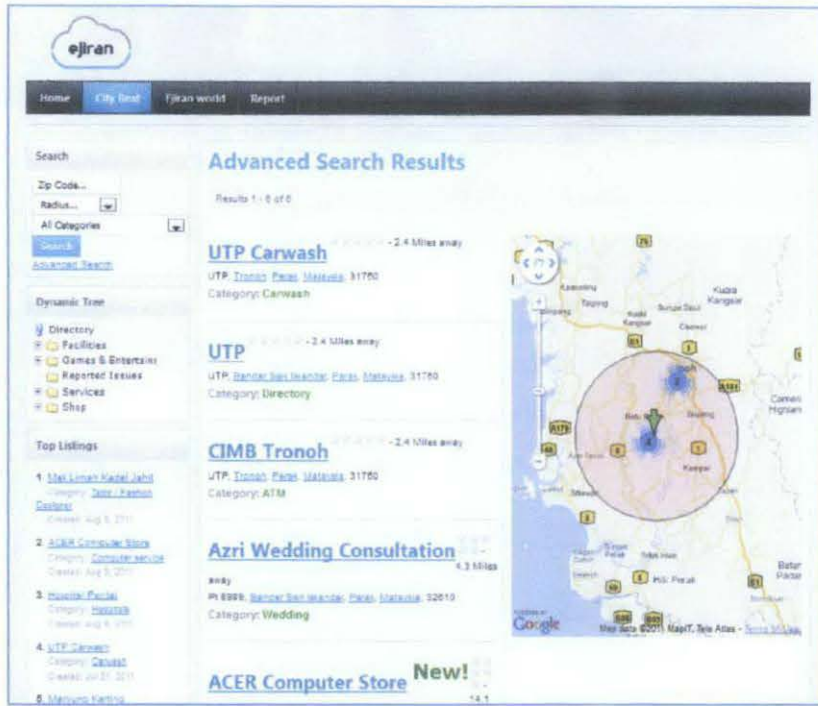
Figure 5.3: Users will be bring to the neighbourhood which they belong to based on location detected.
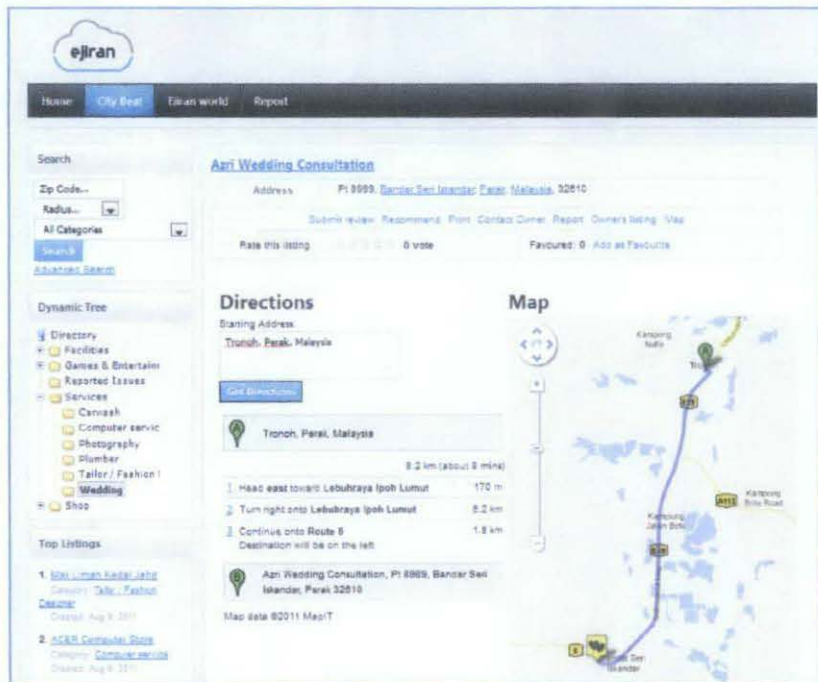

Figure 5.4: User can get the direction to the available places in the neighbourhood.

Ejiran World page

Ejiran World is where user can socialize with their neighbours. The location detected will map user to neighbourhood group which they belong to. Here they can update status, comment on other's posts, add neighbours, create groups, upload photos, share videos, create events and view upcoming events which are happening in their neighbourhood.

Figure 5.5: Ejiran world page

Report page

This is where user can report any issues which need enforcement agencies actions such as there is suspect for drug dealer in the neighbourhood, or other civil issues. The reports will be forwarded to registered enforcement agencies and they will be notified to take further action. This can help enforcement agencies serve the communities better and at the same time build trust and good reputation.

Figure 5.6: Report page – where user can report to enforcement agencies

CHAPTER 6
CONCLUSION

As the conclusion, this research has discovered the vast opportunities and potential of application to be developed which integrate location-based services and social network features to support neighbourhood sustainable development where people are connected into a network and help build social capital, network capital, economic capital and cultural capital which bring sense of wellbeing for neighbourhood and cities. The survey conducted to study on Malaysian social behaviour within online network concluded that Malaysian are socially active in online social network and there is strong civic conscious among us to make our neighbourhood a better place to live.

The significance of this research is to gain in-depth understanding of Location-based Social Network which is necessary to evaluate current systems, to identify gap of opportunities and challenges, to design future system and to understand the impact of online social network on the communities, cities, and neighbourhood development. Based on research, important key technologies identified to design engaging Location-based Social Network are - but not limited to: 1) OAuth, 2) OpenSocial, 3) Sharing API, 4) Mashup, 5) Geolocation, and 6) Geotagging.

To apprehend the idea of neighbourhood sustainable development, Malaysia government must realize the importance of open data which actually can help government to better manage the country. Malaysia should look forward into the concept of open data which has successfully proven by developed countries. There is a bright future for the country development, if the collaboration exists between developers and government to build applications beneficial to public. Last but not least, it is hope that this research can help communities, enforcement agencies, urban developers, or anyone to understand that Location-based Social Network is a promising tool to connect neighbours and strengthen the neighbourhood networks.

Recommendation for future work:

Future work may need to look into the privacy and security issues due to the nature of online social network which may expose the identity of a person to the whole world. Besides, study on architecture design of online social network may need to be concerned to identify the best system architecture to cater large amount of user connected concurrently to the server, data storage, and security issues.

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