INVESTIGATING PRIVACY ISSUES IN MOBILE MESSAGING
THROUGH A ROLE PLAYING GAME

An exegesis submitted in fulfilment of the requirements for
the degree of Master of Arts

TIANPENG HONG
B.MMDA

School of Media and Communication
Design and Social Context Portfolio
RMIT University
July 2009
# Table of Contents

Table of Contents .................................................................................................................. 1

Table of Figures ................................................................................................................... 4

Declaration ............................................................................................................................. 5

Acknowledgement ................................................................................................................ 6

Abstract .................................................................................................................................. 7

Introduction .......................................................................................................................... 8

**WHAT AND WHY THIS INTERESTS ME** ........................................................................ 8

**WHAT EXACTLY IS THE PROBLEM?** ........................................................................... 9

**RESEARCH QUESTIONS** .............................................................................................. 15

**Theoretical Development of The Project** ...................................................................... 16

**A NEW PARADIGM IN MOBILE MESSAGING** .............................................................. 16

- Mobile phone history and culture ...................................................................................... 16
- Social networking applications and mobile social networking ....................................... 18

**PRIVACY ISSUES IN MOBILE MESSAGING** ............................................................. 21

- The realisation .................................................................................................................. 22
- The controls ..................................................................................................................... 24

**RECREATING THE SCENARIO IN THE PROJECT** ..................................................... 26

- How to acheive this project? ......................................................................................... 27
- Using im as a communication method in the game ....................................................... 28
- privacy breach ................................................................................................................. 31
- Character profiles ........................................................................................................... 33
- The survey and conversation history ............................................................................. 34
The Project ........................................................................................................................................... 35

OVERVIEW – SUMMARY .................................................................................................................. 35

Design Considerations ..................................................................................................................... 36

Technical Requirements ................................................................................................................... 36
Program development and specification ......................................................................................... 36
Overview ........................................................................................................................................... 36
Program Functions ............................................................................................................................ 37
Application Interaction Workflows ................................................................................................... 38
System specification ............................................................................................................................ 39
Interface Design ................................................................................................................................... 40
Characters and Invisible Rules ........................................................................................................... 48
Privacy Functions ............................................................................................................................... 52
Trialling the game ............................................................................................................................... 53

ROLE-PLAYING GAME DESIGN AND SPECIFICATION ............................................................... 54

Participants Selection ....................................................................................................................... 54
Game procedure ................................................................................................................................. 55
Game analysis ....................................................................................................................................... 56

Project Result and Discussion ......................................................................................................... 57

THE ROLE-PLAYING GAME COMMENCED ..................................................................................... 57

STATISTICAL FACTS .......................................................................................................................... 58

CONNECTION DIFFICULTIES ........................................................................................................... 59

TECHNICAL PRIVACY PROTECTION ............................................................................................... 60

PERSONAL SECURITY PROTECTION .............................................................................................. 61

How do users react to receiving unintended messages in mobile messaging? ......................... 61
How conscious are users of privacy issues? ...................................................................................... 67
How may users protect themselves? ........................................................................................................68

Conclusion ................................................................................................................................................70

Reference ................................................................................................................................................74

Appendix ................................................................................................................................................79

Appendix 1 - Role-Playing Game Survey ................................................................................................79

Appendix 2 – Character Profiles ...........................................................................................................81

Appendix 3 – Conversation History Log ...............................................................................................83

Appendix 4 – Survey Summary ..............................................................................................................89
# Table of Figures

Figure 1 Comparison between Social Networking Mobile Messaging and Traditional Mobile Messaging ................................................................. 13

Figure 2 MySpace Profile View with Notes ................................................................. 19

Figure 3 Facebook Private and Public Profile View with Notes ............................. 20

Figure 4 Emotion Icons from MSN Messenger ......................................................... 29

Figure 5 Selected Characters-constructed Emotions Icons ..................................... 30

Figure 6 Application Interaction Workflow for Senders .......................................... 38

Figure 7 Application Interaction Workflow for Receivers ........................................ 39

Figure 8 Welcome Page ......................................................................................... 42

Figure 9 Registration Form Page ......................................................................... 43

Figure 10 Users List Update Page ......................................................................... 44

Figure 11 User List Page ....................................................................................... 45

Figure 12 User Profile Page ................................................................................... 46

Figure 13 Chatting Page ....................................................................................... 47

Figure 14 Emotion Icons ...................................................................................... 48

Figure 15 Joshua Chatting With Rebecca and Mike .............................................. 64

Figure 16 Yoshima Chatting With Rebecca and Mike ........................................... 65

Figure 17 Huang Chatting With Mike and Duriana ............................................... 66
DECLARATION

I certify that where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to quality for any other academic award; the content of the exegesis has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Tianpeng Hong
15 January 2010
ACKNOWLEDGEMENT

This project has been quite an extraordinary experience for me. Throughout the period of two and half years, I have encountered different life events, which have contributed to the delay of completing the study. And my English-as-second language-background has also made the exegesis write-up process challenging. I was lucky enough to receive great help from many people. Without them giving me their generous support, I would not have been able to complete the project and the exegesis. For that, I am grateful and would love to express my appreciations and thanks to my great friends and families:

My supervisor Dr Marsha Berry has been dedicating a lot of her time on my supervision and has never failed to help me overcome one problem after another. She has been my great mentor, who has inspired me in practicing academic research, and greatly influenced my critical thinking in the area of my study.

My Mum, who has both morally and financially supported me, and provided love and understanding that I needed during the course.

My partner Mandy Su has offered endless moral and emotional support, and honest criticism over the course of my study. Her love and encouragement energised me to complete this great challenge. Developer Harry He, who helped me develop and test the application. Writer Luke Stickels, and Peter Barden helped by proof reading my exegesis. Game participants Darwin Tan, Gihan Gamage, Jaime Calero, Jeremy Wu, Joanne Wu, Peter Leung, William Arya, and Yiyi Wang dedicated their time to participate in the project. Without their input, I would not be able to complete the project and collect valuable data for later analyses.
ABSTRACT

When internet-mediated messaging and social networking applications were introduced in mobile phones, mobile messaging entered a new paradigm. Users can easily create profiles and communicate with other users instantly at anytime of day and anywhere in the world. This paradigm however, has brought forward new privacy issues.

Over the course of this exegesis I aimed to explore different aspects of privacy issues related to mobile messaging, including users’ awareness and the control of the privacy issues when using social networking messaging. This was demonstrated by conducting a project, which involved development of a mobile phone application and a role-playing game. The project created a frictional scenario of users communicating via mobile messaging. My research revealed that the participants lacked awareness of privacy violations when using mobile messaging, and tended not to modify their behaviours immediately when privacy breaches arose.

This research contributes to the existing body of research in the area of mobile messaging privacy, and advocated user awareness of privacy issues in this domain. It could potentially be used as a base for future research.
INTRODUCTION

WHAT AND WHY THIS INTERESTS ME

My mum gave me my first mobile phone when I was grade 1 in junior high in China (equivalent to year 7 in Australia). It was a way for my mum to keep track of my whereabouts. It served that purpose well, as she could always reach me wherever I was and communicate with me whenever necessary. I soon learned how to take full advantage with the mobile phone and used it to keep in touch with close friends, organise social events and so on. To keep our conversations private and safe from parents’ eyes, we chose to use Short Message Service (SMS) as the main communication method on a mobile phone. This was because Mum was not familiar with SMS at the time, and with shortened words SMS was a much safer way to conceal secrets from her at that time.

After ten years of development since my junior high, mobile phones have fully integrated into our everyday lives. Short Message Service (SMS) has become one of the most popular functions in mobile phones and continues to be the most used function (Lawson, 2001). A more advanced version of text messaging, the Enhanced Messaging Service (EMS) has been introduced with longer text length support and limited multimedia support such as attached ringtones (Ericsson, 2001). Later with the support of Wireless Application Protocol (WAP), which is essentially a mobile internet over the GSM network, Multimedia Messaging Service (MMS) has also been introduced. MMS offers many more features such as even longer text length support, images, sound, and video. Furthermore, with the development of 3G technology, mobile Internet has become much faster. This is considered as the beginning of a new generation of text-based mobile
communication. With the help of the mobile Internet and more advanced models of mobile phones such as iPhone and Blackberry, SMS-type applications have become more flexible, faster and user-experience rich. People can now put more words in the messages to make the meaning clearer, and with applications such as Mobile MSN, Mobile QQ and Mobile AOL Instant Messenger (AIM), people can also send and receive messages on their mobile Internet enabled phones instantly without pause. More recently, online social networking applications such as Facebook and MySpace have offered mobile versions to their users, which enable people stay in touch on the move. This development has not only enhanced mobile messaging through introducing the idea of community and networking to the users, but also merged the online experience with the mobile experience, and creating a new paradigm in mobile messaging. On one hand, this new paradigm has brought along convenience to users as it allows users to continue their conversations from computers to mobile phones; on the other hand, users may encounter a lot more privacy risks such as exposing their personal information, because in order to run these applications on mobile phones the users have to again insert their personal details. These recent developments in mobile messaging set the background to my project, and I aimed to explore various aspects of privacy issues related to mobile messaging.

**WHAT EXACTLY IS THE PROBLEM?**

Many agree that mobile phone is a very private device as it contains a lot of important information about the user. For instance, it may contain certain number of contacts, which may be related to the user in different perspectives, such as work, family or other private affairs. There may be phone calls, and SMS
message histories in the phone, which may tell the user’s activities in his social circle (eg. who he has contacted lately), and closeness with people in his circle (eg. how frequent he contacted certain people). You may also find bank account information, credit card details and even recent online transactions on the user’s phone. This may reveal the user’s financial situation and potentially lead to financial loss if such information has been stolen. The sensitive level of information a mobile phone usually carries has contributed to the closeness between the user and the device.

Furthermore, “It privatizes the public places” (Katz & Aakhus, 2002) for the users when they are using their mobile phones. Due to different rules and regulations of particular public spaces, people may not be permitted to start verbal conversations with others. Also in some circumstances, initiating verbal conversations may be considered inappropriate. Mobile devices have enabled users to break these boundaries, as users are able to communicate in more secretive ways such as SMS utilising communication technologies. For example, in a lecture, where phone calls are prohibited in general, students may quite often engage in private conversations by turning their phones to silent or vibrate mode and communicate with others by SMS. Moreover, evidence has indicated that young people in Japan are more likely to use text message to manages their private lives, due to restriction in vocal communication in public space such as public transportation (Castells, Fernandez-Ardevol, Qiu, & Sey, 2004). The process of using the mobile phone to communicate, to some extent, has become a process of privacy management. That is, user manage the information (the voice, the message, the data and so on), which will be transmitted to the recipients via the mobile phone. They share their own information as well as receive others’
information without engaging the public. The privacy issues among mobile phone users therefore is a focus my research.

Numerous researchers have explored different aspects of this topic. For instance, there are studies about the devices and systems that construct the service, and there are also studies regarding user behaviours in the mobile phone system.

In the first area, there are issues related to privacy management in the context of ubiquitous computing (Langheinrich, 2005) in mobile phones, issues arising in newly available technology and devices (such as iPhone, Blackberry and mobile internet), and privacy risks in service providers (Askwith, Merabti, Shi, Whiteley, & 1997). These studies explored better and more secure systems to protect users’ privacy when using the mobile service. People have become increasingly aware of the need of privacy control and security in the devices. System designers and developers have put together some relatively solid protections and systems for users to maintain high levels of privacy security in mobile phone.

On the other hand, in the second area and at a more personal level, there is a body of research addressing how users handle privacy concerns when using mobile phones. Riviére (2002) discuss confidentiality of messaging in mobile phone and how young users hide their feelings within messages. He, Wu and Khosla (2004) discussed personal control on tackling privacy risks in mobile phone or mobile services. There are also studies focusing on local authorities, social institutions, advertising agents, service providers who have certain power over users in the mobile networks, and the related privacy issues such as spam and direct marketing (Camponovo & Cerutti, 2004; Triki, Piquet, & Trabelsi, 2004). These
studies have discussed how third parties use mobile phones as a platform to deliver their information or messages to mobile phone users. They have also discussed how users can help filter and prevent these kinds of situations when their privacy has been compromised.

Privacy issues related to mobile devices and mobile phone usage are considered to be critical and worth greater social attention is because they may lead to harm to individual users. Quite a large number of tragedies happened due to privacy violations were reported from time to time. Mobile phone users have not yet been fully conscious of the risks they might be facing in reality. In addition, with the introduction of social networking application into mobile phones, the gaps in privacy issues with the users have become even bigger. There has been a greater need to study privacy issues in mobile phone usage, at the same time to advise and help users realise the risks while they are enjoying the benefits that the devices and services provide them.

In the current project, I aimed to explore issues around users receiving unintended messages in mobile Internet messaging. More specifically, I was interested in unintended messages generated by other users in the system, and how the recipients reacted to them.

This project was set in the environment of mobile Internet messaging, which is further developed compared to traditional mobile messaging (SMS, EMS, and MMS). Figure 1 below provided a comparison between the new paradigm of social networking mobile messaging and the more familiar traditional mobile messaging systems.
As demonstrated in figure 1, in the traditional system users can only use their numbers to identify themselves. Parties that have access to user profiles are mainly telecommunication service providers, marketing agencies, and government organisations. Privacy laws and regulations such as the Australian Federal Privacy Act and Company Privacy Policies, to a certain extent, regulate ways these organisations manage individual users’ profiles, and hence prevent potential breach of private information and protect individuals from potential harm. However, the introduction of new technology has created new areas of risks, which challenge these regulations to change (Australian Law Reform Commission, 2008; Clark, 2008). Compared to the traditional GSM standard messaging system, the new Internet mediated mobile message has features that allow users to extend their activities over the mobile network. With this new system, users have the ability to create rich profiles to identify themselves from...
others and to put them up into the network. Whoever has access to the network would be able to view these information. Access to user profiles is available to much less specified audiences and wider parties. For instance, social networking applications were designed to encourage users to interact with other users and users’ networks. Therefore, to register and use these kinds of services is usually a very simple process without strict identity verification. As a result, anyone with a mobile Internet-enabled phone may register as user in MySpace for example, and use their accounts straight away to look at others’ profiles, and initiate conversation by sending an invitation message to others.

In such scenarios, users may be exposed to unexpected and unintended messages, which may potentially lead to breach of privacy information in this mobile message environment. This is likely to cause hazards for the users, as users may be easily targeted by advertisers and receive SPAMs, or more specifically, targeted by other users for their own purposes such as admiration, or potentially criminal purposes such as stalking, bullying and other negative actions. Another unexpected consequence may be a higher phone bill through unintended subscriptions to mobile applications and services.

The project component was a role-playing game. Its aim was to create a simulated, exaggerated and controlled version of real life mobile messaging scenarios. Through observation of the game as well as the post-game qualitative questionnaire, I seek to find out more on how the participants react to the privacy risks arose during the game, and how they manage to communicate their personal and public information in the game under this circumstance. Eight participants were involved in the project. Each of them was assigned to a pre-
defined character as their profile in the game, and they were asked to role-play the character. The characters were designed based on different levels of relationships. Therefore the characters’ roles acted as tacit rules in the game. Participants interacted with each other using the messenger software I created on their mobile phones. The software was a chatting tool for them. While most functions were similar to other commonly used messaging softwares, the messenger for the current project may randomly distributed users’ sending messages to unintended receivers, therefore creating an obvious privacy risk on unintended messages.

**Research Questions**

- How do the participants react when receiving unintended messages in mobile messaging?
- How conscious are the participants of unintended messages as a privacy issue?
- In a role-playing scenario, to what extent will the participants modify their behaviours (e.g. change their privacy setting) when receiving unintended messages?
- How can users protect themselves from unintended messages?
THEORETICAL DEVELOPMENT OF THE PROJECT

A NEW PARADIGM IN MOBILE MESSAGING

MOBILE PHONE HISTORY AND CULTURE

Ever since Motorola introduced the first practical mobile phone in the 70s (Motorola, 2007), it has become more and more popular.

The first wave of adoption of mobile phone was slow, and mostly among businesses. Mobile phones provided businesses the ultimate “end of ‘dead time’” (Agar, 2004), allowing business people to continue important conversations on the go and at any time of the day. Productivity of businesses was hence boosted dramatically.

The second wave of adoptions occurred when mobile phone design shifted from bulky, undesirable box-shaped into a slimmer, ‘sexier’ body. At the same time, mobile phones have become more affordable in terms of both the device and services provided. The target market shifted to the general public, especially towards the younger generation (Agar, 2004).

More and more people have accepted mobile phones as one of the most conventional tools to communicate; it is a good replacement of landline and pay phones on the street. This change was reflected in some statistical studies, as shown in the report from Invest Australia. By the end of March 2006 there were 19.45 million mobile phone subscribers in Australia (Invest Australia, 2007), which was almost 94% of the Australian population at the time. The report also
predicted that, the percentage would reach 100% by the end of 2006\(^1\). Although there was bias in the data, for example, a person may carry two or more mobile subscriptions for various purposes, the figure showed the absolute pervasiveness of mobile phones.

Another good example is the Japanese mobile industry. Report from Market Intelligence Centre indicated that in 2005, there were 90 million mobile phone subscribers in Japan (Market Intelligence Center, 2006), and by the end of 2006, the number topped around 91.8 million. That is about 71.8% of the nation had subscribed to a mobile phone service (Poliakov, 2007). With the high percentages shown in both examples, it is not difficult to see how significant mobile phones impact on people’s life. The report also pointed out that SMS was part of the reason for the popularity of mobile phones. Moreover, in the United States, Philippines and China, SMS has been regarded the most popular and mostly used function of mobile phones (Lawson, 2001). The Australian Mobile Phone Lifestyle Index also revealed a similar situation. According to a report conducted in 2006, 93% of the individuals surveyed identified SMS as an expenditure item (Mackay & Weidlich, 2006), which suggested that SMS is really popular and everyone uses it.

With the development of SMS, mobile phones have gathered a significant amount of users; the introduction of social networking applications in mobile phones, which enable Internet mediated messages in mobile phones, has brought mobile messaging into a new paradigm. This function is much more powerful than SMS

---

\(^1\) The report was conducted in early 2006, published online in 2007.
and provides more content and is more experience rich, however it poses more privacy concerns in mobile phone usage.

**SOCIAL NETWORKING APPLICATIONS AND MOBILE SOCIAL NETWORKING**

In recent years, the popularity of online social networking sites has significantly increased. The main feature of social networking sites is allowing users to socially interact through connections of interests and causes (Dwyer, 2007). Websites such as Facebook and Myspace have gained enormous attention in the few years after they were launched. Facebook claimed on its own site that they have reached 175 million active users and continued rising every day at a rate of 600,000 people (Facebook, 2009). Myspace has 76 millions users and with a steady growth rate of 0.8% (Owyang, 2009). Although these figures may not have provided an accurate enough representation of the real situation, as we should evaluate a website’s usage from various dimensions and factors, such as what the users do, time on site, and interaction (Owyang, 2009), they still show the significance of both websites in the world and reflecting that social networking sites have become a popular way for people to socialise with each other. Social networking sites allow and reinforce the idea of creating user profiles within the system for users to communicate with each other. The profile mechanism is not only a representation of users’ identities, but also extends to communicate users’ social information such as their locations, friends’ information and so on (boyd & Heer, 2006). Therefore through user profiles, others can learn a great deal about the user, such as his or her social status, background, social circle and potentially how others think of the user through testimonials and comments (Figures 2 and 3).
Figure 2
MySpace Profile View with Notes
Figure 3
Facebook Private and Public Profile View with Notes
In a mobile context, social networking services, applications or websites have been around for a while, and along with desktop versions, they have become more and more significant. Different from desktop versions, the mobile version has to compromise a lot of features that desktop versions provide, such as the richness of content, and interaction of the application or websites. This is due to limitations on data bandwidth and devices’ technical limitations. However, the mobile version has introduced some new possibilities into social networking which desktop versions lack, such as replying to messages, updating profiles and viewing contents on the go as well as potentially using location-based services to network with others on the go. Both Facebook and MySpace have a mobile specific version for mobile application and websites. Mobile users can still actively exchange information in the mobile versions, update their profiles, browse others’ profiles and send and receive messages. Nonetheless, the mobile versions of social networking also have similar issues that desktop social networking sites have, and how users manage personal information and protect their privacy within such areas has become more controversial.

**Privacy Issues in Mobile Messaging**

“Privacy means different things in different contexts, in different cultures and to different people.” (Raento & Oulasvirta, 2005). There are various areas of privacy issues and concerns surrounding the use of mobile phones as mentioned earlier. In the current study, I focused on unintended messages from other users in the same network or service environment.

Specifically, I investigated into two main areas: the realisation of the privacy
issues in the context and the ways the users can manage them.

**The Realisation**

“Private space is the place in which one can retreat to alternative worlds of fantasy, worlds that may guarantee psychic survival in a non-supportive environment.”(Modell, 1992). Social networking applications have empowered users to create and manage their own private spaces among themselves, or within group of users. They have provided huge space for publishing users’ personal information, and ‘growing’ their profile in time. It is very common that users can find out a lot of sensitive information about another user by looking at their profile in the application. For example, you may enter a name into Facebook and it is very likely that you will find the person’s profile. With the information provided in Facebook, you may find out basic information: gender, location, age, how s/he looks, relationship status; or more specifically, where has s/he been to, and what social event s/he is attending and has attended; or more intimately, people in her/his friend circle, who s/he has close relationship with (usually can be read from their message exchange in the profiles). You can also find out users’ information through their friends. With all the bits and pieces of information, we can then build a very complete image of a person.

The exposure of a user’s private information may or may not pose risks toward the user himself/herself, but without fully aware that such sensitive information has been exposed to others, some users have encountered some unforeseen consequences. Reported incidents showed that an employee was fired due to using Facebook (BBC, 2009), and a young girl was raped by a man met on Facebook (wsbt.com, 2008).
Without realising what the sensitive private information may contribute to, users can be catastrophic, and yet it is difficult for users to realise the importance due to the openness of the model of the application.

Mobile messaging in social networking applications has similar privacy issues, where users’ profiles may attract different messages for different intentions. While users have the right to communicate with others using short messages, others will have the same rights to respond or initiate contact.

A good example is the social networking application Twitter. It is an application built on top of the SMS model, which allows people to publish short messages (140 characters) to the world instantly using the Internet. Users can ‘follow’ other users and keep himself/herself on track with others’ latest status. If the users did not set their message updates as private (only selected users can view the messages), all the messages published would be available for the world to see, and the users are open for everyone to follow. The application programming interface (API) of Twitter has also been helpful for Twitter to be distributed easily on different platforms including mobile phones. The model of Twitter has allowed creating a structure with two different levels of users: the publisher and the followers, and two different areas of privacy management: managing who to get message update from and who to send message updates to. This model is different from the main focus of my project. An in depth analysis/discussion is needed to study Twitter, which is outside the scope of my research topic. Nonetheless, Twitter is a good reference for future studies in mobile messaging.
THE CONTROLS

Privacy management has been addressed in three different areas in the past decade: assurance through law, through self-regulation and through technical standards (Spiekermann, Grossklags, & Berendt, 2001).

As mentioned earlier, in Australia there are several laws and regulations that have been introduced by the government to regulate these areas. However most of these laws, such as the Federal Privacy Act, were introduced 20 years ago, and were very much out of sync with the current technology such as personal computers, the Internet, mobile phones and so on (Clark, 2008). Although organisations such as the Australian Law Reform Commission constantly propose changes to the law in order to keep up with the current technology (Australian Law Reform Commission, 2008), the process of modifying and reintroducing new laws and regulations requires a relatively long time to take effect (Spiekermann et al., 2001). Therefore the law has its own limitations and disadvantages over these matters.

Another perspective of privacy control in mobile messaging is self-regulation, which has been a regular practice for many service providers. The general approach is to introduce a privacy statement or terms and conditions to make users be aware of the controls on private information both the service provider and the users have in the process of the service. Users have to agree to these agreements or statements before using the services. Generally, users feel more comfortable when they are asked to agree with privacy statement and feel more assured when the statement is approved by a third party (Chung & Paynter, 2002). The privacy statements reinforce and protect the rights of both the service provider and the users. However, the statement does not include controls over
privacy matters between users, especially when these matters are sitting outside the privacy regulation of the service. For example, a girlfriend accidentally read message feeds between her boyfriend and another girl, which contained intimate content about them, and she may then discover that her boyfriend has been cheating on her. Or a user accidentally subscribed to a paid content site on his/her mobile phone, resulting a large phone bill at the end of the month. Many of these scenarios have happened quite often in real life, and users cannot rely on the regulations imposed by the service providers to protect themselves. A personal level of responsibility and awareness of the privacy risks in mobile messaging have to be taken into consideration when users are using the service. Users need to understand what personal information they are sharing with the public, and whether or not they want this information to be shared. Last but not least, they should be aware of the consequences of sharing certain private information.

Many of today’s popular social networking applications, both in web-based and mobile technologies have very sophisticated privacy settings to ensure a certain level of privacy protection. However, system errors are inevitable, and sometimes these errors can lead to fundamental privacy and security issues that may negatively affect the users. For instance, there was a reported case on Twitter that a user’s private message was exposed mysteriously in his/her public message feed, resulting some embarrassment (Chung & Paynter, 2002). Moreover, some of the privacy settings on the applications are overly intrusive for non-technical users, as they require a long time for the users to learn. Consequently, users may not be bothered configuring their settings properly.
before using the service, and hence face privacy and security risks while using the applications.

In conclusion, until privacy controls are managed on a multiplicity of levels, such as laws catching up with the technologies, and service providers providing better software applications which enable better privacy settings, users will have to take personal responsibility to protect their own rights and privacy.

**RECREATING THE SCENARIO IN THE PROJECT**

There are four different aspects I aim to explore through the development of the project and the demonstration of the role-playing game.

Firstly, I want to look into social networking through instant messaging in mobile phones by designing a software Sh.. Messenger (later referred as Sh), which allows user to send instant messages to each other on their mobile phones. Secondly I want to look into the culture of profiling in a mobile context. Thirdly, I aim to explore privacy issues in mobile communications by intentionally stripping the privacy protection setting from the application and installing a privacy bug into my software and discuss the user experience on using the application from the role-playing game participants. Fourthly, I look into a more technical perspective, on the design and development of the mobile software and discuss the issues around mobile phone application development.

With these four areas of investigation, I hope to answer my research questions mentioned earlier, and discuss them later in this exegesis.
**How to Achieve This Project?**

At the beginning phase of my research, I intended to build the project around software, which runs on portable device and allows the user to communicate with whoever uses a similar device. I limited down on my options and rounded up my choices of devices based on the popularity of entertainment gadgets among young people. They were Sony Playstation Portable (PSP) and Nintendo DS (DS). However, after further research into the suitability of the devices, I soon dropped the idea of using both of these devices for two reasons: Firstly, I realised that in order to develop on top of these devices, I would need a dedicated team of developers who have extensive skill sets in programming onto these devices as well as on the wireless communications aspect of the project. Both PSP and DS are marketed as commercial video game consoles, both of them have a very specific programming language, which are published by Sony and Nintendo and close sourced to individual developers. This indicates that without either enterprises’ support, or a reasonable amount of resources, it is unrealistic to expect that an individual could complete such a large project in such a short period of time. Moreover, the strict anti-piracy security feature on both devices also indicates a total new area of study, which would have created another barrier to the completion and outcomes intended by the project.

Secondly, some statistical research and estimation from Entertainment Software Association (ESA 2005) have revealed that the group of devices I had chosen are mostly designed for entertainment purposes, and the communication functions between users is not often used. In comparison, mobile phones have been widely available in developed countries for a long period of time, and technologies such
as SMS have been widely adopted by mobile phone users, especially younger
generations. It makes much more sense to consider developing a program on
mobile phones to accommodate the mobile communications aspect of the project.
Therefore, I decided to use mobile phones as the common platform.

**Using IM as a Communication Method in the Game**

In order for users to communicate with others using my program on their mobile
phones, I would need an interface that is easy to adopt and easy to use. As
usability gurus’ Molich and Nielsen put it, “Any system designed for people to use
should be easy to learn and remember, effective, and pleasant to use.” (Molich &
Nielsen, 1990). Therefore ease of usability is the key to this software, and it is
important that, to create some sort of connection to the program with what is
already out there so that the application is less intrusive, and the users may have
shorter attention span as the focus should be on more time spent on ease of
communication and playing the characters.

The conventional mobile SMS interfaces vary depending on different brands,
handsets, and culture. It is minimal with custom design, which provides a very
specific user experience over different mobile phone users with their familiar
devices. Hence the Sh messenger references largely from SMS interface, for
example, assigning the “send” button to the confirm button on the mobile phone
to remind users of the experience they will encounter when sending an SMS.
In addition, I also designed the application graphically close to online IM by
employing graphical icons such as ‘emotion’ and ‘status’ icons to make sure that
the users understand the graphical information. I used different graphical logos
to present different buttons across the application, as this is a common method in
interface design using semiotic representations to communicate ideas to users.
Emotional representations are also presented as icons in the application where users can send them to express their emotions. It is a common practice in many online instant messaging that users express their thoughts and emotions via ‘emotion’ icons (Figure 4).

Figure 4
Emotion Icons from MSN Messenger
Even in SMS, users may use different combinations of punctuations or symbols to construct different emotions, as demonstrated in Figure 5.

![Selected Characters-constructed Emotions Icons](image)

**Figure 5**
Selected Characters-constructed Emotions Icons

It is considered that in an indirect communication context, such as instant messaging and SMS, emotional representation such as ‘emotion’ icons contribute to decision-making and expression of emotion (Rivera, Cooke, & Bauhs, 1996). By designing these emotion icons, the application can offer a “one-click” solution for users to substitute sentences like “I’m happy”, “I’m sad”, “I’m frustrated” and so on, as well as drawing connections between my application with existing instant messenger the users familiar with. Therefore the ‘emotion’ icons are introduced in the application to create less intrusive communication options.

Users’ online activities and availabilities are represented by different status icons, which are placed next to their user name in the user list. They represent four different user statuses: ‘online’, ‘offline’, ‘new message’ and ‘in conversation’. These icons are intended to remind users what others are doing in relation to themselves, and encourage them to initiate action towards others, such as initiating a conversation with them or reading and replying to their incoming messages.

Another fundamental function I adopted from IM is the basic level of
customisation of a user profile. Users would be instructed to enter their character
details, such as a character name, descriptions and locations onto the mobile
phone prior the role-playing game. This is a very important process as the
profiles are the only way to identify themselves in the chatting environment, and
controls who to talk with. Moreover, this profile function will give an indication in
the logs of user identities in the chat environment for later analysis.
The application has been designed using similar functionality and features to IM,
therefore it is easy to learn for first time users. Although I have spent fair a bit of
time on interface design in Sh., and have attempted to create an interface that is
less intrusive to use, the main focus here isn’t the interface itself: it is a
background item which will assist users to communicate using the application in
the role playing game.

PRIVACY BREACH
One of the key areas that this project intends to explore is to intentionally create
privacy problems in both the application and the game setting. According to
Grinter and Palen (2002), IM users manage their privacy within and with the
system. Specifically, this means when a user is using IM, he or she will be
managing his or her public and private domains in the applications. For instance,
a user may configure (if available) filters to block out spam messages from
unknown people, or make sure his or her messages are sent to the intended
recipient, and at the same time they will also be managing their private and
public physical environments outside the application. A good example would be
that a user may try to prevent others from overseeing what he is typing or
receiving to and from other users.
Inspired by Grinner and Palen’s (2002) analysis, I designed the role-play to hint the participants that their privacy may be breached. For this purpose, I added some privacy features into the project from two perspectives: unlike other conventional IM applications which security settings are enabled, I decided to strip the privacy setting inside the Sh... system: it has no spam filter, and users cannot be “invisible” when using the application, so that other users can see who is online. Whoever is in the user’s list will be able to send the user a message, and in this role-playing game environment, it means anyone can send anyone messages. Another feature I put in is for forwarding messages to random users: the message sent by users may have a random chance that it will also be delivered to other user. Although the users were informed prior to playing the game that there may be privacy issues in the process, there was no clear indication on what exactly they should be expecting. As such, user may not be fully aware of the privacy issues in the game at the beginning, but slowly, while they have become familiar the application, they may slowly realise the issues, and thus adjust their behaviour accordingly.

From the perspective outside the system, I decided to put all the participants in the same room, and they are allowed to walk around and interact with each other. This is due to the limitation of mobile phone Bluetooth and I wanted the participants to be aware of the others’ existence, hence they will have to deal with the bridging of their public and private spaces while they are using the application. Because the character profiles are distributed randomly to each participant, they will not know who they are chatting to. However in this specific setting, because participants are placed so close to each other, and they might modify their behaviour accordingly to compromise the privacy breach. For
example, people may be more cautious in the game, as potentially they are chatting to in the application may be right next to them. And this will challenge the participants on how they will modify their behaviour in such privacy setting.

**Character Profiles**

As Suggested by Nabeth, people enter socially enhanced digital spaces, (such online social networking sites, and in my case, role-playing games operated with mobile phones) they tend to wear masks in order to engage in some activities to experiment with a new identity (Nabeth, 2005). With fun as the ultimate motivation of the game, I created the roles so that all the participants can pretend to be somebody else. I designed the character profiles to give the participants a base to initiate their conversations in the game. Although there are no explicit tasks in the game for participants to complete, there are implicit tasks. Before the game commences, I gave suggestions to the participants and encouraged them to spend time to read the character profiles, think about what would the character do if they were the character and try to be ‘in-character’ as much as possible. The character profiles have been designed following certain relationship structures, which may become the implicit tasks to influence the ways the participants communicate with others. There are several initial relationships that pre-shape the setting, such as the boyfriend and the girlfriend and university pals; furthermore, the profiles suggest potential sub-relationships such as the bored Japanese co-worker is trying to look for fun, and the boyfriend try to cheat on his girlfriend with other girl and so on. Please refer to Appendix 2 for character profiles. Finally, because of the random unintended message feature in the program, along with the two levels of relationships, a third level of relationship will be formed, which involves senders and the unintended receivers. Based on
these three structures, participants will have enough motivations to converse with each other.

**The survey and conversation history**

A simple short survey was conducted after the game to gather qualitative information about game participants in the categories of ‘user experience’, ‘privacy issues’ and ‘relationship forming’. The set of questions in user experience explored the design aspect of the game, such as the program’s interface. The privacy issues questions explored the awareness of participants of the privacy problems in the game and how they chose to adapt their behaviour if they discovered any. In relationship forming, the questions explored participants’ reactions toward the three levels of relationship structures and how they handled unintended relationship initiation during the game.
The Project

Overview – Summary

The game communication was mediated by an application I designed, and it was intended to provide users free SMS within the space. Bluetooth technology was employed, which made the application connectable without using the Global System for Mobile communications service (GSM). Instead of using contact numbers to identify each other, people could create nicknames, and the users would be listed and displayed by the phone. By doing so the participants could choose who they want to chat with. Such set-up simulated an online chat room, but without the host of the server. It was constructed through Bluetooth connections for all the users in the space. There were also new rules for sending and receiving messages. When a sender sends out messages, the program will intentionally and randomly deliver the messages to other users in the space. As a result, not only the target receiver will get the message, but some other people in the space may also get it. By mimicking the real life situation, we can therefore overhear other peoples’ conversations in a text form; interesting relationship dynamics between individuals may hence be established. As people start to become aware of the privacy issues associated with the game, they may attempt to reconstruct their way of communication within the space for security or other reasons. As receivers, they may have to modify how they interpret the messages and they may take part in any conversations of others. Since there is no limitation on who will interact with whom, it will give complete freedom to the people in the space to extend (or restrict) their conversations. With the specially designed characters profiles, participants may continue communication without any problems, and they may find the process frustrating because of the random
unintended messages. While the application is making the process of discussion difficult and not private, it is hypothesised that its users may slowly realise the privacy problem behind the scenes, and may modify their behaviour to continue communications.

Design Considerations

TECHNICAL REQUIREMENTS

The application was developed in J2ME, which is the most standardised programming language on mobile phones today. It was designed to be compatible with most recent mobile phones, has the ability to be extended for further development and is a set software standard in mobile applications (java.sun.com, 2007). The application was also designed to be able to run on Bluetooth enabled phones. Bluetooth is another standard technology that enables mobile devices to interconnect using a short-range wireless connection (java.sun.com, 2007). With the technical standards in consideration at the beginning of development, I aimed to create the application to be compatible with most recent mobile phones out in the market.

PROGRAM DEVELOPMENT AND SPECIFICATION

OVERVIEW

In this section, I will explain the technical functionality of the application. The main function of the game is to enable users to communicate by instant message with their phones.

The development process was conducted in an exploration method. Due to the
different behaviours of J2ME in different mobile phones, constant testing and bug fixing and redevelopment was conducted. This specification was constantly being modified due to change of scope in the application. And it was gradually developed throughout the progress of the application development.

**PROGRAM FUNCTIONS**

This section will present the main functions of the application by describing the functions and what users can do with them.

The application is simply a SMS system. It should allow users to:
1. Send and receive text message to and from other users;
2. Send and receive simple ‘emotion’ icons;
3. View message history (only for the current session, history will be cleared once re-log-in).

The application also allows users to:
1. View all the users within the environment;
2. See the online status of each user including online or offline;
3. Choose which user to send messages to;
4. View user detail information, including nickname, descriptions, tag (all this information will be entered during log-in process).

When the program runs for the first time, user will be asked to fill out all the information to create their profile (in the current project, this would be their character’s profile) to reflect their character-traits. All details will be saved after log-in, there is no need to re-enter if they log-off. In the user list, user can browse others’ detailed descriptions, check conversation histories and refresh user list.

User details include:
1. Nickname;
2. Self description;
3. Location.

APPLICATION INTERACTION WORKFLOWS

Figure 6
Application Interaction Workflow for Senders
Figure 6 demonstrated the workflow of how a message sender interacts through the application, from the stage where s/he registers him or herself into the application to the stage where s/he sends out the first message. The message may or may not become an unintended message to other users.

Figure 7 presented the workflow for a message receiver, which is similar to the workflow of the sender.

**SYSTEM SPECIFICATION**

This section will explain the system design in the application and how the system will perform when the user is present.
The system was developed over the Peer-to-Peer (P2P) communication model. This means each peer will have contribution over the entire system by connecting with each other. In employing the P2P model a server is required to run the application. At the end of the game, conversations from the game will be transferred into a central PC. The central PC will not act as a server; it is a storage device in the game setup. To compromise with the limitations of Bluetooth, and to save power in connection, the user list will not be automatically refreshed. With this setting, the application will only perform search and refreshing user list right after the registration process and on request by users. Furthermore, the user list will be updated once a new user is online. The application will automatically send out a notice to all other existing users. So all user lists will be updated, and all existing users will not be required to search for new users.

In order to maximise the application’s compatibility on different mobile phones, I have employed some limitations and requirements when developing the application. The application has to be based on J2ME MIDP2.0 and Bluetooth technology, and therefore it can only run on mobile phones with JAVA MIDP2.0 and Bluetooth function. It can be run on most of the mainstream mobile phones, including Nokia and Sony Ericsson. Furthermore, to be able to see the ‘emotion’ icons and other icons, the application requires a colour screen. Also to make the application development simpler, I decided not to include touch screen based mobile phones such as the Apple iPhone or the Motorola A1200.

**INTERFACE DESIGN**

In this section, I am going to explain the interface design of the application, which has an emphasis on better usability, a less intrusive learning curve and will be
simple and clean. To make this easier to understand, I will use a case study from user's perspective and introduce the interface step by step.

**Step 1: Graphic Design Preference**

The preferable background colour is white, however due to different configurations and limitations on different handsets, this white background setting maybe overwritten (eg. displayed different colour according to each handsets settings). To increase clarity and visibility on small screens, I employed a san-serif font such as Helvetica. The consistent thickness of the font strokes work well on a small screen and will provide an easy to read experience for users.

**Step 2: The Interface design page by page**

To make the explanation as clear as possible, I will refer the design appearance at different stages of interaction in the application as “Pages”, and I will also name them with descriptive titles, so it is easier to follow. I will also demonstrate the interface using a character called Joshua in the game: what you are about to see is what Joshua will suppose to be seeing in the application.
1. **Welcome Page**

This welcome page will appear when Joshua launches the application on his phone. It includes display copyright information, program author and developer (Figure 8). It will go into the next page: Register Page after 2 seconds.

---

**Figure 8**

*Welcome Page*
2. **User Registration Page**

In this page, Joshua is required to enter his user name and other information to describe himself and build up his profile character. As demonstrated in Figure 9, Joshua can enter his character information accordingly. After Joshua finished entering all the information, the data will be saved. When he relaunches the program next time, all the information will be filed according to the saved information, so user doesn’t have to re-enter the details.

Pressing the “Options” button will show standard mobile phone options (depending on different handsets, it will have variable content), pressing “Ok” will bring him to the next page, and pressing “clear” will clear all the entered data.

![Figure 9](image)

*Figure 9*

*Registration Form Page*
3. **User list update for the first time and message box**

After Joshua finished the registering process by pressing “Ok”, a message box will appear and indicate the search for other users within the area (Figure 10).

![Users List Update Page](image-url)

**Figure 10**

*Users List Update Page*
4. **User List Page**

If everything goes smoothly, and users connect correctly, Joshua will then see this page, which will display all the connected users who are running the application in the game area. Joshua can select others to see their profiles and send messages to initiate conversations. Others’ online statuses are shown on the left hand side of user names. There are four different types of status, online 🟢, offline 🟥, new message 📨 and in a conversation 🤝 (Figure 11).

The offline status will only appear when a user was first connected and dropped out.

![User List Page](image)

**Figure 11**
User List Page
5. **User Detail Page**

Joshua will then select one of the users (in this case Chloe). He can view her details by pressing her details in the menu.

In the Chloe’s User Detail Page, Joshua can see the user’s name, a brief introduction and their location (Figure 12).

![Figure 12](image)

**User Profile Page**
6. **Chatting Page**

When Joshua decides to initiate a conversation with Chloe, he can start sending messages to her. There will be a separate conversation page for each chat with different users. In this Chat page, you can see Joshua has started a conversation with Chloe and he is using both text and ‘emotion’ icon to express himself in the chat. On the other hand, when Joshua receives a new message from Chloe, the message will instantly appear in this chatting Page. At the same time, if other users have sent him new messages, a new message icon 🚒 will appear at the mid bottom of the page (Figure 13).

![Chatting with Chloe

<table>
<thead>
<tr>
<th>Chatting with Chloe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi</td>
</tr>
<tr>
<td>Hi, How are you!?</td>
</tr>
<tr>
<td>😊</td>
</tr>
<tr>
<td>I am great! you?</td>
</tr>
<tr>
<td>Im good! a little intro of urself?</td>
</tr>
<tr>
<td>I’m Joshua, from Australia!</td>
</tr>
</tbody>
</table>

Figure 13
Chatting Page
7. **E-motion icons**

To make the conversation more interesting and closer to existing IM application, I have designed a set of ‘emotion’ icons which can be used to represent Joshua’s different expressions (Figure 14).

![Emotion Icons](image)

**Figure 14**
**Emotion Icons**

The graphical interface design was largely inspired by existing IM applications. It acts as a simple agent to assist the user to communicate using the application. Because of the reference to existing IM, an IM user should have no problem learning how to use the slight variables in the program in a short time.

**CHARACTERS AND INVISIBLE RULES**

Eight different characters were role-played in the game. These characters had different locations, and/or cultural backgrounds, and each character may have relationships with other characters. Such information about the characters was suggestive of certain rules that the players should follow during the game play. This was so the participants could role-play the character truthfully.

The Characters are as follows:

1. Chloe, America, NYC
2. Katherine, Australia, Melbourne
3. Joshua, Australia, Perth
4. Mike, England, Newcastle
5. Huang, China, Guangzhou
6. Yoshima, Japan, Tokyo
7. Duriana, South Africa, Johannesburg
8. Rebecca, Israel, Jerusalem
“Chloe”

Chloe is an under aged girl I have introduced into the game to represent the younger generations who are grown up with the internet and technology. She I have given her a very curious and open personality to make friends and also is open to new topics of conversation. She has just broken up with her boyfriend. This adds an extra fragility to this character, which may potentially make her very vulnerable in this role playing game.

“Katherine”

Katherine is a character that is intended to accompany Joshua within the game. She is his girlfriend who lives in Melbourne. Her intensive love toward Joshua and emotional background are supposed to create more tension in the game. Moreover, not being in the same city, she is quite eager to talk to her boyfriend, to express how much she misses him. With the privacy function in the system, whatever Joshua sent unrelated to Katherine may still be delivered to her phone, hence she may find out he is flirting with other female characters in the game, which may create tension between the two, and may result more serious interaction such as a fight.

“Joshua”

Joshua is a character that has a relationship with character called Katherine. He is charming and handsome; however, he has moved to Perth for his studies and is apart from his girlfriend in Melbourne. His physical location has given him great advantage for doing things that he can’t do if he lives in Melbourne. He can flirt with other girls online and ask them for a date in Perth, and his girlfriend will not find out easily. I designed this condition to encourage Joshua to have more
interactions with other female characters in the game. Because of the twist in the system, whatever Joshua sent out to other characters may potentially be forwarded to unintended recipients, for example, his girlfriend. Joshua is a character that is involved in two circles of relationships, with other characters and with his girlfriend. This character is expected to be quite active in the game.

“Mike”

Mike is a character that bonds with his good friend Huang. His friendship with Huang started back in a few years ago in Beijing University in China. Since then, they have been best friends and love to discuss boys’ topics. Such a setting has enabled the connection between Mike and Huang, and it has encouraged them to interact with each other more often than with other characters. The preferred conversation topics that I selected will also contribute to whatever they will be chatting about in the space.

“Huang”

As mention earlier, Huang is connected closely with Mike in the game. It is predicted that, he will talk to Mike mostly, and topic of interests will be around pretty girls, as he is not into politics. His Chinese background and current status of being financially supported by his girlfriend will also bring in new element of topics of interest.

“Duriana”

Duriana is a character which reflects the user form technical savvy group in reality. At the same time, she has taken an interest in Joshua. This may cause
tensions. This relationship between Duriana and Joshua may be interfered with using the unintended message feature of the application. Users such as Joshua’s girlfriend may find out about the new relationship. The extra information that she planning an exchange study will give the player more motivation to interact with Joshua, as she may go to study in Australia, potentially in Perth (where Joshua is currently located).

“Yoshima”
Yoshima is a character base on typical Japanese ‘salary-man’, who follows a set of routines and very much a workaholic lifestyle (Roberson & Suzuki, 2003). His repetitive lifestyle makes him very likely to use his mobile phone to communicate with others privately and anonymously.

“Rebecca”
Rebecca is another underage character I introduced into the game, although compared with Chloe, Rebecca is even younger, so may be even more vulnerable due to inexperience with life and technology. Her location may indicate that she has a strong religious background, however I did not specify this as I want it to be open for the player to adopt/adapt as they see fit. The player may relate the character to their own life experience, and they may have different religious experience or preference. This may influence the game play. Furthermore, her character has a particular interest in Asian culture, which may provide motivation for the player to communicate with other Asian players in the space.

To sum up, different characters have different personalities, different relationship statuses and cultural backgrounds, which to some extent resembles the social
networking community. Moreover the different characters have specific motivation to communicate with each other, and some players may choose their own preference of topics, and may initiate different conversation topics as well. The information provided in the character profiles will become the invisible rules, which may guide the participants’ conversation contents through the game. The character profiles will also give tasks to the participants to perform in the game.

**Privacy Functions**

As stated earlier, two major privacy functions were built in the application. They were intentionally designed to make the users more conscious about the privacy risks in the role-playing game.

*No privacy setting*

Privacy settings or preferences were stripped off the application. Therefore, users could not protect themselves by configuring the application. For example, users were unable to put on spam filters to block out messages from unknown users and they could not set their online status to invisible to avoid others knowing they were online.

*Random Messaging*

Another fundamental function I have introduced to the application was the random unintended message function. When a user sends a message to another user, his or her message will not only be delivered to the intended recipient, but also by chance, that the message may be delivered to an unintended user. The chance would be generated by the application randomly, which means the action of sending the unintended message may or may not occur, and every time when it
does occur, it will randomly choose one user other than the intended recipient to deliver the message.

For example (see Figure 13), Joshua sent a message to Chloe, and randomly the application activated the unintended message function, which made Joshua send out a message not only to Chloe, but to his girlfriend Katherine as well. Katherine would see the message and may think the message was for her. On the other hand, Joshua and Chloe would have no idea that the message was delivered to Katherine.

**TRIALLING THE GAME**

After the application was built and tested, I hosted the role-playing game with eight participants. I assisted all the participants to download and install the applications onto their mobile phones and launched the application with their character profile filled in.

Participants were asked to role-play the given characters as much as they could based on the background information of their own character, and they were instructed to use the application to communicate with other participants.

The game started when the users were successfully connected with each other and it was intended to last for about twenty minutes.

After the twenty minutes of game play, participants were asked to fill out a survey questionnaire (Appendix 1), which contained questions in regards to their experience in the game and how players felt about the privacy violations in the game play. The purpose of the questionnaire was for me explored my research
questions as stated earlier in the exegesis.

While the participants were filling out the surveys, I collected their mobile phones and downloaded their conversation histories onto a PC. The conversation histories were later analysed and the analysis would allow us to learn about how the participants changed their behaviours and conversation contents during the game play. Further details of the role-playing game design and specification will be discussed in the following section.

**ROLE-PLAYING GAME DESIGN AND SPECIFICATION**

In this section, I will explain the design and specification of the role-playing game. It will be presented into three sections as followed: participants’ selection, game procedure and game analysis.

**PARTICIPANTS SELECTION**

The project started with me inviting eight of my friends who were between age 22 – 30 years old and either current university students or recent graduates to participate in the game. Based on different technical efficiency backgrounds, they were divided into two user groups, the technically savvy group and the general group. People from technically savvy group either have a degree in multimedia related subjects or have been active in the multimedia related industries; therefore they understand interface designs and have strong ability to pick up and learn new technology faster. The second group, the general group have various backgrounds from different fields, they are not necessarily technical savvy and may require a longer time to adopt new technology. However once they learn and practice, they would not have difficulty using the technology.
GAME PROCEDURE

Stage 1. Participants was asked to read through the plain language statement. The statement clearly explained to the participants that the study concerned about privacy issues in mobile communication. It also explained to them that what they would need to do in the game, including the character role-play and communicate using the program. They were also told that they may receive messages from other participants during the game and all the conversation messages would be recorded for later analysis. The participants can withdrew their participations and their data collected in the game at any time. If they withdrew during the course of the game, the information such as conversation history data would not be used at later stage.

Stage 2. Participants were asked to pick a character profile randomly from all the profiles. They then role-played the character profile selected. Their characters were explained to them in brief detail: including age, location, gender, brief background and relationships with other characters if there was any. They were asked to act according to their characters.

Stage 3. Participants were asked to run the program on the mobile phone and sign in as with their characters’ user names and details.

Stage 4. Participants played the game in a lecture room, and used the application to communicate with each other for 20 minutes. According to the information given based on their characters, participants assumed the time indicated in the clock given as their local time.

Stage 5. Game finished and all conversation history data was sent to the PC for later analysis.

Stage 6. Participants were required to fill out the questionnaire, which would take about 10 minutes.
GAME ANALYSIS

All the conversation history recorded during the experiment will be analysed, and if someone chooses to withdraw, their conversation histories data will be withdrawn. The analysis will be conducted according to two primary relationships. First one is the relationship between the sender and intended receiver, and second one is the sender and the random selected receiver. From those two relationships, I will draw examples from the analyses which may be reflecting what users may experience in terms of possible privacy violation in the game, and how they may change their behaviour after they encounter such violation.
PROJECT RESULT AND DISCUSSION

THE ROLE-PLAYING GAME COMMENCED

Eight participants were gathered at a RMIT postgraduate research lab. The participants were firstly required to read the plain language statement and understood that they were required to install the applications onto their mobile phones. The statement also briefed them that they were required to use the application to communicate with each others in the game and may receive messages from others.

The participants were required to install the application by turning on their Bluetooth and downloading it from the Mac computer. After they successfully downloaded and installed the application, they were instructed to start it up.

The participants then randomly chose a character profile, which they would role-play later on in the game. They were also instructed to register their profile information including their desired usernames, introductory descriptions and locations according to the profile into the application so that other users could identify each other in the game as the character they were role-playing.

Having completed the previous steps, the participants were asked to use the application to connect with each other and start communicating in the room.

After roughly 20 minutes of message sending and receiving, I stopped the game and announced that the game was finished.

Lastly, I downloaded the messages from six the participants, as two users’ mobile
phones crashed before uploading the data, and the data was permanently lost. While I was doing the data downloading, participants were given the questionnaires to fill out and provide comments about their experience throughout the game. I also informally chatted to the participants to get some verbal feedback of the game. The whole process including briefing, setting up, game play and survey gathering lasted for about two hours.

**Statistical Facts**

Based on the collected conversation histories, in 20 minutes of chatting time, about 300 messages were sent, and an average of 8 messages were exchanged between each pair of participants. These results included both intended messages and unintended messages that were generated by the application randomly.

According to the questionnaire survey, all of the participants thought the game reminded them IM and generally find the experience satisfactory. Only a few participants suspected privacy issues in the game (3/8), although most of them have admitted that they received messages from strangers (7/8), one participant failed to connect, and some of them formed new conversational relationships with the strangers (5/8). These sets of figures illustrated that the participants were not fully aware of the privacy issues implanted in the applications in mobile messaging, although they were briefed that there were privacy issues involved at the beginning of the game, and they did receive unintended messages from other users who they did not initially talk to. With one participant failing to connect, more than half of the participants reported that they feel comfortable forming new conversational relationships with strangers through unintended messages.
during the game, which indicated that users were not entirely on guard when they are using the application.

**Connection Difficulties**

Prior to the start of the game, participants were required to install the application onto their mobile phones and they were required to run the application and connect with each other using the application. However due to different phone specifications, or a potential programming bug in the application, the participants could not login and connect with each other at the same time. This problem was partially resolved when I discover some of the iMac computers in the room had their Bluetooth on, and so I switched them off.

However, one participant still had difficulty connecting with her Nokia phone, although she was able to do it earlier. She failed to connect to others for the entire process, possibly due to the set up of her phone or other unknown reasons. Another participant had difficulty sending messages to others, therefore only six participants were actively chatting during the course of the game.

More specifically, during the role-playing game, some connections between mobile phones dropped off, creating unexpected “offline” user statuses during the game, the “offline” participants were confused because there was no indication in the application to show they were “offline”, and they still attempted to send out messages to people in their user list, and as a result, their offline message could not be delivered and they did not get a response from the intended recipients.
One participant experienced message-sending problems. From the conversation history, it showed that she had no difficulty receiving others messages, but her messages had problems getting to others.

The frustrating connection issues have provided very good examples of the addressing difficulty in mobile phone standards and inconsistencies mentioned earlier in mobile phone application development. The lack of standard platforms in both mobile phone platforms across different brands, or models of mobile phones may have caused the connection issues. As matter of fact, various phone hardware structures, different operation systems, and configurations have created many different combinations of mobile phone platforms, even with programming frameworks such as J2ME which is specifically designed for mobile phone as a cross-platform template, we still encountered various difficulties in the development, testing and execution stages of the application.

To a certain extent, this has also reflected that, in order to create a smoother development process, better-tested and less buggy application for mobile phone, we will need a standard, which unites the development process and provides guidelines for mobile phone manufactures to develop their handsets and provides development frameworks for software developers to build programmes for different handsets.

**TECHNICAL PRIVACY PROTECTION**

When playing the game using the Sh... application, users could not rely on the system to protect their privacy, nor there was any privacy protection setting that existed in the application. Perhaps this is because lots of the applications out
there such as MSN messenger that have sophisticated privacy settings built-in purposely to help protect users’ information, and users are used to the protection normally built within the system. Therefore in the game, most users did not react to the privacy issues inherent in the system. One user pointed that, he would generally be nicer to people while using application to communicate, as he did not want to offend anyone because all of his information was exposed to others, even though he was only role-playing a character. This comment suggested that this specific user was aware of the privacy implications when information was exposed to the public. Others may use the information to identify him; in order to ‘save’ himself from potential embarrassment, he would have to be polite when using the application.

**PERSONAL SECURITY PROTECTION**

With the design of unintended messages imposed in the application, which formed potential privacy risks for the players of the game, mixed results were presented in the game.

**HOW DO USERS REACT TO RECEIVING UNINTENDED MESSAGES IN MOBILE MESSAGING?**

From the role-playing game setting, there were two types of scenarios where unintended messages may be sent to a user.

*First Scenario was created by user intentionally.* User A wanted to initiate a conversation with User B who he/she did not know (in the game setting, this means, they do not have a pre-designed relationship with each other), User A
would send User B an message to catch User B’s attention. The environment had a predetermined condition, where users were encouraged to interact with each other. Therefore in the process of playing the game, users didn’t refuse to reply any incoming messages from would-be strangers, and in most cases, conversations would start from these initiating messages.

For example, Mike received incoming messages from two other characters, who he didn’t know. One was from Duriana, and the other was from Rebecca. They greeted each other, and both addressed his name in the messages, as they could easily find his name and background information from his profile section. Mark replied with great interest and expressed his emotions positively using emotion icons built in the system.

Another example was about the character Rebecca. She received a message from Joshua the ‘flirty boy’ character, who intended to get hooked up with her. She had no problem continuing the conversation from the initiated message.

From above examples we can see that, in an environment where user profiles are available to the public, others can use that information to draw closer to the user by addressing them by their names, mentioning their background and so on to initiate conversations. In most cases, users are happy to respond to these messages. This has drawn out the users’ level of awareness about privacy issues in mobile messaging. People are very used to the idea of talking with strangers in messaging situations. The almost game-like, unobtrusive design, of many messaging/mobile messaging environments, may also contribute the less serious, and less on guard manner in users’ behaviour. The situation could be alarmingly
risky, especially when the stranger is messaging the user for harmful purposes.

Clearly the familiar nature of messaging environments can create a false sense of security in relation to privacy controls and identity protection.

*Second Scenario occurred randomly due to system faults.* The system I designed has a built-in function, which randomly duplicates a user’s message and randomly sends it out to an unintended recipient. When User A sends a message to User B, the system decides in a random manner if it will duplicate the message. If the decision was yes, the system would send this message out another unrelated recipient, User C. Therefore in this scenario, there would be 2 recipients of User A’s message. Because of the random nature of this scenario, unintended messages may occur anywhere during the chat process.
Figure 15
Joshua Chatting With Rebecca and Mike

When Joshua was flirting with Rebecca, he asked her if she was single. The message had also been forwarded to Mike. This created an awkward moment for Mike. He responded with a pause phase “well” and then started to answer Joshua’s question. On the other hand, Joshua was unaware that his message had been sent to Mike and he felt strange when he received Mike’s message. He asked two questions to confirm if Mike was talking with him, and what Mike’s gender was. Apparently Joshua wasn’t interested in guys, as indicated in the chat history. He mainly talked with all the female characters, and he stopped the conversation after Mike has answered them.
Japanese character Yoshima was chatting with Rebecca. To please her, Yoshima told Rebecca that she had a pretty name. However, the message was delivered to Mike as well. This unintended message initiated another conversation, in which Mike started to mention how sexy his name was. Yoshima took the wrong impression and thought that Mike was a girl, but later Yoshima found out Mike was a guy, then he sent him a message to apologise and expressed his misunderstanding. This message was also sent to Rebecca. Rebecca freaked out and replied: “I am girl. That’s rude”. She stopped the conversation after that.
In another situation, Huang and Mike were chatting together and their pre-designed relationship was friends in the game. Huang received a random message from Mike, which belonged to a conversation between Mike and another player while they were in a conversation. The random message did not interfere with the conversation between Huang and Mike as the game was progressing. Huang didn’t seem to notice the random message from Mike. For instance, Huang received a message that was supposed to be sent to Duriana from Mike, indicating that Mike was up for anything that Duriana was proposing. In the context of Mike and Huang’s conversation, this statement was insignificant compared to the relatively larger amount of non-random messages they were exchanging at the time.
With the random message system, unintended messages became distractions in conversations. The system leaked users’ messages to unintended recipients and clearly should be identified as a privacy risk. It mimicked the scenario in which users’ personal messages got read by someone, who was not the intended recipient. It was intended to test out how the users may respond to others when their personal messages have been leaked. We can see most users found these situations out of the context. To be able to communicate with these strangers in unintended conversations, some people required a few messages to adapt, while others may just stop and do not engage with the strangers. In the context of the game, the results also suggested that with different conversations and relationship between the players, the consequences could be as like little to nothing happened as mentioned above in Huang and Mike’s conversations; or it could initiate a new conversation like in the case of Joshua and Mike. However if two individuals had no interests toward each other, the conversation might be ceased; it could affect the result of the conversation in a negative way, such as in the case of Yoshima and Rebecca, resulting in the termination of the conversation.

**HOW CONSCIOUS ARE USERS OF PRIVACY ISSUES?**

As reflected in some of the examples above, the participants weren’t very aware of the privacy issues inherent in the application. As for those who were aware of the issues, they tended to continued using the application to exchanged messages with other participants. These results showed how little they modified their behaviours and conversations to protect themselves from potential harm.

As mentioned earlier, the low level of awareness of the privacy issues in the game
may be caused by the design of the application as well as the setting of the game. The less intrusive design and the reference to IM have created an intuitive experience to the participants. Many social networking applications, such as Facebook and MySpace the participants have experienced, provide simple fun and informal forms of interactive user experience. As the participants had become more accustomed to such interaction style, they may take on less serious attitudes toward the application during the game-play, which in turn led to low levels of awareness of the privacy issues involved. While the participants were enjoying the experience, they gave away their private information without considering who the recipient might be. Such action could be problematic in real life situations, as it may cause potential harm to other users and members of the public generally. Therefore users should be more aware of privacy risks and manage their privacy in social networking applications.

**How may users protect themselves?**

The application was built without the privacy protection features, and this was not identified as privacy issues by most participants in the game. In reality many social networking applications are usually equipped with powerful and sophisticated privacy protection features. They are great guards to keep harmful privacy invasions away from the users. However, in most cases, these settings need to be fully configured in order to protect the users, and sometimes they are difficult to utilise for non-technical users. Users may neglect or mis-configure the settings, which could result in potential failure of the system’s privacy protection. Luckily, system designers are constantly trying their best to make the learning of configuring these settings less intrusive as possible and are constantly improving the privacy features to protect users. Users have responsibilities to learn and
employ these features to protect themselves.

The project’s results have also suggested that the participants weren’t very aware of the unintended messages delivered by the system. This indicated that users were not fully aware of what they are sharing privately and publicly. To be able to protect themselves from exposing private information publicly or unintentionally, users should try their best to be aware that the information they are sharing with one individual or could also be shared with the world. Through this awareness, users can identify what is public knowledge and what is private, and they can modify the privacy settings of the application according to their own preferences.

From the conversations in the game, we could see a number of unintended messages were exchanged. The participants handled these messages differently, which suggested that when encountering unintended intrusions such as unintended messages from a stranger, users should treat them with caution. As the conversation may start with some intentions by the senders, the recipient should learn about the senders’ intentions before giving away their private information. As indicated in the game, stopping conversation when in doubt may be a good way to prevent potential harm.
CONCLUSION

Throughout this project, I put a strong focus on how users perceive and manage privacy issues in mobile messaging. By hosting a role-playing game, I was able to create a fictional scenario, which simulated a social networking environment with some potential privacy issues for the participants to engage in. I was also able to draw out some very interesting results about how the users perceived and managed privacy from the game play, conversation history, and the survey questionnaires.

From the game and previous studies (Harper, Lamming, & Newman, 1992), we understand that privacy means different things to different people in different situations. With new technology, such as social networking applications in mobile messaging, users are engaging in new paradigms of communication with others, which is different from their experience with traditional mobile messaging such as SMS, EMS, and MMS. Specifically, in social networking mobile messaging, users may get confused because of new technical features and difficult to configure privacy settings. When talking about privacy issues in this specific area, users may use their previous experiences in technology devices as guidelines to manage their privacy in these applications, which may not be sufficient for the new technology. While the users learning how to use the applications, they will also learn to manage their privacy in the applications. It is a transitional period from their previous experience to the new experience as well as a learning process for the users.

The boundary of what is private and what is public in these kinds of new
technology may not be well defined by the users. They may not fully understand the need of protecting themselves from potential privacy invasions. Users will have to adopt new rules, learn to realise whether the information they put up is shared in public or private domains in social networking mobile messaging. Furthermore, during this process, users should be prepared to face the consequences caused by their unawareness of privacy issues in the applications.

On the other hand, the designers and developers who have created the application have the best knowledge of the applications, and they have been putting in a lot of effort to make these applications fun and easy to use, and effortless to integrate with our lives.

However, the configuration of privacy settings in these applications may still be difficult for users to understand and handle. In order to better protect users’ personal information and raise awareness of privacy issues, more effort will be needed to develop less intrusive configuration in these social-networking applications.

Users at the same time have to be sufficiently aware of the privacy issues in these applications, before they can manage them. They can better protect themselves either by self-regulation, by system settings and by laws.

As researchers, we shall continue to investigate privacy issues in new technology applications such as mobile internet messaging and develop guidelines for users to identify what’s private and what’s public in these technology items. Therefore users can protect themselves from unforeseen harms. This especially applies to
younger generations, who are much more attached to new technology. New privacy educational frameworks should be developed and introduced in order to help guardians and teachers to guide young people to self-regulate and manage their own privacy.

Even with more than ten years of user experience on mobile phones and with my undergraduate multimedia background, I find there are numerous aspects of mobile phones that can be investigated further. It is not possible to know everything about mobile phones. The technology of mobile phones has been constantly evolving; new features and possibilities are introduced all the time, which usually may create new problems and define new territories of research interests. This has become one of the limitations and difficulties for researching in technology.

I also realise that, the research of technology in a boarder perspective is about combining theoretical foundations and hand-on practices, which may result the research process being too complex. It is also difficult to keep up with the pace of technology advancement. This is because much of the literature about research is already out of date by the time it is being published, especially with regard to journal papers which can take up to three years to be published. I started this project two and a half years ago. Numerous developments have taken place in mobile phone technology since then. The use of internet messaging systems is now the mainstream. This was not the case two and a half years ago. Moreover, in this long journey of exploring and experimenting with mobile phone privacy, I have discovered more than I could have imagined two and half years ago. All of which makes me even more interested to see what will happen in the future, what
will happen to the kids of our generation, and how they will manage their privacy in this constantly developing mobile technology, as in comparison with when I was a kid who was given his first mobile phone.
REFERENCE


http://www.investaustralia.gov.au/index.cfm?id=9A0C9842-D0B7-180C-16403701E984FDFB


Triki, A., Piquet, S., & Trabelsi, I. (2004). MOBILE TELEPHONY AS A TOOL OF DIRECT MARKETING :

POTENTIALITIES AND PROBLEMS OF IMPLANTATION.
APPENDIX

Appendix 1 - Role-Playing Game Survey

1.0. Section 1: User experience

1.1. Did the software program remind you of normal instant messaging (IM) program?
☐ Yes ☐ No

1.2. What was the level of overall satisfaction of your experience using the program?
☐ Very pleasant ☐ Pleasant ☐ Normal ☐ Not good ☐ Terrible

1.3. Any other comment on the program?
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2.0. Section 2, Privacy issues

2.1. Did you experience any privacy concerns when you are using IM program on mobile phone?
☐ Yes ☐ No

2.2. Do you have any privacy issues using this program?
☐ Yes ☐ No

2.3. If you did, can you please describe the issues.
____________________________________________________________________________________
____________________________________________________________________________________

2.4. When you realised there was a privacy problem, what did you do?

______________________________________________________________________________________

______________________________________________________________________________________

3.0. Section 3, Relationship forming

3.1. In the experiment, did you receive message from a person you did not initially talk to?

☐ Yes    ☐ No

3.2. If yes, briefly describe your reaction to the message.

______________________________________________________________________________________

______________________________________________________________________________________

3.3. Did you form a new conversational relationship with that unknown person?

☐ Yes    ☐ No

3.4. Did this relationship interfere your other existing relationships? If yes, please describe a example.

______________________________________________________________________________________

______________________________________________________________________________________

______________________________________________________________________________________
Appendix 2 – Character Profiles

Chloe, America, NYC

Chloe is a 16 years old girl, who is attending high school in New York City. She loves to online chatting with friends and other people. She is the generation that was born with the Internet. She has a MySpace account, and loves pop music and action movies. Sadly, she just lost her first love (He dumped her).

Katherine, Australia, Melbourne

Katherine is a 21 years old university student, who is studying fashion design in RMIT University. She is Joshua’s girl friend and very serious about this relationship. She is deeply in love with Joshua and very emotionally involved with little things. She listens to indie music and writes poems.

Joshua, Australia, Perth

Joshua is a 22 years old university student, who is studying commerce in University of Western Australia. He is originally from Melbourne, because of study, he moves to Perth. His current girl friend is Katherine, who is still in Melbourne. Joshua is a handsome boy, who knows how to charm girls.

Mike, England, New Castle

Mike is programming engineer of a big company in New Castle. He used to study at Beijing University, where he met Huang, his best friend. He loves to talk about world politics and girls with Huang. He is single and too busy with work for a girl friend.
**Huang, China, Guangzhou**

Huang is unemployed engineer in Guangzhou. He also studied at Beijing University, however, unlike Mike, he failed to graduate, and eventually dropped out of university. He has a wealthy girlfriend who financially supporting him at the moment. He loves to talk about girls with Mike, but not world politics. He has never told Mike that he doesn't like talking about world politics.

**Duriana, South Africa, Johannesburg**

Duriana is a 20 years old British girl living in Johannesburg. She is studying information technology in university of Johannesburg. She just met Joshua online, and developing a slight interest in Joshua. She doesn't know Joshua has a girlfriend. She is planning a exchange study to other countries.

**Yoshima, Japan, Tokyo**

Yoshima is a 30 years old Japanese office worker in Tokyo. He has an average salary and living in small size apartment. He is good at English, and that is the reason he got his job. He is doing over-time. The job is boring. And he is longing for an escape from his current situation.

**Rebecca, Israel, Jerusalem**

Rebecca is 13 years old junior high student. She just turned 13, and as her birthday present, she received a mobile phone with Internet access. She is new to this territory, and find it very exciting to know everyone online and willing to talk to any one. She is a very active person and has a great interest in Asian culture.
## Appendix 3 – Conversation History Log

<table>
<thead>
<tr>
<th></th>
<th>Chloe</th>
<th>Duriana</th>
<th>Huang</th>
<th>Katherine</th>
<th>Mike</th>
<th>Yoshima</th>
<th>Rebecca</th>
<th>Joshua</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sent to Joshua:</strong></td>
<td>U wana come stay here</td>
<td></td>
<td></td>
<td></td>
<td>r u</td>
<td>I’m in melb now, well u got any facebook?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Where in japan are you</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sent From Joshua:</strong></td>
<td>Would love to</td>
<td>Hi</td>
<td>U talkin 2 me?</td>
<td></td>
<td>My home town is in melb too</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Where you</td>
<td></td>
<td></td>
<td></td>
<td>Lets hang out sometime</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>My gf just dump me</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chloe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sent to Mike:</strong></td>
<td>Hey mike</td>
<td></td>
<td></td>
<td></td>
<td>I like your name</td>
<td>Hello mike, are u hot?</td>
<td>Cool are u single?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shit man did u see that hot chic outside with the beard! She was full on digin ur hairy chest!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How are u</td>
<td>Hey i funked uni. Can i chill at ur crib for a while?</td>
<td>In japan many men pretend be woman</td>
<td></td>
<td>Really? U free tonite?</td>
<td>U are a guy too?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I swear i wont hit on ur sis, shes all urs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>You jewish?</td>
<td>Talk to me baby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wana meet up for coffee tonite</td>
<td>Hey i need help</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Yea mate. Can i stay at ur place?

Hey there. Want to hook up?

I dropped out of uni
Let me stay

Sent From Mike:
hey :-)   hey   [emotion icon] hearted  ha ha yeah mike is a sexy name aint it  [emotion icon] tough  well

hey u der   hell yeah does she have a BEARD that so turns me on  i like ur name  [emotion icon] tough  thats for u to find out  technically no

[emotion icon] hearted   shut up jaime  nai IM working tonight a little busy  r u pretty good now that im talking to u   yeah sure im up for anything baby  let me check

i m WAT EVER RACE U LIKE ME TO BE   hey buddy wat u think of the new us president  really thats interesting so do u suspect me too  [emotion icon] hearted

yeah im working late today  hallo  I am aussianese. The fushion of both. What are you?  [emotion icon] tough  How are you?  only at night baby

Chloe  Duriana  Huang  Katherine  Mike  Yoshima  Rebecca  Joshua

Sent to Rebecca:  
Hey mike  

84
<table>
<thead>
<tr>
<th></th>
<th>Hello</th>
<th>I used to study at the beijing uni</th>
<th>thats for u to find out</th>
<th>[emotion icon] cry</th>
<th>Im gd, are u single</th>
</tr>
</thead>
<tbody>
<tr>
<td>asl</td>
<td>But i dropped out. I need a place to live</td>
<td>well</td>
<td>I'm looking for english speaking girlfriend</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Hello</td>
<td>I like your name</td>
<td>Im in perth atm where r u now?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What language you speak</td>
<td>[emotion icon] hearted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yeh</td>
<td>Oh ok where are you from?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You jewish?</td>
<td>Oh ok me so sorry. Thought you a girl</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sent From Rebecca:**

<table>
<thead>
<tr>
<th></th>
<th>Shalom, how are u? Today i just got a phone. How exiting.. U free to talk</th>
<th>Yes. Shalom2</th>
<th>Shalom huang, are u chinese? Or aussie?</th>
<th>How are u katherine?</th>
<th>Hello mike, are u hot?</th>
<th>Shalom shalom, how u are today</th>
<th>Good. How are u?</th>
</tr>
</thead>
<tbody>
<tr>
<td>[emotion icon] confused</td>
<td>I speak eng and latin</td>
<td>I'm from israel, i'm in aus now.</td>
<td>[emotion icon] laugh</td>
<td>Really? U free tonite?</td>
<td>[emotion icon] laugh</td>
<td>Yes. How about u? I'm very outgoing and willing to meet new people</td>
<td></td>
</tr>
<tr>
<td>Yah. I'm half jewish half aussie. Hey do u play facebook?</td>
<td>Oh. U in australia now? Which part are u? I'm in brisbane now</td>
<td>U study fashion, wow that's impressive</td>
<td>Verry good. Konnichiwa!</td>
<td>I'm in melb now, well u got any facebook?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloe</td>
<td>Duriana</td>
<td>Huang</td>
<td>Katherine</td>
<td>Mike</td>
<td>Yoshima</td>
<td>Rebecca</td>
<td>Joshua</td>
</tr>
<tr>
<td>Duriana</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sent to Duriana:</td>
<td>I dropped out of uni and i need a place to stay</td>
<td>hey u der</td>
<td>Yes. Shalom2</td>
<td>hi again</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Let me stay</td>
<td>[heart face]</td>
<td>[cry]</td>
<td>Good. How are u?</td>
<td>cool are u single?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pretty good now that im talking to u</td>
<td>no cam</td>
<td>Verry good. Konnichiwa!</td>
<td>read my profile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>yeah sure im up for anything baby</td>
<td>i am in tokyo</td>
<td>I speak eng and latin</td>
<td>would love to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I guess we cant meet</td>
<td>[smile]</td>
<td>where you</td>
<td>i am from tokyo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sent From Duriana:</th>
<th>I in sth africa</th>
<th>Hey mike</th>
<th>ah! I know</th>
<th>Hello</th>
<th>asl</th>
</tr>
</thead>
<tbody>
<tr>
<td>U wana come stay here</td>
<td>How are u</td>
<td>you have msn or yahoo? we chat webcam</td>
<td>asl</td>
<td>im from joburg in sth africa</td>
<td></td>
</tr>
<tr>
<td>Wana meet up for coffee tonite</td>
<td>its ok then</td>
<td>You jewish?</td>
<td>my names duriana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>where in japan are you</td>
<td>yeh</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wow</td>
<td>where u from</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big place</td>
<td>oh</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chloe Duriana Huang Katherine Mike Yoshima Rebecca Joshua

<table>
<thead>
<tr>
<th>Huang</th>
<th>Chloe</th>
<th>Duriana</th>
<th>Huang</th>
<th>Katherine</th>
<th>Mike</th>
<th>Yoshima</th>
<th>Rebecca</th>
<th>Joshua</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sent to Huang:</td>
<td>I in sth africa</td>
<td>hey</td>
<td>Shalom huang, are u chinese? Or aussie?</td>
<td>Hi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U wana come stay here</td>
<td>hell yeah does she have a BEARD that so turns me on</td>
<td>I’m from israel, i’m in aus now.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shut up jaime</td>
<td>Oh. U in australia now? Which part are u? I’m in brisbane now</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yeah sure im up for anything baby</td>
<td>[emotion icon] laugh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hey buddy wat u think of the new us president</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sent From Huang:</th>
<th>I dropped out of uni and i need a place to stay</th>
<th>Shit man did u see that hot chic outside with the beard! She was full on digin ur hairy chest!</th>
<th>I am aussianese. The fushion of both. What are you?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let me stay</td>
<td>Hey i funked uni. Can i chill at ur crib for a while?</td>
<td>I used to study at the beijing uni</td>
<td></td>
</tr>
<tr>
<td>Talk to me baby</td>
<td>Hey i need help</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yea mate. Can i stay at ur place?</td>
<td>But i dropped out. I need a place to live</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hey there. Want to hook up?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I dropped out of uni</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sent to Yoshima:</td>
<td>Chloe</td>
<td>Duriana</td>
<td>Huang</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>ah! I know</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ha ha yeah mike is a sexy name aint it</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>you have msn or yahoo? we chat webcam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[emotion icon] toughn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>its ok then</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verry good. Konnichiwa!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>where in japan are you</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big place</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sent From Yoshima:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In japan many men pretend be woman</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[cry]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no cam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i am in tokyo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I guess we cant meet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[emotion icon] hearted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oh ok where are you from?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oh ok me so sorry. Thought you a girl</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 4 – Survey Summary

<table>
<thead>
<tr>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
<th>Participant 7</th>
<th>Participant 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Did the software program remind you of normal instant messaging (IM) program?</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>1.2 What was the level of overall satisfaction of your experience using the program?</td>
<td>Terrible</td>
<td>Normal</td>
<td>Not Good</td>
<td>Normal</td>
<td>Normal</td>
<td>Pleasant</td>
<td>Normal</td>
</tr>
<tr>
<td>1.3 Any other comment on the program?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It worked 3 times when there were about 6 people on. When there are 8 people on, no luck in at all!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard to navigate, can't talk to multiple person at the same time. Random comment just pops out</td>
<td>I guess because of mobile phone, it is annoying to keep typing</td>
<td>Navigation is fiddly - too many steps to send a message!</td>
<td>The text option was pretty difficult to use to send the text was annoying, have to scroll down to &quot;ole&quot; button</td>
<td>It takes a while to refresh the program and it seems doesn't work properly.</td>
<td>people drop out, interference with chatting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Did you experience any privacy concerns when you are using IM program on mobile phone?</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>2.2 Do you have any privacy issues using this program?</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>2.3 If you did, can you please describe the issues.</td>
<td>someone said they my phone/name on their phone</td>
<td>it's using Bluetooth… that means the person you are chatting with is near you. Sometimes people are not ready to meet that soon.</td>
<td>There are random people start talking to me and it doesn't make sense</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4 When you realised there was a privacy problem, what did you do?

| I can't do anything. But I will change my mobile name next time | nothing because it was just a test. In reality I think I would still have the application running but be very cautious of what I say because I don't want to offend any one near me.. ( not as free as IM ) | ignore | I think I would change my profile and identity to cover my identity |

3.1 In the experiment, did you receive message from a person you did not initially talk to?

| no, cuz no one else was start talking | yes | yes | yes | yes | yes | yes | yes, most people |

3.2 If yes, briefly describe your reaction to the message.

| I as quite happy, but curious about the person's intention | was expecting this kind of thing to happen in public space, so it is fine | the message was funny, fun and the overall conversation was pleasant | feeling exciting and interesting | confused, new software |

3.3 Did you form a new conversational relationship with that unknown person?

| no | yes | yes | no | yes | yes | no | yes |

3.4 Did this relationship interfere your other existing relationships? If yes, please describe a example.

| didn't get on | no, but in reality the above mentioned privacy issue will apply | no, because my girlfriend character completely ignore me | not really, nice to know new person | no | no | no |