THE INFLUENCE OF SOCIAL IDENTITY WHEN DIGITALLY SHARING LOCATION

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ABSTRACT

By enabling users to self-report their whereabouts and share it with a vast and diverse audience, location sharing systems can be useful means of projecting the self and expressing one's social identity (an individual's personal self-conception). Through three research studies, this thesis investigates how social identity influences the digital sharing of location. It does so by first exploring how people socially interact offline and then investigates how facets of this behaviour are enacted in location sharing systems. Thus, it offers insights into how offline social behaviour extends to digital spaces and how it impacts social interaction in the digital realm.

The first study, a user survey, explores how social identity is manifested in current 'location-aware' social media. Analysis reveals that for many participants, identity is comprised of personality, character and hobbies and interests; all are part of identity and are reflected by location. Evidence is also found for impression management and tensions about identity management are discovered.

The second study explores the impact of targeted sharing, based on facets of identity, on location sharing behaviour through the comparison of two location sharing apps. In the first app, users shared to a generic friends list. In the second app, contacts were organised based on three life-modes: 'social', 'professional' and 'family'. Statistical analysis revealed that users shared more locations overall with the second app, with this difference being statistically significant. Post-study interviews showed that they also felt more comfortable with this app. Sharing required less thought because users could be more open and intimate.

Through the repertory grid technique, the final study investigates how different location sharing situations are perceived and interpreted. Using this information, the study then explores the particular audiences most likely (and least likely) to be shared with in different location sharing scenarios. Finally, the specific reasons for sharing to particular contacts are probed, revealing how location sharing decisions change as people enact different facets of their identity.

This thesis finds that social identity not only influences digital location sharing, but in systems that enable social networking, is the very driving force behind the phenomenon. Users actively exhibit their identity through their location, using it as a means of communicating moods, emotions, activities, and experiences. Social

identity impacts the places likely to be shared and those places, in turn, reflect one's identity by revealing much about an individual's personality and lifestyle.

This research also discovers that aspects of offline social behaviour have not been replicated particularly well in the online world. Conventional location sharing systems often require users to broadcast their content to one homogenous 'friends' list. This model overlooks some of the key components of offline social behaviour such as multi-faceted identities, context-specific behaviour and the heterogeneity of human relationships. This can result in challenges when attempting to manage different facets of identity and can heighten anxieties about sharing as a whole. Recommendations are made on how such issues can be mitigated in future platforms.

By researching how offline social behaviour is manifested in online spaces through digital location sharing, this thesis has implications for the design of future location sharing systems. By studying human interaction in digital environments, it also contributes to the Human Factors and HCI disciplines.

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CHAPTER 1
INTRODUCTION

1.1 RESEARCH BACKGROUND

Technology is pervasive in urban environments, from portable devices such as mobile phones and laptops, to in-car navigation systems, to self-help systems in supermarkets: the use of technology is very much an intrinsic part of everyday life. This technology is not something external to the environment, nor something layered on top of it (Dourish, 2006), but rather one which is enmeshed within the very culture and social practice of that environment (Williams & Dourish, 2006). It is a means through which urban space is encountered and how it is read and interpreted (Brewer & Dourish, 2008). Further, through the collective, technology-assisted movement of people through urban cities — that space, in turn, is given life and meaning (Dourish et al, 2007).

Locations sharing technologies, in particular, do not view urban environments as chaotic, as something to be overcome, but rather as opportunities for new interactions and experiences (Dourish et al, 2007). In this sense, they can add to the very legibility of urban space (Williams & Dourish, 2006). Apps like Foursquare[1], Yelp[2], and Tinder[3], for example, create opportunities for urban environments to be reinterpreted through the discovery of new places and people. They are part of an emerging group of location-based technologies that view urban movement not as an obstacle but rather as something to be exploited in the exciting endeavour to create new, powerful interactive experiences. Thus, through the use of location sharing technology, "people may not just find their way, but find *more than their way"* (Dourish et al, 2007).

Until recently, digital location sharing was primarily a one-to-one activity where users responded to explicit location requests. Now, location sharing is a one-to-many process (Tang et al, 2010), enabling users to share content to a potentially boundless audience (Marwick & Boyd, 2010). For this reason, location sharing has transformed from being purpose-driven to being social-driven (Tang et al, 2010). This

[1] https://foursquare.com
[2] http://www.yelp.co.uk
[3] https://www.gotinder.com

transformation has given rise to location-based social networking apps such as Foursquare (now known as Swarm) that offer virtual rewards such as 'stickers' and 'mayorships' for those who frequent particular venues. Dating apps such as Tinder use GPS location to help find users potential 'matches' in their local area. Further, popular social networking platforms have seamlessly integrated location sharing features into their systems; for example, Facebook[4] and Google+[5] enable users to check-in to venues much like Foursquare, and Twitter[6] enables the 'tagging' of location. Social networking systems give users access a broad, diverse social network that in turn, naturally brings about greater social incentives. Barkhuus et al, (2008) observe that by sharing location, one is not simply communicating place, but also expressing moods, lifestyle and events. The sharing of location can have many social purposes including sharing interesting information and enhancing self-presentation (Scellato et al, 2011). As Cramer et al, (2011) state, by giving users more control over when and how their location data is shared, "location has changed from something you *have* (a property or state) to something you *do".*

The need to be loved and socially accepted is an intrinsic human need (Gangadharbatla, 2008). The socially-oriented features of location sharing software are perhaps some of the key reasons behind its widespread adoption (Roback & Wakefield, 2013). Research has observed that socialness induces enjoyment, which makes the continued use of that technology more likely (Roback & Wakefield, 2013). This phenomenon can, rather paradoxically, offset the privacy 'cost' of sharing location (Roback & Wakefield, 2013) and can lead people to forgo some privacy if a greater benefit is perceived (Tang et al, 2010).

Social interaction in digital environments is not unique and exclusive to that space but rather an extension of the social behaviour exhibited in the physical world. Engaging in social interaction, whether online or offline, is a means of enacting one's *social identity*. Part of the self-concept, a person's social identity is the public representation of the self (Cheek & Briggs, 1982) and can include socially constructed roles (e.g. father, husband, lecturer) as well as leisure activities, physical appearance and personality (Thoits & Virshup, 1997). Social identity is often expressed externally; people take aspects of internal selves and project them on to their social, public selves for others to view and perceive (Boyd, 2002). This form of

[4] https://www.facebook.com
[5] https://plus.google.com
[6] https://twitter.com

identity is fundamentally social, and is derived from and through social interactions with others (Thoits & Virshup, 1997).

Further, when interacting socially, people often put their 'best foot forward' by "packaging" (Schlenker, 1980) themselves in a way that is most appropriate to a given context or situation (Arkin et al, 1980). For example, a person might rigorously prepare for a job interview, actively rehearse a public presentation the night before, or adorn themselves in their best attire in preparation for a date. This type of behaviour is termed managing one's *self-presentation* and is motivated by the desire to portray particular self-images to an ever present audience (Buss & Briggs, 1984). Self-presentation is a pervasive part of social life and can have many benefits including attaining social power, achieving social and material resources and receiving social approval (Baumeister, 1982).

To this end, theorists like Goffman, (1959) have described social interactions as a type of performance, akin to that found in a theatrical setting. Much like a stage actor, people carefully exhibit and conceal aspects of the self to create the desired image in the minds of their audience (Buss & Briggs, 1984). This behaviour, however, is oftentimes not displayed to construct inauthentic, idealised versions of the self. Rather, our ability to convince others of competence in various parts of life is vital to our success and can have a profound influence on our future (Hogan & Briggs, 1986).

Just as people enact their social identity offline, selectively revealing parts of themselves and engaging in a social 'performance', it is logical to assume that this behaviour extends to digital social networking environments — spaces that are specifically constructed for social interaction to take place on a mass scale. In the case of location sharing platforms, users, alongside conveying themselves through text, imagery and video, can also share their physical whereabouts, making digital social interaction all the more interesting. The primary objective of this thesis, therefore, is to explore the influence of social identity when digitally sharing location. By influence, we mean how one's social identity is enacted through the sharing of location and thus, how it is manifested in location sharing systems. This research builds on the preliminary findings of Barkhuus et al, (2008), Tang et al, (2010), and Cramer et al, (2011) by further exploring the sociality of location sharing practices. It does so by specifically framing the discussion in the study of social identity as a theory.

We begin by first understanding how human beings engage in social interaction offline by discussing the social identity theory. Here, we explore the topic from a social science perspective by drawing upon relevant literature from the social and behavioural sciences. Next, we explore how social behaviour is exhibited in digital environments, including wider social media. After grounding the discussion in the various forms of social interaction, both offline and online, each research study then investigates the topic of social identity in relation to location sharing systems. The objective is to develop a deeper understanding of how social identity can impact and influence when and how location is shared. We acknowledge that social identity is a broad topic and that it would be relatively impossible to research the subject in its entirely. Instead, each research study teases apart aspects of the social identity theory and then investigates their manifestation in digital location sharing systems. Some of the topics explored include the relationship between identity and location, self-presentation and impression management.

This thesis also investigates the issue of digital identity management. It takes the view that rather than being singular, identity is faceted (Farnham & Churchill, 2011) and that people display different behaviour depending on the context. For example, behaviour in home, work and social contexts can vary considerably. It might be unwise, not to be mention unprofessional, for a person to display the loose, casual behaviour found in a social setting at their place of work. People evaluate different environments, and present parts of their identity that is most appropriate to a given situation. In essence, they segment the various facets of their life depending on the demands of the context. Offline, this is done with very little conscious effort (Boyd, 2002). Managing one's identity online, however, is a lot more challenging. Social media makes the problematic assumption that users have a singular identity that fits all situations (Farnham & Churchill, 2011). In social networking systems, multiple, diverse audiences are collapsed into one (Marwick & Boyd, 2010). This means that any information shared has the potential to reach beyond the scope and context in which it originated (Marwick & Boyd, 2010) and potentially reach unintended audiences (Litt et al, 2014). The mismatch between the information and the audience can have serious consequences such as breakdown of relationships and loss of employment (Wang et al, 2011). This illustrates that segmenting different facets of life online is not the subconscious process that it is offline. This problem can be exacerbated further in location sharing systems because one's physical whereabouts is shared along with other forms of media. Thus, the potential repercussions of inappropriate, unintended sharing can be even more severe, and can heighten

tensions about sharing as a whole. The first study explores the topic of identity management by uncovering how people manage different parts of their lives in location sharing systems. The second study then seeks to address the tensions in identity management through actual technology design.

The research conducted in this thesis is interdisciplinary, drawing upon methods and techniques from Human Factors and HCI disciplines as well as theories from social science where appropriate. By developing a greater understanding of how offline social behaviour influences the digital sharing of location, our aim is to inform the design of future location sharing systems.

1.2 RESEARCH PERSPECTIVE

Before moving on to the aims of each study, it is important to clarify the particular perspectives and assumptions of this research.

Firstly, the term social identity carries multiple definitions and can have different meanings depending on the social or behavioural science discipline (Brewer, 2009). Therefore, we take a very specific understanding of the theory. The form of social identity investigated in this thesis is the sociology-based interpretation of the term, one that is very much individual-focused and centred primarily on the individual's personal self-perception. Individual-level identities help answer the question "who I am" (Lappegard, 2007) and identifies the self *as* a kind of person (Thoits & Virshup, 1997). This is the part of a person's identity that includes but is not limited to, socially constructed roles, leisure activities, physical appearance and personality (Thoits & Virshup, 1997). The sociology definition of social identity is somewhat contrasted by the psychology-based interpretation which views the self in terms of membership with a collectivity. Originally proposed by Tajfel & Turner, (1979), this interpretation seeks to explain the identification of the self according to memberships to a social collective and can include ethnicity, religion and political affiliation, among others. Although parts of this research can be applied to collective-level social identity, it is the public, external expression of individual-level social identity that we are primarily concerned with.

Secondly, drawing upon the theories of other research (Farnham & Churchill, 2011), we hold the view that identity is not singular but faceted. Just as people take multiple roles in life, they also maintain multiple social identities that together form a self-

concept. This is not to suggest that the self is somehow inherently fragmented. Rather, the various parts of a multi-faceted identity become active depending on the situation and context. Through evaluation of the environment, individuals display particular aspects of the self that are deemed most appropriate to a given situation. A man, for example, can take the identity of a father at home, an academic at work, and a friend in a social environment, displaying different behaviour in each context. This behaviour is not conceited nor duplicitous, but rather a pervasive part of social interaction, and one that is vital to properly manage different facets of life and give each area its due care and attention.

Thirdly, although this research draws upon literature from social sciences such as sociology, it is very much in applied form. Such literature is used as a means of grounding the research in a theoretical discussion of social identity. It is the manifestation of this behaviour in digital location sharing environments that is actually researched. Thus, by seeking to inform the design of location sharing systems, the primary contributions of this research are made to the Human Factors and HCI disciplines.

Fourthly, digital location sharing lies at the heart of this research. Thus, it is important to clarify what is meant by the term. Location sharing has recently seen widespread adoption, not just in the bourgeoning market of location-based social networking and place discovery systems, but also in the integration of location sharing features into popular social media platforms. By location sharing, we mean the digital sharing of physical location via explicit GPS-based location sharing systems such as Foursquare, Swarm and Yelp, and that which is done through social media platforms that provide location sharing features such as Facebook, Google+ and Twitter. Location sharing is now a familiar form of digital information sharing across many forms of social media; thus, our focus cannot be on explicit location sharing technologies alone. We therefore use the terms location sharing, location sharing systems, and location aware systems interchangeably throughout this thesis.

Fifthly, this thesis primarily focuses on location sharing in urban environments and not rural contexts. Urban cities are perhaps the environments where technology-assisted social interaction is most ubiquitous. They are also the focus of many location-based social networks and place discovery systems. The findings emerging from this research are therefore grounded in an urban context.

Sixthly, the studies conducted in this thesis do not focus on specific age or gender groups in particular. This was to ensure that location sharing behaviour could be explored more broadly and the findings, therefore, generalizable to a wider population. However, the research lays the foundation for the subject to be investigated with more specific demographic groups as a possible avenue for future work.

Finally, much like Boyd, (2002), the social interaction studied in this thesis is framed in a British, Western context. This is not to say that insights into other environments are not equally as intriguing and valuable. Indeed, social media is just as ubiquitous in other parts of the world as it is in the western world. Yet, my lack of knowledge of other global contexts means that I cannot dutifully address them. This research may indeed have implications for digital social interaction in other cultures but, as a British academic, my knowledge and expertise do not extend beyond the western perspective.

1.3 RESEARCH AIMS

The primary aim of this research is to investigate the influence and consequent manifestation of social identity in the digital sharing of location. Each study explores the topic from different standpoints. This thesis aims to answer three main research questions. Each question is broken down into sub-questions in the respective study chapters.

RQ1. How is individual-level social identity exhibited through the digital sharing of location in current 'location aware' social media?

The first study explores how individual-level social identity is exhibited through the locations shared in current 'location aware' social media. By 'location aware', we mean platforms that enable the sharing of location such as Facebook, Twitter and Foursquare. By 'current', we mean those platforms available at the time of writing. The first study is exploratory in nature, taking the form of a web survey (N=189) distributed to location sharing users. It builds upon previous research such as Tang et al, (2010) and (Cramer et al, 2011) in investigating the sociality of location sharing but does so through the lens of social identity. However, unlike previous research, it specifically explores the relationship between identity and place by understanding how social identity is reflected in the locations shared by users.

It also investigates how people self-present through location sharing and how they engage in impression management.

Further, given the notion that identity is faceted (Farnham & Churchill, 2011), the first study also explores how identity is managed in location sharing systems. In the absence of the clear bounded contexts found offline, it seeks to uncover the strategies employed by users when negotiating the different facets of their life. In doing so, it seeks to evaluate the effectiveness of existing platforms in the management of identity. Quantitative data is analysed using factor analysis and qualitative open-ended questions are used to study the subject in greater detail, by capturing users' personal opinions and experiences of location sharing software. The findings from the first exploratory study then act as a basis for the rest of the research.

RQ2. What is the impact of targeted sharing, based on facets of identity, on location sharing behaviour in comparison to broadcast sharing?

The second study revisits the notion of multi-faceted identity by directly addressing the tensions surrounding identity management that were uncovered in the first study. It takes an interventionist approach by deploying technology in the field. The primary objective of the second study is to explore the impact of targeted sharing, based on facets of identity, on location sharing behaviour. The specific 'facets of identity' used are those commonly associated with home, work and social contexts. The study is experimental and comparative; two fully functional location sharing apps are designed: one where sharing is broadcasted to one, homogeneous audience and the other where sharing is organised according to three facets of identity. The apps are then used by participants in the field for a period of 14 days. Through technology design, the second study demonstrates an alternative approach for location sharing that recognises multi-faceted identity at its core, and assesses its efficacy in comparison to the broadcast sharing model of conventional location sharing systems. Quantitative usage data is subjected to statistical analysis and qualitative interviews are conducted to probe users' experiences further. Both location sharing approaches are evaluated and critiqued in light of findings and implications for future technology design are discussed.

RQ3. How are different types of location sharing scenarios cognitively perceived and interpreted and what are the specific audiences associated with them?

The third lab-based study concludes the research by investigating how different location sharing scenarios are cognitively perceived and interpreted. Using the repertory grid technique, the final study explores the personal meanings used to distinguish one location from another, and seeks to understand how locations are mentally categorised. The repertory grid technique has its roots in clinical psychology (Björklund, 2008); it is a means of exploring individuals' unconscious knowledge and bringing people's perceptions and interpretations of particular phenomena to the surface in an 'uncontaminated way' (Honey, 1979). In our case, different types of location sharing scenarios are presented to users and their personal meanings and interpretations of them are elicited through a series of exercises. The resulting data, termed 'mental constructs', give insight into users' inner meanings and conceptions when sharing location in different types of situations. The study then explores the specific audiences associated with different locations and the particular reasons for sharing locations with them. This process seeks to establish the factors that influence location sharing decisions in varying scenarios. Overall, by gaining a better understanding of how location sharing is interpreted from a cognitive point of view, the study has implications for the design of future location sharing systems.

1.4 MAIN CONTRIBUTIONS OF THESIS

This thesis makes several contributions to social media research:

- Builds on prior research on offline and online social behaviour by narrowing focus to digital location sharing. Through the lens of individual-level social identity, research helps understand how offline social behaviour influences and impacts the digital sharing of location. By virtue of it, also uncovers how aspects of offline behaviour (e.g. impression management) are manifested in online location sharing environments.

- Explores the relationship between identity and physical place, and how the two combine to provide the context and backdrop for digital location sharing disclosure. In doing so, uncovers the socially motivated behaviour of location sharing users and how it drives their location sharing decisions.

- Investigates how identity management takes place in the digital realm; specifically, how facets of identity are negotiated and managed in location sharing environments. As a result, unpacks the dichotomy between offline and online behaviour — particularly the notion of multi-faceted identities — how online spaces fail to recognise it, and the subsequent consequences on location sharing disclosure.

- Through technology design that enables actual user behaviour to be observed in context, demonstrates an alternative approach to sharing location specifically aimed at reducing tensions in the management of identity. Findings offer direction on how future location sharing systems can be built that recognise multi-faceted identities at their core.

- Facilitates a deeper understanding of how location sharing behaviour changes as different facets of identity are enacted. Research has implications for design of future location sharing technology, particularly in understanding the specific audiences associated with different location sharing situations and how users' sharing decisions change as they enact different parts of their life.

- Broader implications for the design of future location sharing systems.

1.5 MOTIVATION FOR RESEARCH

This research is not conducted purely from a technological standpoint, but rather draws upon theories from social science to develop an understanding of the impact of social identity on location sharing behaviour and vice-versa. As we have discussed, technology is not external to the physical world but rather situated and intertwined within it. In this sense, it is fair to assume that it might have a mutual, reciprocal relationship with that world. Just as technology is influenced by the social behaviour of people, so to does technology influence how people behave by offering opportunities for new interactive experiences. Indeed, location sharing systems are good examples of this because they fundamentally exploit movement through space,

thereby facilitating the legibility of that space and enable it to be rediscovered and re-interpreted.

This thesis is motivated by that fact that social interaction, in all its forms, is an inherently human phenomenon and thus a pervasive part of life. In traversing social environments, people actively exhibit their social identity, selectively self-presenting as they interact with one another and managing different parts of their life by maintaining bounded contexts. It is our view that because social identity is an inherent part of how we behave offline, it is therefore logical to assume that it is exhibited in digital social environments, the very spaces that are constructed to aid social interactions. The motivation for this research, then, is to understand how this occurs and to what extent social identity influences digital social behaviour, particularly digital location sharing. Further, the intriguing aspect of location sharing systems is that they almost blend the physical and digital realms. Although location is shared digitally, it emerges via and from physical space. This is prevalent in self-reporting systems like Foursquare that encourage exploration through urban space by requiring users to physically check-in to different places. Thus, the physicality of space is just as important as the digital form in which it is conveyed. It is the requirement of being present in physical space that ultimately gives that digital information context and meaning. This thesis aims to explore facets of this intriguing relationship.

Although social networking systems carry some resemblance with the offline world through the use of metaphors (e.g. “friends”, “share”, “tag”, “meet”), the physical and digital worlds are fundamentally different. Social networking tools use certain aspects of the offline world to increase the familiarity of digital space; yet, this is done primarily to aid technology design. Digital worlds are often constructed around technological possibilities and around users’ desires (Boyd, 2002). This means that by designing technology, assumptions are made about the meaning and relevance of concepts borrowed from the offline world. For example, in the physical world, the term ‘friend’ might carry connotations of closeness, familiarity and trust. On the other hand, a ‘Facebook friend’ may not necessarily carry the same meaning and can instead denote distance, unfamiliarity and a lack of trust — attributes not descriptive of a ‘real friend’. Similarly, the audience in offline social interactions is limited, often bounded by physical and temporal space. The online audience, however, is potentially limitless and can transcend the boundaries of physical space. Such differences can fundamentally transform how social communication is understood.

Any information shared, therefore, can exist in a context beyond which it originated and can reach a potential audience that is greater than what users can adequately perceive. Part of this research explores the issue of digital identity management, investigating the strategies employed and potential tensions experienced when managing multiple facets of the self in the digital realm.

This thesis seeks to understand the interplay between offline social behaviour and the digital sharing of location. By doing so, the design of future location sharing systems can be informed. Further, unpacking some of the differences as well as the similarities of the physical and digital world, the design of technology can be aided, particularly in the endeavour to bring social networking technologies closer in line with the offline social behaviour of people. After all, the success of any technology design lies not in the mechanics of the technology itself, but in how it is experienced by the ones for whom it is developed.

1.6 STRUCTURE OF THESIS

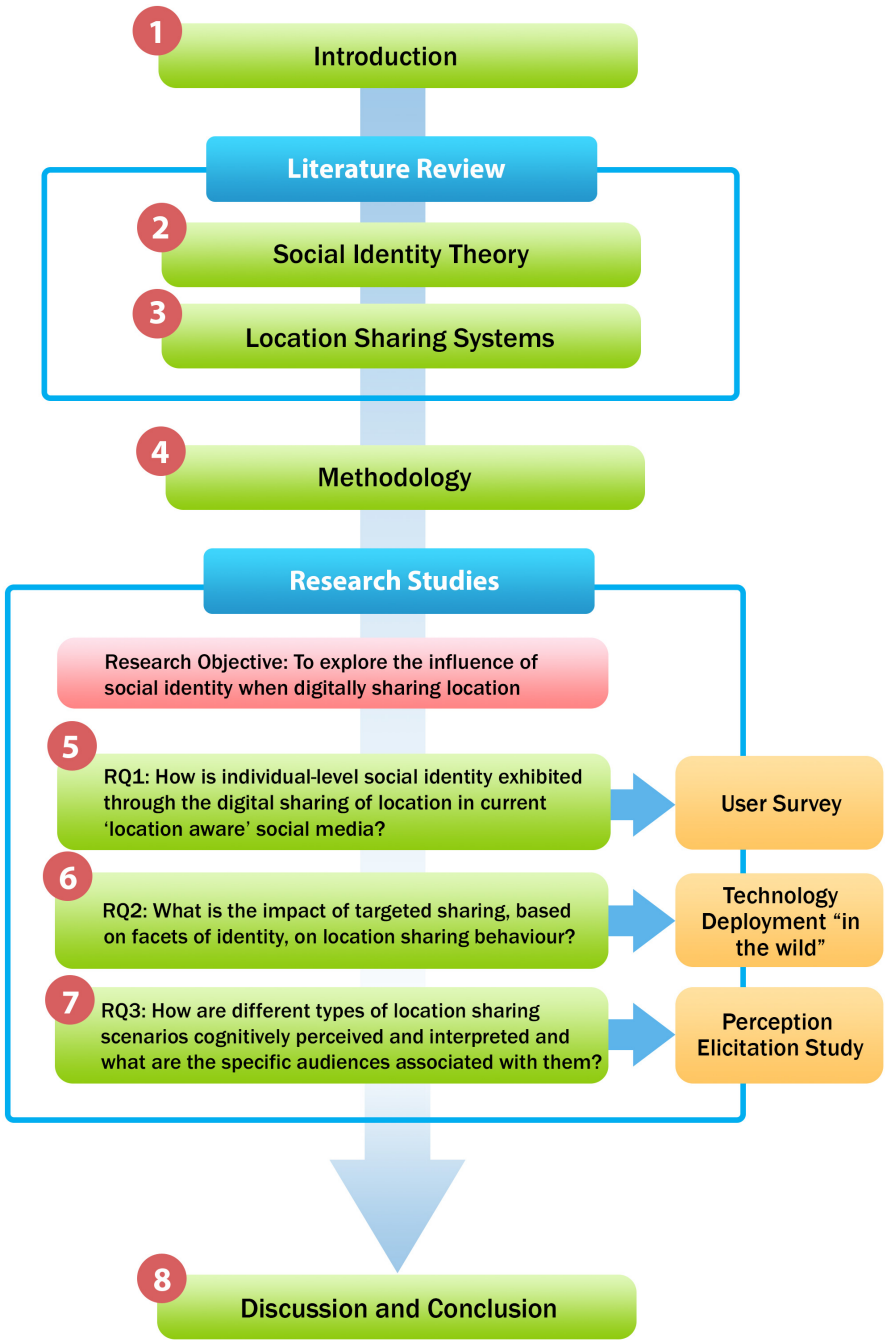

Fig 1.1: Thesis structure diagram (numbers indicate chapters)

1.7 SYNOPSIS

Chapter 1 provides a general introduction to the thesis. It outlines the central argument of the research, defines the aims, and presents the structure and synopsis of the thesis.

Chapter 2 is the first of two literature review chapters and sets the scene for the overall thesis. The concept of social identity, in its various manifestations, is discussed. It draws upon literature from both psychology and social science disciplines.

Chapter 3 is a review of the literature on location sharing systems. It looks at how and where locations are digitally shared from a technological standpoint, as well as discussing Human-Computer related issues such as privacy and the socially-driven behaviour of location sharing users. A discussion of literature on wider social media is also given where appropriate.

Chapter 4 provides an overview and critique of the various methods and techniques employed throughout the research. It highlights the benefits and limitations of each method and reveals why they were used at each stage. The actual implementation of each method is then further discussed in the relevant study chapters.

Chapter 5 describes a user survey study distributed to users of location sharing software (N=189). The study examines how social identity is manifested in current 'location aware' social media. It explores several topics including the relationship between location and identity, how identity is managed in location aware social media, and also looks at impression management in digital location sharing.

Chapter 6 describes an experimental study that examines the impact of targeted sharing, based on facets of identity, on location sharing behaviour. It does so through the design of two fully functional location sharing mobile apps that are then actively used by participants over a period of 14 days. Usage data is statistically analysed and face-to-face interviews are conducted to capture users' experiences overall.

Chapter 7 describes a lab-based study that explores how different types of locations are cognitively perceived and interpreted by location sharing users. The 'mental constructs' of users are elicited using the repertory grid technique. In addition, it also

explores the reasons for sharing (and not sharing) location in different location sharing scenarios.

Chapter 8 discusses the overall findings of the research and examines them in light of existing research. It also discusses the main implications of the research for the design of future location sharing systems. The main contributions of the thesis are highlighted, limitations of the work addressed, and potential avenues for future work are proposed.

CHAPTER 2
SOCIAL IDENTITY THEORY

To explore how social identity influences digital location sharing, it is important to first understand what is meant by the term social identity. Indeed, a thorough understanding of digital social behaviour cannot be developed without first understanding how social interactions take place in the offline world. Drawing upon literature from social sciences, the chapter starts with a discussion of social identity, explaining its meaning and construction, and reconciles between multiple definitions of the term. Then, some of the offline manifestations of social identity are discussed by first looking at the notion of self-presentation: how people, depending on the context and situation, selectively present different parts of the self in order to create desirable impressions. Self-monitoring behaviour, namely how individuals take cues from social settings to inform and regulate their own behaviour is also explored. The chapter concludes with a discussion of how people manage and negotiate multiple identities in order to segment the different areas of their lives.

Following a theoretical discussion of how human beings interact offline, the next chapter then explores how social interactions take place in the digital realm.

2.1 SOCIAL IDENTITY

What is the self? When small children are asked this question, they answer by indicating their bodies; the self therefore starts with the physical characteristics of the body (Baumeister, 1999). As people grow older, they start to perceive the self as something “inside”, something separate from the physical body, something that cannot be seen through visual inspection (Baumeister, 1999). A person’s self-concept, in the broadest terms, refers to “how the person thinks of himself or herself, that is [sic], the person’s own beliefs and ideas about the self” (Baumeister, 1999).

The self is constructed through a “process of social interactions with various communities, physical structures, environments, as well as with other humans and objects” (Morie et al, 2008). In interaction with the world, aspects of the self are selectively revealed to that world as afforded by the environment, the reactions of others, and the social structures surrounding the self (Morie et al, 2008). Meaning for the self, then, is derived from, and arises out of, the social interaction that one has

with others (Blumer, 1986). Such social interactions can be seen as enacting one's *social identity* (Cheek & Briggs, 1982).

Social identity is a theory that seeks to explain the psychology of the individual — the representation of the self — as well as the wider social structure in which the self is embedded. It is a concept that is familiar across all social and behavioural science disciplines. As a consequence, it has been invented and reinvented and thus, rather unfortunately, has no single, shared meaning (Brewer, 2009).

Social identity, as a theory, generally falls into two categories: "individual-level" identity and "collective-level" identity (Thoits & Virshup, 1997). Where individual-level identities help answer the question "Who I am" (Lappegard, 2007), group-based collective identities help answer the question "Who we are" (Tajfel & Turner, 1979). Sociologists have used individual-level identities to explain personal self-conception: the identification of the self *as* a certain kind of person. Psychologists, on the other hand, have used collective-level identities to view the self *with* a collectivity, claimed and enacted with or for other members (Thoits & Virshup, 1997). Both types of identities are fundamentally social because it is through social interaction that identities actually acquire self-meaning (Hogg et al, 1995). Without society and experience as a basis for reflexivity, there can be no internalized evaluation (Giddens, 1991). Both interpretations are examined, starting first with collective-level social identity.

Group-based social identity was introduced by Tajfel & Turner, (1979) to explain the belonging of people to some group or human aggregate (Ashforth & Mael, 1989) that defines and distinguishes it from other groups (Hogg et al, 1995). These are collective-level identifications that can include ethnicity, religion and political affiliation. For example, a woman may define herself in terms of memberships to social collectives: 'I am British', 'I am a Woman', 'I am a Christian'. The more individuals identify with a particular group, the more they seek to fit in (Seyranian, 2013).

To be considered a member, an individual does not need to expend efforts to internalise the groups goals and values, but rather only perceive themselves as psychologically intertwined with the fate of the group (Ashforth & Mael, 1989). Thus, group identification does not occur because of the inherent characteristics of group members but rather based on the collective classification that distinguishes the group

from significant others (Abrams & Hogg, 2004). It could be that “one may like people as group members at the same time as one dislikes them as individual persons" (Turner, 1984). As individuals increase in the identification with the group, the values and practices of the “ingroup” become more salient and perceived as unique and distinctive (Ashforth & Mael, 1989).

In contrast, individual-level social identities proposed by sociologists seek to explain a person’s individual self-perception. This approach is primarily centred around role-based identities. Role-based identities help define the self in relation to others (Stryker, 1980) and are influenced by societal norms and expectations (Brewer, 2009). This theory was initially proposed by Stryker, (1980) and posits that the self has distinct components for each of the role positions in society that people occupy (Hogg et al, 1995). For example, a person’s role identities may include the fact that she is a mother, a wife, a daughter, a social worker, and a blood donor (Hogg et al, 1995). Role identities acquire meaning through social interaction. As others respond to a person’s identities, those identities, in turn, develop a sense of self-meaning and self-definition (Hogg et al, 1995). They can consist of occupational role relationships (doctor-patient, teacher-student), familial relationships (parent-child) and close personal relationships (friendships and sexual partnerships) (Brewer, 2009).

Roles can encompass not only sociodemographic attributes (e.g. father, teacher, student) but also leisure activities (e.g. fitness enthusiast, stamp collector); dress, appearance or physical characteristics (e.g. slim person, homeless person, disabled); and even personality traits (e.g. honest, extroverted) (Thoits & Virshup, 1997). Because most social roles only loosely prescribe appropriate behaviour, they are not immutable, but rather are subject to improvisation and embellishment by individuals, potentially resulting in creative, individualised performance (Thoits & Virshup, 1997).

Theories pertaining to role-based identities view the self as being multi-faceted, composed by a set of discrete identities. In this sense, “persons potentially have as many identities as there are organised systems of role-relationships in which they participate” (Stryker, 2000). In other words, because the individual enacts multiple social roles, the self can consist of multiple social identities (Karelaia & Guillén, 2012). The notion of multiple social identities is discussed in more detail later in section 2.4.

Similar to other researchers such as Cheek & Briggs, (1982) and Froming et al, (1982), Boyd, (2002) argues that identity comprises of two components — one's internal identity and one's external social identity. Internal identity, in her view, is the "individual's self-perception in relation to their experiences and the world". She posits that while internal identity is constructed and maintained by the individual, social identity is perceived externally and is the effective expression of one's individual presentation. When socialising, people take particular aspects of their internal identity, and project it on to their social identity for others to view and perceive. Much like Hogg et al, (1995) and Thoits & Virshup, (1997), she acknowledges that social identity is inherently social, one that is read "in light of the body conveying it and the situation in which it is being conveyed", with the (social) environment playing a crucial role in the production and perception of social identity.

It is clear from the literature that there are two distinct interpretations of social identity — one psychology-based and the other sociology-based. Some researchers have argued for the merging of the two approaches because they are both primarily concerned with self-categorisation (Hogg et al, 1995). Indeed, even Tajfel, (1978) theorised that the individual and collective self exist at opposite ends of the same continuum with unique interpersonal behaviour on one end and common intergroup behaviour on the other (Abrams & Hogg, 2004). Most daily interactions, then, can be viewed as occurring at many points in between (Thoits & Virshup, 1997).

Given the multiple definitions of the term, it is important at this point to specify the particular interpretation of social identity used in this thesis. By social identity, we mean the sociology-based, individual-level identity as postulated by Thoits & Virshup, (1997) and Brewer, (2009). These are features that are part of a person's individual self-conception and includes, but not limited to, sociodemographic attributes, interpersonal styles, personal preferences or values, physical appearance, leisure activities and personality (Thoits & Virshup, 1997). Further, it is the public, social expression of these attributes (Cheek & Briggs, 1982) (Froming et al, 1982) via the "external self" (Boyd, 2002) that we are concerned with. Our objective is to understand how this type of social identity is expressed and manifested through the digital sharing of location. It is this definition of social identity that is employed throughout this research.

2.2 LOOK AT ME! SELF-PRESENTATION IN EVERYDAY LIFE

When enacting their social identity, in almost every area of life, people strive to present themselves in a favourable light. Whether it is job applicants carefully preparing for a job interview, or a salesman accentuating the particular strengths of a product, or young adults engaging in dating relationships by never disclosing their bad habits — people try, as much as possible, to 'put their best foot forward'. This type of behaviour can be described as managing one's *self-presentation*.

Self-presentation refers to the manner in which "individuals plan, adopt, and carry out strategies for managing the impressions they make on others" (Arkin et al, 1980). The basic premise of this theory is that individuals are highly concerned about winning the approval and avoiding the disapproval of others (Arkin et al, 1980). Self-presentation behaviour is usually goal-oriented; people present, exaggerate, and sometimes even fabricate their characteristics in order to create the desired impression in the minds of others (Guadagno et al, 2012). In other words, they attempt to carefully control their self-image by only presenting information about themselves that is conducive to this goal while concealing things that might be inconsistent with their desired image (Hausenblas et al, 2004).

Self-presentation is not only a pervasive part of life, but in many cases, vital to our success. It can have many benefits including attaining social power, achieving social and material resources and receiving social approval (Baumeister, 1982). The ability to convince others that we possess certain desired attributes can also have a profound influence on our future (Hogan & Briggs, 1986). As Brown, (2007) states "Who we marry, who our friends are, whether we get ahead at work, and many other outcomes depend, to a great extent on our ability to convince people that we are worthy of their love, their friendship, their trust, and their respect". Our innate need to create positive impressions on others is perhaps one reason why people spend billions of pounds a year on cosmetics and other appearance related products, (Brown, 2007).

Self-presentation is sometimes also referred to as impression management (Leart & Kowalski, 1990). Some authors, however, have distinguished between the two terms. Schlenker, (1980) defined impression management as an attempt to control self-image in order to increase the power of the individual; whereas self-presentation has been described as projected images that are more self-relevant. In this interpretation,

self-presentation can be seen as a more authentic representation of the self. For example, a person composing a CV might highlight their strengths to prove their applicability for a particular job role; a person constructing a social network profile might simply wish to convey an embellished but realistic representation of themselves. On the other hand, impression management can be seen as behaviour that seeks to *define a situation* (Goffman, 1959) by attempting to create particular favourable impressions. For example, in order to be perceived as social and gregarious, a person might post regular photos of themselves at parties; a person wanting to create an image of himself as a frequent traveller might post a plethora of holiday pictures. In both these scenarios, the primary objective is to create a specific image in the minds of their audience that may, or may not, be authentic or self-relevant. However, some authors have regarded self-presentation and impression management as twins (Buss & Briggs, 1984) and have used the terms interchangeably (Leart & Kowalski, 1990) (Singh & Vinnicombe, 2001) (Sheffer et al , 2001) (Lorenso-Dos, 2005) . Thus, we will continue with this convention throughout this thesis.

Impression management is a term originally coined by Erving Goffman (Goffman, 1959) to describe behaviours that seek to intentionally regulate the impressions that observers have of oneself (Lewis & Neighbors, 2005). Central to the impression management theory is the dramaturgical metaphor that seeks to explain how social interaction is a performance given to an ever-present audience (Buss & Briggs, 1984). In the words of Goffman, “When an individual plays a part, he implicitly requests his observers to take seriously the impression that is fostered before them.” In this sense, people mould their outward behaviour by taking into careful consideration the specific social context and target audience (Feldman et al, 2002). Much like a stage actor, Goffman theorised that when living their daily lives, individuals go back and forth between a “frontstage” and a “backstage”. A backstage is where the impressions enacted by a person’s performance are constructed. In other words, it is where much of the ‘behind the scenes’ work is done to keep up appearances (e.g. engaging in more open candid talk when socialising after work) (Hogan, 2010). The frontstage, described by Goffman, is the absence of the openness or candour displayed behind closed doors; it is where the actual performance of impressions, according to specific roles, takes place (e.g. lecturer, teacher, colleague) (Hogan, 2010). Managing impressions and presenting a ‘front’ not only involves verbal disclosure, but also includes physical appearance such dress and demeanour (Solomon et al, 2013).

Applying the dramaturgical metaphor to everyday life, stage roles can be equated to the social roles specified by society (Buss & Briggs, 1984). When enacting social roles, in addition to self-presenting, people also allow the expression of their individuality, personal feelings and personality traits (Buss & Briggs, 1984).

2.2.1 Techniques used to manage self-presentation

Individuals may employ a variety of techniques to selectively self-present. Jones & Pittman, (1982) developed a taxonomy of impression management techniques commonly used: self-promotion, ingratiation, exemplification, intimidation and supplication. Described by Lewis & Neighbors, (2005), self-promotion, as the name suggests is when individuals publically voice their achievements in order to appear competent in the eyes of others. Ingratiation is when individuals might try to obtain likeability from others through praise and flattery. Exemplification is when individuals might go above and beyond what is necessary in order to be perceived as diligent and hard working. Intimidation occurs when individuals display their power and authority in order to control others. Finally, supplication occurs when individual present their weaknesses and deficiencies in an attempt to receive support and compassion from others.

Bolino & Turnley, (2003) found that individuals differ in how they use such impression management strategies. In their study, one group of participants actively employed positive impression management tactics such as ingratiation, self-promotion and exemplification; a second group used aggressive impression management techniques such as intimidation; while a third group was more passive and reserved in their usage. They found that there were individual differences in the patterns of impression management demonstrated. They found that women generally tended to take a passive stance in their use of impression management relative to men while men opted for a more aggressive approach relative to women. They observe that those who employed positive and passive techniques were more likely to be viewed as desirable workgroup colleagues in comparison to those who took an aggressive approach.

Guadagno et al, (2012), in their study of online dating, reveal that men but not women tended to change their self-reported personality characteristics and physical appearance when they expected to meet a potential date. They were more likely to

exaggerate such characteristics when the method of meeting a potential partner was via email. Their findings are consistent with (DePaulo et al, 1996) who report that there are gender differences in how people lie; men lie for more self-serving purposes (e.g. to make themselves look good) while women report lying for other-serving purposes (e.g. to spare someone else's feelings).

Self-presentational concerns can also be associated with increased or decreased exercise behaviour. For some people, the need to exercise can be motivated by self-presentation such as losing or maintaining weight, improving muscularity, enhancing physical appearance and developing a fit and lean physique (Conroy et al, 2000). Some research has shown that individuals who are comfortable with the appearance of their body might not be anxious about exercising in front of others; however, individuals who are uncomfortable with their body can be anxious about exercising in public, which, ironically, might prevent them from participating in the very activity that will actually help them attain a fit and healthy physique (Hausenblas et al, 2004). Obese women, for example, report that the primary reason they avoid exercising in public settings is apprehension about being negatively evaluated by others (Bain et al, 1989). In addition, adolescent girls report that the primary deterrent for swimming in public pools was the potential embarrassment or presentation of their bodies (James, 2000). Thus, individuals who might have the greatest need to exercise might be the most reluctant to do so because of anxieties about how others would evaluate their appearance (Hart et al, 1989). These examples illustrate that self-presentation can involve both positive and negative motivations; the desire *to not* create a particular impression can be just as potent as the desire *to* create one.

The specific type of audience can affect how people self-present. Tice et al (1995) observe that self-presentation was more self-enhancing in the presence of a stranger than in the presence of a friend. Specifically, when interacting with strangers, people emphasise their positive attributes, but with friends, they shift more towards modesty. They observe that accentuating positive characteristics might be advantageous to people when beginning relationships because that is all the information that the audience knows about the self-presenter. However, in the case of an established relationship with friends, 'getting along' might take precedence. In addition, given their longer-term relationship, friends are more likely to detect invalid claims by the self-presenter if they are inconsistent with the person's actual behaviour. They conclude that the modesty tactic allows people to steer toward a "middle course" that allows people's past identity to remain intact whilst also avoiding irritating or

alienating one's friends. These findings are in line with Schlenker, (1975) who found that participants were cautious not to claim greater competency when future events could possibly invalidate a too boastful self-presentational stance. In contrast, when under anonymity, with little threat of future events, participants were found to uniformly engaged in self-enhancing tactics regardless of personal expectations of actual performance.

Further, the way in which a person self-presents can have an impact on how the audience views them. In their study of audience reactions to actors' performances, Schlenker & Leary, (1982) found that displaying modesty by downplaying a superior performance was viewed favourably by the audience, but only when claims followed performances. When actors claimed they *expected* to do extremely well and followed that claim up with superior performances, they were viewed as more competent, more truthful, less modest and were given a slightly higher overall evaluation. They conclude that, in addition to appreciating modesty, people admire those who make superior claims and 'back up' their words with actions. In other words, admiration is for those who can 'talk the talk, and then walk the walk'.

Given the literature discussed so far, one could view self-presentation as behaviour that primarily involves pretence, deception and illegitimacy (Schlenker & Weigold, 1990). Self-presentation is usually a conscious "packaging" of the self so that audiences can draw a preferred conclusion (Schlenker, 1980). Packaging can be seen as "arranging, interpreting, and weighting information about oneself in a fashion designed to create a desired impact on audiences, even though one might not usually arrange, interpret, or weight information in the same way (Schlenker, 1985). Some people might react to the term 'packaging' as though it is a euphemism for superficial, pretentious or deceitful conduct (Schlenker & Britt, 1999). However, Schlenker & Britt, (1999) argue that packaging is not necessarily false or untruthful but rather a "justifiable construction of reality" that is motivated by a person's particular goals and plans. Schlenker & Weigold, (1990) observe that this information is fundamentally true but merely "fitted to appropriate circumstances". They argue that just as a writer might edit information in order to present their thoughts in a concise, readable fashion, so to do people edit information about themselves in everyday life to, in essence, provide "the best description possible".

Schlenker & Britt, (1999) reveal that self-presentation can be very beneficial when done for the sake of others. In their experiment, they found that in order to make their

friends more desirable to the opposite sex, people shifted their descriptions of their friends to match people's expectations. If the attractive other preferred an extravert, their friends were described as such; if they preferred an introvert, they were told that their friend was an introvert. Further, in cases where the friend found the other to be unattractive, people shifted their descriptions in the opposite direction by suggesting that their friend was not the other's "type". They observe that friends are often singled out for helpful treatment because of their close relationship; people tend to exhibit greater concern for their friends' welfare and partly define themselves in terms of their relationship with those friends. The authors argue that "packaging" is pervasive throughout social life and can have many benefits. They conclude that impression management conducted to benefit others, such as "building their confidence, boosting their moods and enhancing their identities" demonstrates how it can be used not just for oneself, but also to help and assist others as well.

2.3 'I AM WHAT MY AUDIENCE IS' — SELF-MONITORING IN SOCIAL INTERACTIONS

In exhibiting their public selves, according to some theorists, people differ to the extent to which they monitor (observe and control) their expressive behaviour and self-presentation (Bono & Vey, 2007). Snyder, (1974) introduced the self-monitoring theory to explain how certain types of people 'monitor' the environment and present a public self that is consistent with the demand or expectations of a given situation (Bono & Vey, 2007).

Snyder, (1974) proposed that those 'high' in self monitoring are particularly sensitive to the expression and self-presentations of others and use these cues as a means for managing their own self-presentation accordingly (Kumru & Thompson, 2003). This is usually done out of a concern for "social appropriateness" (Snyder, 1974). In contrast, 'low' self-monitors have less concern for the appropriateness of self-presentation; their behaviour is controlled from within rather than being influenced by the current social situation (Snyder, 1974).

While the high self-monitor might ask "What is called for here?", the low self-monitor might ask "What would be most like me here?" (Dabbs et al, 1980). High self-monitors are particularly skilled at adapting their behaviour according to the demands of the situation (Bono & Vey, 2007) and can be described as "consummate social pragmatists" who are willing, and able, to craft images designed to impress others

(Gangestad & Snyder, 2000). The low self-monitor, on the other hand, is less influenced by the demands of social situations; their sense of self is driven by inner characteristics and personal attributes, insisting on a self that is “me for all times and places” (Kumru & Thompson, 2003).

Research has shown that high self-monitors are more socially skilled, more likely to engage in affiliation cues with others, and better able to manage their impressions than their low self-monitoring counterparts (Wright et al, 2007). They enjoy being different people in different situations. Turnley & Bolino, (2001) found that high self-monitors were effective in tactics involving ingratiation and self-promotion. In using such tactics, they were more likely to be viewed as likeable, competent and dedicated. On the other hand, low self-monitors were less effective in such tactics; they were more likely to be perceived as conceited and egotistical. Further, Bono & Vey, (2007) found that individuals high in self-monitoring are well suited for situations that require “emotional regulation”. Their study reveals that high self-monitors deliver effective emotional performances, display “deep acting” capabilities and report less stress when doing so (in comparison to low self-monitors).

Klein et al, (2004) conducted an intriguing study assessing the impact of self-monitoring on attitudes toward homosexuality. Participants were asked to take a measure of the self-monitoring scale and a measure of prejudice toward homosexuals. Participants were then told that they would discuss their answers with a group of people whose attitudes were either “favourable” or “unfavourable” towards homosexuals. They found that high self-monitors modified their attitudes to fit those of their audience. The higher the level of self-monitoring, the more likely subjects were to express attitudes consistent with those of their audience. The authors reveal that the relationship between self-monitoring and prejudicial expression is most positive when the audience is perceived as prejudiced. Consistent with other studies (Turnley & Bolino, 2001), (Kumru & Thompson, 2003), they conclude that the behaviour of high self-monitors is flexible and dependant on the situation they are faced with. High self-monitors might be motivated to conform to their audiences’ attitudes in order to gain social approval. In this pursuit, if conformity to a prejudicial perspective is more rewarding, high self monitors might engage in anti-normative behaviour (Snyder & Monson, 1975).

Wright et al, (2007) found that high self-monitoring was negatively related to intimate communication, satisfaction, and commitment in a romantic relationship. They

observe that, driven by a desire to fit into a given social situation, high self-monitors might be inhibited from showcasing their true selves in intimate interactions with their romantic partners. They might be concealing their true unhappiness to avoid conflict and argument. In contrast, low self-monitors are less likely to be motivated by impression management behaviours, leading to more honest and expressive behaviour that fosters more openness, especially during couple conflict.

Similarly, Snyder & Simpson, (1984) reveal that high self-monitors are less likely to show commitment to daily relationships; they express a willingness to engage in activities with partners other than their current dating partners; and are quite willing to terminate their current relationship in favour of an alternative one. They observe that, in the case of marital relationships, high self-monitors might view marital satisfaction as primarily being derived from a mutual enjoyment of shared activities. In contrast, low self-monitors might derive satisfaction from intimacy and companionship with their partner and thus derive pleasure from "simply being with one another". As a result, they conclude, low self-monitors might display greater commitment to relationships, potentially leading to stronger and more long lasting marital relationships.

2.4 MULTIPLE ME'S – MANAGING A MULTI-FACETED IDENTITY

As we have learnt, individuals can enact multiple roles and thus have multiple social identities that together form a self-concept (Karelaia & Guillén, 2012). For example, a woman may take the roles of a professor, wife, mother and friend. This phenomenon can also be described as a multi-faceted identity where different identities are performed depending on the context and audience (Farnham & Churchill, 2011). The particular behaviour attached to each role or identity can vary considerably. In an academic role, a person might be expected to be articulate and speak well in public; but in a parental role, that same person might be expected to be caring and nurturing toward their children. In order to enact each role effectively, people segment their lives into bounded areas, with each area dedicated to a particular role (Farnham & Churchill, 2011).

People make daily transitions between these domains, often tailoring their behaviour, focus, goals and interpersonal styles to fit the demands of each role (Clark, 2000). This process results in the creation of "slices of reality" that have different meanings for the one creating them; "home", "work", "church" are examples of such boundaries

(Ashforth et al, 2007). By segmenting domains, people are able to focus on the domain that is currently active and less on other domains (Ashforth et al, 2007).

Segmentation of life often occurs between work, family (Clark, 2000) and “third places” (Ashforth et al, 2007). Clark, (2000) observes that work and family life “can be likened to two different countries where there are differences in language or word use, differences in what constitutes acceptable behaviour, and differences in how to accomplish tasks”. Similar to Farnham & Churchill, (2011), she argues that people construct “borders” — lines or “mental fences” (Zerubavel, 1991) that demarcate domains, defining the point at which domain-relevant behaviour begins and ends.

These borders, according to Clark, (2000), are of three types: physical, such as the physical walls of a workplace or home, temporal (time-bounded) such as work hours and family time, and psychological borders which are rules constructed by individuals that dictate “when thinking patterns, behaviour patterns and emotions are appropriate for one domain but not the other”. She also argues that borders can be permeable and flexible. Permeability dictates “the degree to which elements from other domains may enter” (Beach, 1989). Flexibility is concerned with the “degree to which a border may contract or expand”(Hall & Richter, 1988).

Nippert-Eng, (1996) proposes that people manage their domains along a continuum, with ‘integration’ on one end and ‘segmentation’ on the other. A person who has highly integrated domains might not distinguish, to a great degree, between them and might allow one to ‘spill over’ into the other. For example, a parent working from home might have to stop the task at hand to attend to the needs of their children. Ashforth et al, (2007) state that segmentation and integration can have costs and benefits. The primary benefits of segmentation are that it reduces “blurring” between roles, in that roles are adequately distinguished allowing people to concentrate on one role at a time. The primary cost, they argue, is the magnitude of transition between one role to another. On the other hand, high segmentation might make transitions relatively easy, but “blurring” might be more frequent with interruptions potentially frequent, resulting in difficultly maintaining proper segmentation.

Transitioning between roles, particularly those that are more segmented, involves “rights of passage” (Ashforth et al, 2007) that facilitate the transition. For example, taking a shower in the morning and changing clothes in preparation for work. This is similar to Ozenc & Farnham, (2011) who found that transitions from one area of life

to another were concurrent with external transitions, such as moving through time or physically moving from one place to another.

To this end, each role has an entry and exit (Ashforth et al, 2007). Role entry involves psychologically and perhaps physically becoming engaged in the role, for example commuting to work and physically entering the office building. In contrast, role exits can be triggered by "rites of separation" (Ashforth et al, 2007); for example, a person returning from work, dressing in home attire and switching on the TV.

The greater the contrast between different role identities, the greater the difficulty in transitioning from one role to another (Ashforth et al, 2007). For example, a manager might bring the same managerial, decisive behaviour required at work, into their family life. Similarly, a didactic, instructive teacher might display similar behaviour at home because of a difficulty in "switching cognitive gears". Research indicates that the moods, stress and thoughts generated into one role, can often influence or spill over into another (Marshall et al, 1992). The challenge, then, is not just in the practicalities of role segmentation, but also in making the psychological and emotional changes required to fully and appropriately give each role its due.

2.5 CHAPTER SUMMARY

This chapter has explored social identity in its many guises and manifestations. The term mainly falls under two definitions: one psychology-based and the other sociologist-based. Psychologists, in particular, view social identity as being on a collective-level (Tajfel & Turner, 1979), one's self-perception in accordance to group memberships. Sociologists, on the hand, argue that social identity is more individual-level (Thoits & Virshup, 1997), one that is maintained by the individual and enacted through social interactions with others. In this definition, social identity can include socio-demographic attributes, leisure activities, physical appearance and personality. As discussed, it is the public expression of this individual-level social identity that is used throughout this thesis.

When engaging in social interactions, people 'package' themselves (Schlenker, 1980), selectively revealing aspects of the self according to the situation and context. This strategy is termed, interchangeably, as both self-presentation and impression management (Leart & Kowalski, 1990). It is a pervasive part of social interaction and

can have many benefits, not just for oneself, but for others as well (Schlenker & Britt, 1999).

Further, certain types of personalities are more sensitive to the demands of their social environment and can adapt their behaviour and give a ‘face’ most appropriate to the current social situation (Bono & Vey, 2007). This type of behaviour can be described as self-monitoring (Snyder, 1974). High self-monitors have a high concern for social appropriateness and are motivated by a sense of ‘fitting in’ with their audience. Low self-monitors are less influenced by such factors and are driven more by internal beliefs and principles.

Finally, rather than being singular, identity is faceted (Farnham & Churchill, 2011); it is perfectly normal for people to have multiple social identities just as much as there are different roles in society (Karelaia & Guillén, 2012). In addition, people often make daily transitions between home, work and third places (Ashforth et al, 2007). In managing their lives, people vary along a continuum (Nippert-Eng, 1996) — some choosing to live highly segmented lives, and others highly integrated ones. For segmented lives, some people can experience challenges when transitioning from one domain to another. For integrated lives, ‘blurring’ between roles is more probable, making segmentation more difficult.

The literature presented in this chapter has implications for the goals of this research. It is clear that social identity is exhibited abundantly in offline social interactions. It is constructed and given meaning through interaction with the world — whether through objects in that world or social encounters with others in that environment. However, while opportunities to enact one’s social identity might be plentiful in offline settings, they are constrained by certain limitations. For example, physical constraints mean that interactions can only take place in certain environments, whether at home, at work, or in a social gathering, for example. These physical constraints also mean that the audience interacted with is limited to those present in particular place. Temporal constraints mean that conversations are mostly limited to the specific time in which they were spoken.

On the other hand, digital environments, particularly social networking technologies, transcend physical and temporal boundaries. They offer people the opportunity to interact with one another on a global scale. In the absence of the physical body, users can potentially construct their online presence in any way they desire. This can

be in line with their offline self, or, if the motive exists, can even be an idealised representation of the self. One's online identity, whether authentic or otherwise, can then be communicated to an audience that is vast and potentially limitless. The potential for 'packaging' oneself in the best possible way, then, is perhaps much greater in the online realm than it is in offline environments. Further, location sharing systems add another interesting layer to the mix. One's physical whereabouts can be communicated alongside an online profile, opening up intriguing possibilities for using place as a means of communicating the self and managing self-presentation. While offline, for example, the communication of place might involve sending a holiday post-card to friends and loved ones, sending one's location digitally is almost instant and can reach a much larger audience. Such opportunities might influence the types of places visited and the manner in which they are shared. This topic is investigated further in the first study of this research, particularly in understanding how social identity might be reflected in physical place and how locations are used to potentially enhance self-presentation.

Having said that, the lack of physicality in digital spaces can bring about challenges as well as benefits. While the bounded contexts observed by Ashforth et al, (2007) might be maintained subconsciously offline by allocating behaviour to particular physical environments (e.g. home, office, party), doing so online is not so straightforward. The physical and temporal boundaries argued by Clark, (2000) are practically non-existent in online spaces; interactions take place digitally and persistent storage means that conversations can exist way beyond the time in which they originated. The huge diversity of the online audience means that, in social networking platforms, multiple audiences are all brought into one space, potentially collapsing different contexts. This presents interesting challenges. Tice et al (1995) argue that when interacting with strangers, people tend to accentuate their positive attributes whilst displaying modesty when interacting with friends. Because the individual is not known, the risk of being held accountable for inauthentic portrayals of the self is low. Although the absence of physicality might make an idealised online self harder to verify, the online audience often consists of a mix of known contacts (e.g. friends and family) and those unknown (e.g. relative strangers). In this situation, while portraying an embellished self-image might work well with strangers, it might also risk alienating people that are more familiar. Location sharing systems can exacerbate this problem because GPS co-ordinates indicate physical presence in a particular place, making potential misinterpretations by the audience more severe. Managing different parts of the online self, then, can be a difficult balancing act and

is transformed from a subconscious activity into a conscious one. The first study (chapter 5) explores the concept of digital identity management in location sharing systems and the potential tensions in managing a multi-faceted identity. The second study then addresses these challenges through actual technology design.

Having presented a theoretical discussion of offline social behaviour, the next chapter takes a closer look at how facets of this behaviour are manifested in digital location sharing as well as wider social media. The findings of the next chapter then serve to inform the direction of the first research study.

CHAPTER 3
SOCIAL MEDIA & DIGITAL LOCATION SHARING

This chapter reviews literature on digital location sharing. The subject is explored from a number of standpoints. Firstly, the environment in which location sharing systems are situated is discussed. Location sharing emanates from a physical setting; although it is conveyed digitally, the components of physical space — its places, its cultures, its people all serve to give that location context and meaning. The chapter, therefore, first explores the 'where' and 'how' of location: namely the physical spaces in which locations are typically shared and the means by which they are conveyed. In addition, the impact of location sharing technology in not only helping people traverse urban space, but also in giving that space life and meaning is investigated.

Secondly, there has been much research on the potential privacy concerns of sharing one's location. To attain the social benefits of location sharing, sending the details of one's physical location is a necessary component. This action, by itself, is not without risk. Location sharing often requires a delicate balance between striving to achieve the rewards of digital social interaction while managing the potential risks to one's privacy. Thus, before exploring the social aspects of location sharing, some of the key privacy-related factors that influence location sharing decisions are discussed. The chapter also discusses how one's privacy can be potentially leaked through location sharing software and presents some of the solutions available in combatting privacy concerns.

Finally, the sociality of location sharing is investigated. Specifically, the socially-driven behaviour of location sharing users is explored including self-presentation and impression management behaviour. The tensions experienced in managing multiple facets of the self in digital environments are also discussed.

Although chapter 2 drew upon works from social science and psychology in discussing the social identity theory, ultimately, it is in digital sharing of location where the main contributions of this thesis lie. This chapter not only acts as a basis for presenting a background on location sharing, but through an understanding of how location sharing systems work at present, also aids in informing the objectives of subsequent research studies.

3.1 LOCATION SHARING IN URBAN ENVIRONMENTS

The urban environment can be viewed as a combination of “space” and “place” (Dourish, 2006). ‘Space’ can be defined as the “geometrical arrangements that might structure, constrain, and enable certain forms of movement and interaction”; ‘Place’, on the other hand, “denotes the ways in which settings acquire recognisable and persistent social meaning in the course of interaction.” (Dourish, 2006). Place is the experience of particular locales — settings that have particular relevance such as “at home”, “at the office” and “in the woods” (Brewer & Dourish, 2008). In other words, where space might be seen as the opportunity, place is the (understood) reality (Dourish, 2006).

This space is given life and meaning through the everyday, collective movement of people (Dourish et al, 2007). The process of human movement — mobility — can take many forms. There are different kinds of journeys (e.g. commuting to work, running errands, going on vacation etc.); the same journeys can be undertaken in different ways (e.g. taking the train to get to different locations for different purposes). In addition, mobility is a collective pattern and experience of movement rather than individual. Although we might move individually, “collectively we produce flows of people, capital and activities that serve to structure and organise space” (Dourish et al, 2007).

Urban cities, which are intrinsic components of urban environments, are not simply settings or containers of action, but rather “products of historically and culturally situated practices and flows” (Williams & Dourish, 2006). They reflect how we see the world and as such, are entwined in heritage, history and culture that together give it their uniqueness. Further, the legibility of the city is affected by who *you* are and *how* you move. Williams & Dourish, (2006) cite an example of the residents of a northern Irish town called “Ballybogoin” to demonstrate this point. Here, the city is demarcated by “whether a house is two storeys or one storey, whether or not you and your neighbour know each other’s first names, whether one’s movements through space are ‘Protestant’ or ‘Catholic,’ whether you park your car east or west of the town square, and whether you talk or do not”. In this city, Protestants and Catholics may have profoundly different interpretations of which spaces are safe and welcoming. How cities are read interpreted, then, can be influenced by the culture, history and personal experiences of the people within it.

Some research has viewed technology as being external to, or something layered on top of the physical world (Dourish, 2006). However, pervasive technologies do not merely provide virtual environments, but are means through which space is encountered; they do not stand apart from the physical world, but rather provide new ways in which that world is understood and interpreted (Brewer & Dourish, 2008). Further, pervasive technologies are *situated* within the environment and are therefore entwined and enmeshed within the social practice and culture of that environment.

To this end, location-based technologies do not view urban spaces as chaotic, as something to be overcome, but rather as opportunities to create interactive experiences that rely upon or exploit movement and space (Dourish et al, 2007). From a user perspective, this not only enables space to be re-encountered but also opens opportunities for the discovery of new places and experiences.

3.1.1 The 'where' and 'how' of location

Location sharing systems, in addition to providing social networking features, can also act as *participatory sensing systems* (Li & Goodchild, 2012). With the ubiquity of mobile devices, users can be considered 'social sensors' because the devices they carry almost 'sense' the environment, and the collective data shared by them reflects their habits and routines (Li & Goodchild, 2012). This aggregated data is essentially 'digital footprints' of users and can be used for a host of applications including finding hotspots within a city (Le, 2014), analysing user trajectories (Quattrone et al, 2014), predicting human behaviour (Long et al, 2012), and studying traffic conditions (Mcardle et al, 2012).

This section looks at how space and place are given meaning through the collective movement of users. We look at the types of places that people share location in urban environments, their timings and levels of frequency. We discuss the implications of this behaviour in light of the theories presented above. We also look at specific examples of location sharing applications that specifically exploit movement and space, thereby augmenting and potentially enhancing urban experiences.

Cheng et al, (2011) found that the density of check-ins[7] is highest in North America, Western Europe, South Asia and Pacific Asia. The most popular venues are restaurants coffee shops, stores, airports and other venues reflecting daily activity (Cheng et al, 2011) (Preoţiuc-Pietro & Cohn, 2013). There are three major peaks of check-ins during the day: one around 9am, one around 12pm, and one around 6pm (Cheng et al, 2011) (Long et al 2012). Eating venues peak around noon, evening (6pm) and late night (11pm); entertainment activities peak around late night, and shopping and recreation trips are predominant on the weekends (Hasan et al, 2013). Workplaces see spikes in activity during the morning; nightlife venues see spikes during evenings; for residential venues, most (Foursquare) check-ins occur in the morning and in the evening (Preotiuc-Pietro & Cohn, 2013) . Users check-in more toward the end of the week than at the beginning (Le, 2014). Destinations are not selected randomly, but are based on popularity — the popular a venue is, the more likely others will visit it (Hasan et al, 2013).

Users tend to perform check-ins in short distances, around 1km (Noulas et al, 2010) (Colombo et al, 2012). Colombo et al (2012) observe that check-in behaviour is usually in a pattern of repeated behaviour; users repeatedly check in to the same venues, in a similar order — this is especially the case with long term users of Foursquare[8] (Melià-Seguí, 2012). Rural populations have more regularity in their mobility patterns than urban populations (Qu & Zhang, 2013).

Long et al, (2012), in observing the patterns of user movement, find that people prefer to shop and dine at places close to one another, go to restaurants after shopping and check-in to universities and colleges mainly on the weekdays. They find that the differences in check-in patterns on the weekdays and weekends correspond to the differences in human mobility between these times of the week. When studying transitions in movement, Preotiuc-Pietro & Cohn, (2013) find that for most of the check-in categories studied, if a user is at a particular location, it is very likely for him or her to transition to a place belonging to the same category. For example, when at a University Building, it is likely that they will visit another building in campus next. Further, they find that it is very likely for people to go out to eat after

[7] A 'check-in' refers to the process of indicating physical presence in a particular location via a digital device. Check-ins can then be shared with others in a social network, as in Facebook, and sometimes exchanged for virtual and monetary rewards as in apps like Foursquare.

[8] The research studies in this thesis were conducted before Foursquare was rebranded as Swarm in 2014. Thus, any references to Foursquare used throughout this thesis refer to the old social networking functionality of the software, features now present in 'Swarm', and not the dedicated place discovery features of the new version to date. However, the discussions are equally relevant to both the old and new versions of the platform.

an artistic event (in ‘Arts and Entertainment’ category) and a high probability for them to eat or go shopping after work. Similarly, they observe a reciprocal relationship between Food and Shopping venues, with those out shopping more likely to follow up with a visit to food venues and vice versa.

In most of these cases, it is clear that location sharing patterns are a reflection of the day-to-day activities of people. This reinforces the argument that technology, and indeed location sharing systems, are not separate components to the physical world, nor layered on top of it (Dourish, 2006), but rather enmeshed within the fabric of society, thereby reflecting the patterns of everyday movement — however special or mundane.

This point is further illustrated by Lehikoinen & Kaikkonen (2006) who deployed a custom location sharing platform to study how people name locations. They found that for ‘points of interest’, places generally known by local people, users employed “nick names” to refer to places rather than use their official names. These names were understood by local residents but would be difficult to interpret for any outsider. Geographical locations, such as a district, city or a country, were described using community-specific names rather than official ones. Here, rather than adapt their behaviour, people used the technology to simply communicate common parlance. In other cases, the technology was used in personal and innovative ways. Location names not only conveyed physical location but also current activity and other contextual attributes. Interestingly, “generic locations” were used as a way of regulating location disclosure; names like “Krista’s home” and “work” deliberately omitted specific location information and could only be understood by those in a narrow friends circle. They were also used to convey status and availability; being at a “friend’s house” signalled pre-occupation, suggesting a lack of availability at that particular time.

In other instances, space can almost be re-interpreted through the use of location services. Photos can be geotagged with location data; therefore establishing a link between the place, depicted by the photo, and the location, made available by the georeferenced data. Li & Goodchild, (2012), found that places like Disneyland, although not officially located in Paris, was still considered Paris for the Flickr users who uploaded photos there. Another example of this is geotagged photos of the Eiffel Tower. Because it is visible from a number of different locations, they found that there were large peaks (of geotagged photos) around the location of the tower; they

observe that these spatial footprints not only indicate the location of the Eiffel Tower, but also where it can be seen. These particular locations, at least for Flickr users, were given new meaning as 'viewpoints' in relation to their distance from the Eiffel Tower.

An emerging generation of applications view urban environments, not as situations to be controlled or overcome, but as opportunities to create interactive experiences that exploit movement and space (Bassoli et al, 2007). Online dating apps like Tinder use GPS technology to help users find potentially romantic partners. Users upload a basic profile and are then presented with potential matches that are nearby; users swipe right to 'like' them and left to 'pass'. If the recipient also 'likes' the user, a match is found and personal messaging is offered. Other apps such as Swarm (formerly known as Foursquare) encourage social networking by alerting users of their friends' whereabouts and also promote place discovery. There is evidence to suggest that this is working; Colombo et al (2012) find that users have an inclination to visit places frequented by their friends.

In summary, Dourish, (2006) argue that space and place are "products of embodied social practice". The people who enact these practices are those who through everyday movements within urban space, give that space life and meaning (Dourish et al, 2007). Furthermore, cities are not just settings and containers of action but as products of historically and culturally situated practices and flows (Williams & Dourish, 2006). Therefore, the cultural logics by which spatial practice is understood are, in turn, embedded into the technology that is brought into those spaces (Brewer & Dourish, 2008). Moreover, technology is not a separate entity layered on top of urban space, but can act as the lenses through which the world is encountered, with their own logics becoming inscribed into those spaces (Dourish et al, 2007). We have seen how location sharing technology can act as participatory sensing systems, capturing and reflecting everyday activity in urban settings. In addition, it offers new ways of traversing urban cities and interpreting space and place. It presents the city not as an environment full of ominous strangers (Williams & Dourish, 2006), but as an opportunity to forge new relationships, and to explore and discover new places within the urban landscape. In this sense, through the use of location sharing technology, "people may not just find their way, but find *more than their way"* (Dourish et al, 2007).

3.2 LOCATION PRIVACY

The act of sharing location means that people must part with the details of their physical whereabouts. Communicating this information to an online audience can carry privacy risks, especially if the information is potentially accessed by unwanted parties. Thus, location sharing can often involve a difficult balance between trying to attain the benefits of digital social interaction and managing the risks of parting with potentially sensitive information. Before discussing the sociality of location, this section investigates the role of privacy in location sharing platforms. The objective is to understand users' concerns about privacy and its role in influencing their location sharing decisions. It looks at where and to whom location is shared from a privacy standpoint; the privacy related factors influencing location sharing decisions; how personal information is potentially leaked and how to alleviate privacy concerns. The section also investigates how location sharing platforms can potentially be subverted and possible prevention techniques are discussed.

Popular social media such as Facebook and Twitter have recently integrated location sharing as a feature into their platforms. Now, not only is a user's personal data stored, but also their physical whereabouts (Bilogrevic et al, 2013). With each location update shared, service providers can potentially create detailed behavioural profiles of their customers (Scipioni, 2012). Further, self-reporting mechanisms have lead people to report their location in a myriad of locations — from private places such as homes and hospitals, to those reflecting daily activity such as workplaces and schools (Jin et al, 2012). The storage of highly sensitive information has attracted many privacy concerns (Xie & Knijnenburg, 2014) which may have impeded the growth of location based services (Knijnenburg et al, 2013).

Studies have found that those that are concerned about privacy in general are also concerned about the privacy of their location (Zafeiropoulou et al, 2013). Zafeiropoulou et al (2013) found that the majority of their participants (79%) were concerned about their privacy and the majority (64%) used privacy settings. Having said that, there has been suggestion of a privacy paradox in wider social media, indicating a disparity between people's perceived concerns about privacy and their actual behaviour (Norberg et al, 2007). This paradox seems to have extended to location sharing platforms. Barkhuus, (2004) found that users initially have concerns about location tracking, but in an actual situation, that privacy becomes less of an issue. Similarly, Zafeiropoulou et al (2013) found that when studying user behaviour,

there was no correlation between people's attitudes toward privacy and their actual behaviour, uncovering a potential privacy paradox.

3.2.1 Attitudes toward the privacy of location

Benisch, et al, (2011), in their study of location sharing practices, discovered that sharing takes place twice as much during the day on weekdays as at night on weekends. This is supported by Xie & Knijnenburg, (2014) who found that people prefer more privacy on the weekend and sharing at night is typically more conservative. Toch et al, (2010), in their field study of a custom location sharing system, find that users tended to feel less comfortable in sharing low "entropy" locations — those that are not visited uniquely such as "home" or "friend's house". Conversely, high entropy locations, those visited by a diverse set of unique visitors, are considered less private. Highly mobile users (as recorded by the system) received significantly more location requests than less mobile users, and found location sharing more useful overall.

In their study of BriteKite, a location sharing app now discontinued, Li & Chen, (2010), found that female users are more privacy conscious than their male counterparts. In addition, the level of privacy concern steadily increases with age, from teenage years to middle age. They claim that since older users may have more stable families, friends and social relations, they might prefer to share with known individuals rather than those less familiar. However, these findings are somewhat contradicted by Thomas, et al, (2013) whose younger participants were more concerned with their disclosures, were less trusting of social network systems (SNS) and had lower intentions to use SNS with friends, family and colleagues when compared to older participants. One reason for this could be that younger people, having largely grown up in the information age, are more accustomed to socialising through such platforms and can be quite tech savvy from this standpoint, making them more aware of their functionality and potential perils.

Many smartphones offer tighter, user-controlled privacy settings that enable people to grant or deny applications access to their location. Fisher et al, (2012) found that users are actively making use of such controls, with most users granting location access to at least two-thirds of the apps that requested it and a significant number denying access to more than half of them. They also discover that the decision to grant an app access to location depends on the purpose of the app and the expected

value that is derived from sharing their location. If location is a central feature of the software, then access is granted. In their study, 97% of users granted access to Foursquare while only 53% to Shazam and 59% to IMDb.

Lin et al (2010) found that semantic names, an official or informal name for a place, are sometimes used to regulate privacy by not making them directly locatable. Similarly, they observe that when people have flexibility to manipulate their location information, sharing their exact location is not preferred. Location blurring, by manipulating the granularity of disclosure, gets stronger when sharing to less intimate social groups.

3.2.2 To whom should I share? Privacy related factors that influence location sharing decisions

There can be many privacy related factors that influence location sharing decisions (Consolvo et al, 2005). This can include the audience shared to and implied trust (Henne et al, 2013) (Thomas et al, 2013); the more trustworthy a social network is perceived, the more likely someone will use it (Thomas et al, 2013). Henne et al, (2013) found that many of their participants were comfortable in posting location to Wikipedia because of the perceived benefit but surprisingly, not to Facebook due to a lack of trust and concerns about how their data would be manipulated by the platform. Users' trust beliefs (in the platform) can help mitigate their privacy concerns and increase their willingness to disclose personal information through location sharing (Xu & Tan, 2005).

Once a conscious decision has been made to share location, to what audience are users most comfortable sharing with? Benisch et al, (2011) found that participants were comfortable sharing location 93% of the time to friends and family and 60% of the time with Facebook friends. The strength of social ties can be the strongest factor in deciding whether or not to share (Bilogrevic et al, 2013). Tang et al (2012) suggest that users are least willing to share to 'weak ties' such as bosses and strangers and that close ties are more likely to be responded to.

Further, the activity one is performing when receiving a location request is also significant. People are "very willing" to disclose something when doing household chores; "fairly willing" when exercising and "less willing" when studying, running errands or talking to someone in person (Consolvo et al, 2005) Interestingly, mood

also plays a part; with people most willing to disclose location when they feel "depressed", "happy", "calm or relaxed" and less willing when "angry" (Consolvo et al, 2005). Xie & Knijnenburg, (2014) similarly find that when feeling positive, people tend to share more with family and friends; when feeling negative they share less with colleagues.

Tensions about sharing location can be heightened if someone is able to publish location that includes information about other people. This pattern of sharing can cause more harm to a person's privacy than information consciously shared by that person themselves. Henne et al, (2013), in their study of geo-tagged photo sharing, find that users take this issue seriously, with 91% considering threats to others "at least a bit" in their sharing decisions and 61% rating threats to others on the same level as their own.

3.2.3 Privacy leakage

Location data can contain a lot of sensitive personal information that can increase tensions about the potential for misuse. In self-reporting systems, it is not uncommon for users to share their location at residential homes. It is fair to assume that this is perhaps the scenario in which concerns about privacy might be at their highest. Jin et al, (2012) found that out of their Foursquare dataset of check-ins, 2.9% provided addresses of residential homes and over 40% the addresses of apartments. However, they found that the longitude and latitude values of residential values are always public in Foursquare. From this information, by using the Google Geocoding API, they claim that the full address of the venue can be inferred within a range of 800 meters. Furthermore, they found that the mayor of each residential venue is made public, and, based on frequency of check-ins, the detailed home address can be obtained. Similarly, out of a dataset of 13 million Foursquare users, Pontes et al, (2012) claim that it is possible to easily infer the home city of around 78% of analysed users within 50 kilometres.

Besides physical location, other media such as photos can be geo-tagged with location data, and can therefore contain detailed information about the user who posted it. Henne et al, (2013) found that of the twenty thousand Flickr picture dataset they crawled, 19% was geo-tagged with location data, and of data from mobile phone users, 34% contained GPS information. Alarmingly, they found that photos contained not only GPS data but also personal information such as telephone numbers. They

conclude that one third of images taken by dominant camera devices contain GPS information, with one third of these images depicting people; therefore 10% of such photos may harm other people's privacy without their knowledge.

One possible way of protecting privacy is enabling users to carry pseudonyms that can make personal information harder to identify. However, Gambs et al, (2011) observe that pseudonymity is not sufficient because a combination of locations can act as a "quasi-identifier". A user's 'points of interest' can cause a privacy breach because it can be used to infer sensitive information such as hobbies, religious beliefs, and political preferences. In their experiment, they found that 32% of 5000 Foursquare users had connected their account to Facebook and 16% to Twitter. A Foursquare profile contains much information that is public by default. For example, the hometown of a user, number of check-ins, the number of actions (check-in associated with a comment), badges won, places of mayorships, as well as a random sample of 10 of contacts are all public information. Gambs et al, (2011) argue that the locations a user has left a comment on and hence visited can be used to reconstruct a partial mobility profile of users. For frequent users, this information can act as a window into their daily routine. Badges can also indicate the person's interests and the places they spend a lot of time on a regular basis. Similarly, they suggest that it is relatively simple to construct a social graph of Foursquare users by regularly refreshing the profile of the user because with each page refresh, a different set of random samples of friends can appear.

3.2.4 Combating privacy concerns

With the number of privacy concerns about location, how can systems be designed to reduce them? One possible avenue is to provide real-time feedback of people who have viewed a user's location. Jedrzejczyk, (2010) implemented such a system named 'BuddyTracker'. One of the implications of their study was that by implementing real-time feedback, it introduced a "should I do it?" debate in the user's mind that made them more conscious about whether or not to disclose location. This type of feedback also limited usage mainly to situations that required location the most. From the data requester's side, this feature limited the number of unmotivated and unreasonable location requests, thereby helping users to preserve their privacy.

Wilson et al, (2013) argue that designs intended to simplify users' initial privacy choices may, inadvertently, become the 'new norm' and have lasting effects on what

is deemed an acceptable level of disclosure. They conclude that efforts to simplify choices can have a significant impact on the levels of privacy that users select — similar to (Gross & Acquisti, 2005) who found that default privacy settings tend to be retained by users.

Another possible way of combating privacy concerns is to provide more choices in the granularity of location disclosure. Consolvo et al, (2005) argue that blurring location to protect one's privacy is not necessary because if that privacy is at risk, people choose not to disclose location at all. However, Tang et al (2012) found that when given more location granularity options, people shared more to weaker ties than without the options. They conclude that greater granularity options can lead users to share location in more situations and to more relationship types. Knijnenburg et al, (2013) found, in their examination of the effect of coarse-grained vs. fine-grained sharing options, that when a finer-grained sharing option is removed, participants deliberately choose the subjectively closest remaining option. When a new extreme option (in terms of granularity) is introduced, it causes users to switch from a less extreme option to the new option and increases sharing across the board.

3.2.5 'I just want to break the rules': Subverting location sharing systems

Location based social networks such as Foursquare are heavily dependent on user-generated content and as such, they are also reliant on the honesty of users in playing by the system rules. Typically, check-ins do not require physical presence at a venue; merely being in the vicinity is often enough to register a check-in with the software. Users can therefore check-in beforehand or retrospectively, and this behaviour is deemed acceptable by Foursquare. However, this level of flexibility can open the door for users to create their own rules. Glas, (2013) found that users obtain badges without actually earning them; for example, achieving the 'I'm on a boat' badge without physically being present on a boat. The same research also cites users in Indonesia amassing almost all possible badges available in Foursquare with thousands of check-ins across the world in a practice known as 'jumping', much to the chagrin of fellow Foursquare users. For Indonesian users, having lived under strict governmental laws in the past, this subversion is seen as a source of prestige among peers and is considered not deviant, but a means of enhancing status (Glas, 2013).

Certain features of Foursquare have been used for other than their intended purpose. Micro-reviews of venues, known as tips in Foursquare, are used to communicate folk lore, give local survival advice, express sentiments, partition communication and even used as rudimentary voting systems (Duffy, 2011). User-generated venues can also be misused because it invites the temptation for people to create new venues purely to become mayor. Duffy, (2011) found that popular coffee shops had duplicate venues; with one user setting up an unofficial venue and then being personally responsible for more than half of the check-ins registered there. This behaviour, as concluded by the research, was motivated by a desire to increase their ranking on the leaderboard and for the kudos of becoming mayor. Some users also engage in tip spamming by advertising links to products that are entirely unrelated to the venue (Vasconcelos et al, 2012). Surprisingly, these tactics are successful in attracting the consumer-driven attention of many users.

The ability to subvert a gaming mechanic is known as ‘grokking’ the system (Nandwani et al, 2011). Specialised applications exist that enable automatic check-ins when in the vicinity of particular venues. Specific websites exist that explain exactly how to obtain mayorships for particular places. In their research, Nandwani et al, (2011) checked in to a Starbucks location whilst having a coffee at a nearby competitor — potentially enabling loyalty points to be collected from one brand whilst purchasing a product from another.

In an attempt to combat ‘grokking’, researchers have suggested more reliable approaches to checking-in based on Near Field Communication (NFC). Nandwani et al, (2011) implemented a system that used RFID cards, in their case student library cards, which interfaced with a web-service that identified each user at a specific venue when they “touched” their tag on their phone. Carbunar & Potharaju, (2012) used WiFi, QR-codes and NFC to provide similar solutions. Alternative approaches are implemented by other researchers, such as “cloaking zones” in Che et al, (2012), and more algorithmic solutions in Polakis, et al, (2013).

By allowing users to self-report their location, and the potential inaccuracy of GPS-technology, there is no guarantee that users will play by the rules intended by software designers. Reinforced by a competitive game play mechanic, apps like Foursquare may have unwittingly fostered an environment in which finding novel ways of circumventing rules in some cases, and subverting the system in others, may be an enticing temptation for some users.

We can see that there are genuine privacy concerns surrounding location sharing systems. Palen & Dourish, (2003) observe that privacy management is a “dynamic response to circumstance rather than a static enforcement of rules”. Their central argument is that privacy regulation is a dynamic process that involves the management of boundaries and a balance between privacy and publicity. For example, we have boundaries between the “self and the other”: boundaries of (acceptable) disclosure, and we choose to maintain both a private and public face for personal, social and professional reasons. Technology, they argue, can disrupt or destabilise these boundaries; audiences are not restricted by space and information can exist not only in the present but also in the future. Therefore, users may not have full control over what information is stored, how it distributed, and to what audiences it is exposed.

Henne et al, (2013) argue that privacy decisions are part of a process of “structuration”, where people’s attitudes and values are “tempered by situation and context”. In other words, decisions about privacy involve an interplay between general attitudes and the context in which location is shared, with perceived benefit and level of trust important factors in that process. Further, these ‘structures’ are malleable, in the sense that certain decisions establish new norms resulting in a new influencing structure.

Studies like Jin, et al, (2012), Henne, et al, (2013), and Gambs et al, (2011) illustrate that privacy information can be leaked without the conscious knowledge of users. Such examples clearly highlight the potential perils of technology, with information potentially being used for other than its intended purpose. They are also cases that demonstrate the disruption in what Palen & Dourish, (2003) term as the “reflexive interpretability of action” — our ability to understand how our actions appear to others. The trajectory of one’s journeys through space can not only be misinterpreted by an unintended audience but also potentially misused by those with more sinister intentions.

However, studies such as Toch et al, (2010) and Fisher et al, (2012) demonstrate that users are actively managing their privacy, giving access only to those apps they feel need it the most. Zafeiropoulou et al (2013) find that privacy is a very real concern to users and is certainly not something to be overlooked when designing location sharing systems.

In sum, privacy regulation is dynamic (Palen & Dourish, 2003); it is dependent on social and cultural context, intention, and can even differ depending on age (Thomas, et al, 2013). Thus, attitudes toward privacy are subject to change as Henne, et al, (2013) highlight. This perhaps explains the existence of the privacy paradox discovered by Barkhuus, (2004) and Zafeiropoulou et al (2013). Users seem to be continuously renegotiating their attitudes toward privacy in response to new forms of interaction and experiences offered by location sharing technology. Further, by using location sharing social networking apps like Foursquare, perhaps users are balancing between privacy and publicity argued by Palen & Dourish, (2003), disclosing parts of their private life (i.e. movements through space, checking-in to personal and public venues) in exchange for the social benefits offered by the software.

3.3 THE SOCIALITY OF LOCATION

Apps like Foursquare enable users to share their location with their friends as well as discover their whereabouts in the city. The widespread growth of smartphones has led to location sharing features being integrated into platforms such as Facebook, Google and Twitter, thus dramatically changing the location sharing landscape (Patil et al, 2012b). Rather than location being automatically recorded (Benford et al, 2006), users can now self-report their location (Lindqvist et al, 2011), selectively choosing with whom they wish to share their whereabouts. The potential for sharing to a wide social network has transformed location sharing from *purpose-driven*, that which is done in response to specific location requests, to *social-driven,* that which is shared to large social groups (Tang et al, 2010). In this sense, location sharing is not just about sharing physical place, but also about actively expressing personality, moods, lifestyle and events (Barkhuus et al, 2008). Ultimately, this means that location has changed from something you *have,* (a property or state) to something you *do* (an action) (Cramer et al, 2011).

This section looks at the sociality of location sharing. Specifically, we look at how people manage their self-presentation through the places they share and how they engage in impression management. We also look at the tensions experienced when sharing location to diverse, multiple audiences. Literature is drawn from wider social media where appropriate.

3.3.1 Being social through location

What was once primarily a one-to-one activity, where users responded to explicit location requests, location sharing has now become a one-to-many endeavour (Tang et al, 2010), with 'many' potentially being a boundless audience (Marwick & Boyd, 2010). Because of this, location sharing can be a social, emotional and moral affair used to express moods, lifestyle and events (Barkhuus et al, 2008) (Cramer et al, 2011). It can be as much about interaction, in terms of emotion, reassurance and connection, as it is about the communication of accurate information (Brown et al, 2007).

People need to be loved and socially accepted (Gangadharbatla, 2008). The need to belong is something that all human beings possess: to "form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships (Baumeister & Leary, 1995). Social media, of which location sharing mechanisms are now a seamless part (Patil et al, 2012b), provides opportunities for expressing oneself and gaining social approval. Research suggests that participation in online social networking can help increase social capital (Cherubini et al, 2010), increase a sense of connectedness (Burke et al, 2011), and have a positive impact on self-esteem (Toma, 2010).

'Socialness' is perhaps one of the reasons for the wider adoption of location sharing services (Roback & Wakefield, 2013). Roback & Wakefield, (2013) argue that socialness induces enjoyment, which is an "intangible, intrinsic user benefit that is sufficient to facilitate the disclosure of location information". The greater this enjoyment, the more likely people are to use the technology. They observe that when technology interactions are perceived as enjoyable, "an internal psychological reward" is attained that drives the continued use of the technology that provides it. Such positive perception can offset the privacy 'cost' of sharing location (Roback & Wakefield, 2013), with people willing to forgo some privacy if there is some clear benefit (Tang et al, 2010). This perhaps explains the rather paradoxical phenomenon that given the choice between over sharing and not sharing at all, people will opt for over sharing their information (Farnham & Churchill, 2011).

Research has found that sharing physical place is not the primary motivation for location sharing, but rather serves as a means toward achieving socially oriented goals such as sharing a positive experience with one's social circle (Patil, 2012a) .

This is corroborated by Patil et al, (2012b) who found that the main motivations for sharing location are to connect with social and professional circles, to project an interesting self-image, and to receive rewards for check-ins. Being at new, unique, unusual, or non-routine places can be another motivation to share location (Lindqvist et al, 2011) (Patil et al, 2014); it can also be a means of signalling availability to friends (Lindqvist et al, 2011). Interestingly, another motivation for using location sharing social networks was to find out where others have been (Lindqvist et al, 2011); in this way, they can act as an intriguing "window" into the lives of others (Cramer et al, 2011).

Moreover, the act of sharing location can sometimes be a proxy for conveying other messages such as current activity, availability and future movements (Iachello et al, 2005). The desire to express activities, share experiences, and the awareness of reciprocity (from the social network) derived from that process, can be underlying reasons for sharing physical place (Cramer et al, 2011). Weilenmann, (2003), in their study of phone conversations, found that the frequent question "where are you?" was sometimes a query into current activity and possible availability. Thus, activity and place can be used jointly or interchangeably for achieving communication goals (Jones et al, 2004); the choice of what to disclose can be influenced in part by the activity being accomplished with the communication (Iachello et al, 2005).

3.3.2 The performance of location sharing

As the 18th century philosopher George Berkeley declared, "to exist is to be seen by someone else" (Morie et al, 2008). In everyday interactions, we use our bodies to project information about ourselves through movement, clothes, speech and facial expressions (Boyd, 2007). Further, every person engaged in communication has an audience (Marwick & Boyd, 2010). Whether interacting with colleagues at work, or socialising with friends at a party, the presence of others is very much a part of everyday communication. Research suggests that one's awareness of an audience, or sense of "publicness", affects the way we behave (Gonzales & Hancock, 2008).

Goffman, (1959) theorised that the construction of the self is achieved through interactions with other people and objects. The self is engaged in an ongoing 'performance', with aspects of the self selectively revealed and then redefined in response to one's environment, the reactions of others, and the social structures surrounding the self (Morie et al, 2008). He proposed that in any given situation,

people navigate ‘frontstage’ and ‘backstage’ areas. In the frontstage we present an idealised version of the self according to a specific role (e.g. lecturer, teacher, colleague); in the backstage much of the ‘behind the scenes’ work is done to keep up appearances (e.g. engaging in more open, candid talk when socialising after work) (Hogan, 2010). Individuals, then, can be understood as ‘actors’ who tailor their self-presentation based on context and the audience (Marwick & Boyd, 2010).

While in the offline world the audience is limited and restricted to particular settings, in social media, the audience is potentially limitless (Marwick & Boyd, 2010). Prior to the internet age, only the lives of the rich and famous were deemed important enough to publicise (Boyd, 2007). The emergence of new tools for mediating sociality has changed this, giving ordinary people potential access to vast and persistent publicity. Social media can take the simplest form of individual expression and amplify it to make it “hyperpublic” (Boyd, 2007). In this sense, users can create a mental model of their imagined audience, and then use that model to guide their activities online (Bernstein et al, 2013).

Online environments enable people to carefully choose what information to put forward and what to withhold (Boyd, 2007). This is unlike offline interactions where the presence of the body in social encounters prevents people from claiming identities that are not part of their physical characteristics (e.g. sex, race, and looks); this makes it difficult for an individual to present what he or she is not (Zhao et al, 2008). Since the physical body is detached from social encounters in the online environment, it becomes possible for people to interact with one another is such a way that reveals nothing about their physical characteristics (Zhao et al, 2008). People are able to ‘craft’ their identities, accentuating positive attributes that may represent their real self or even an idealised self (Hum et al, 2011). They can, in effect, ‘try out’ several identities, evaluate the response from the audience, and modify their self-presentation accordingly (Hum et al, 2011).

Dalsgaard & Hansen, (2008) argue that awareness of the presence of others has an impact on technology interaction because through that knowledge, a person can transition from the role of a user to that of a performer. They posit that the act of performing is added when use becomes possible for others to observe. They cite an example of a user playing the “Dance Dance Revolution” game; while the user’s attention might be directed toward the sound and visuals of the game, the awareness of a spectating audience makes the experience a performative spectacle in its own

right. As another example, a man conversing on his mobile phone may be focused on the phone conversation but at the same time might be paying “unfocused attention” on those around him — making eye contact, acknowledging and then looking away. The primary point here is that interaction with technology, particularly in a public space can be influenced by one’s surroundings, especially by those who may be directly or indirectly observing the behaviour.

Barkhuus et al, (2008) found that location sharing is also a way of managing self-presentation. In their study, participants shared locations that reflected personal meanings; location updates consisted of personal expressions, witty comments and story telling. Participants were mindful of each other’s location, monitoring the activities of one another to avoid the risk of falling ‘out of touch’ with their social circle. All such communicative techniques were part of the on going repartee among friends. Brown et al, (2007) revealed that location was shared in a context that could only be understood by particular people, in their case members of close families. Barkhuus et al, (2008) discovered that location sharing supported the ‘private geographies’ of users — places that are common to particular groups of people and can therefore be interpreted only by them.

The awareness of others’ activities can also affect the sharers’ own self-presentation (Cramer et al, 2011). An example of this is illustrated by Guha & Birnholtz, (2013) who found that participants had a conscious awareness of their friends’ activities on Foursquare. One participant, upon observing an intriguing check-in of a friend, found that it reinforced her own confidence to check-in to places that she was reluctant to do so before. Apps like Foursquare not only allow users to share their own location, but also view the check-ins of others. This allows users to actively project their identity to others as well as modify their self-presentation if the situation demands.

Cramer et al, (2011) observe that the physical act of checking-in can influence norms on when and where people check-in. They argue that interacting with a mobile device in the presence of others becomes part of the ‘frontstage’ behaviour described by Goffman, rather than an invisible ‘backstage’ activity. In their study, they found that many participants found it socially awkward to check-in when others were co-present and would adapt their check-in routines; for example, checking in before friends arrive or doing so when others have left. On the other hand, the interaction may have been hidden from some but was expressively revealed to spectators who were fellow ‘players’. This resulted in amplifying the shared

experience and building rapport with one another. These observations clearly illustrate that because location sharing can be performed in public and private spaces, it is simultaneously both a 'frontstage' and 'backstage' form of technology interaction and can be influenced by those co-present.

As well as carefully controlling the presentation of the self, people can seek to *define a situation* (Boyd, 2007) through their behaviour. They can do so by using contextual cues from the environment around them (Boyd, 2007). This process, where people actively manage how others perceive them to produce desired social outcomes is termed by Goffman, (1959) as impression management. As the name suggests, impression management is the negotiation of leaving and receiving impressions (Boyd, 2002). Impression management is completely tied to the reactions of others; without those reactions, there are no impressions (Boyd, 2002).

Online impression management can blur the distinction between the real and ideal self (Manago, 2008). By offering tools to present oneself as one pleases, social media can encourage deliberate impression management in a way that everyday interactions do not. As Strano & Wattei, (2010) put it, "The very structure of a Facebook page encourages an idealized and normative vision of the self that is wrapped in a colourful display of popularity and consumerism."

Impression management is also common in mobile dating apps. Birnholtz et al, (2014), in their study of Grindr[9], reveal that users disclose information in their dating profile that is likely to make them seem attractive to others so that the relationship can transition from an online context to a face-to-face one. Hancock et al, (2007) found that deception was frequently used in dating profiles. They discovered that weight was the most lied about attribute, followed by height and age. Men systematically overestimated their height while women consistently underestimated their weight. Users frequently accentuate positive attributes (e.g. muscles) but are more reserved about the parts of their appearance perceived as less attractive (Birnholtz et al, 2014). Van De Wiele & Tong, (2014) found that users who sought out social inclusion and sexual gratifications on Grindr were less likely to communicate honest information about themselves to others. This is because the risk of "accountability" is less with short-term, one-time encounters. On the other hand, the anticipation for a long-term romantic relationship, where platonic or otherwise, means

[9] http://grindr.com/

that users have to balance the desire for self-promotion with their need for accurate self-presentation, resulting in more 'realistic' disclosures (Ellison et al, 2006).

Tang et al, (2010) suggest further evidence for impression management in social-driven location sharing. In their study, one participant reported sharing location at a fancy restaurant because it was deemed as "pretty cool" and something they wanted others to know about. Conversely, Lindqvist et al, (2011) cited participants who were reluctant to check-in at so-called "boring" place for fear of ruining self-image. Guha & Birnholtz, (2013) studied impression management on Foursquare and found that participants engaged in selective location disclosure and were conscious about what and what not to share. For locations motivated by financial incentive, participants checked-in at multiple venues to avoid appearing as a "discount seeker". Some participants shunned check-ins at certain social venues to avoid giving the wrong impression to family. Further, users' last check-in was also used to good effect. On Foursquare, old check-ins are replaced every time a new check-in is registered by the system. However, the last check-in can remain visible for a longer period of time, especially during periods of inactivity. Participants ensured that their last check-in was appropriate in making the right impression and contributed to formulating their location sharing decisions. Guha & Birnholtz, (2013) refer to this as the "check-in transience". The authors argue that this last check-in can contribute to impressions more than the cumulative sum of previous check-ins.

It could be argued, especially in light of the literature discussed so far, that self-presentation and impression management techniques are idealised, self-aggrandising behaviours that are motivated by self-centred interests. However, there is evidence to suggest that engaging in such practices can potentially have emotional, psychological and behavioural benefits. Some research implies that social media profiles can restore users' sense of self-worth through reminders of the important aspects of their lives such as friendship, identities and group memberships (Toma, 2010). Gonzales & Hancock, (2010) discovered that exposure to one's Facebook profile actually enhances self-esteem, especially when a person edits information about the self, or selectively self-presents. Toma, (2010) observed that participants who spent 5 minutes on their Facebook profiles experienced more positive feelings, both "self-directed (feeling loved, supported, connected) and other-directed (feeling loving and grateful)". Social media communication may actually "level the playing field" between users of high and low self-esteem (Burke et al, 2011). For those with lower communication skills, receiving messages from friends,

and consuming news feeds from those friends can increase their feeling of connectedness (Burke et al, 2011).

Furthermore, research has revealed that online self-presentation can, with time, become integrated into how we view ourselves (Gonzales & Hancock, 2008). Possible selves may be transformed into actual selves when a user transforms ideas about the self into an objectified image online, and the image receives public social approval from his or her audience (Manago et al, 2008).

In an intriguing study, Gonzales & Hancock, (2008) found that participants asked to portray themselves as introverts online actually rated themselves as introverted and those assigned to the extraverted condition rated themselves as extraverted after the study. In essence, online self-presentation caused people to "shift their identities" to actually become more consistent with their actual personality. The authors observe that when people walk away from the keyboard, they make take aspects of their online self-presentation along with them. They conclude that in addition to treating the internet as an outlet for social interaction, it should be considered as one for self-construction.

Similarly, in the realm of online dating, Ellison et al, (2006) reveal that online profiles may be a way of constructing an idealised version of the self that is desired in the future. For some, the process of constructing an online identity may not just be a part of self-presentation but also self-growth, as individuals strive to close the gap between the actual and ideal self. This view is corroborated by Zhao et al, (2008) who argue that sites like Facebook enable users to bypass physical "gating obstacles" to create the "hoped-for" possible selves that they are unable to establish offline. The online self might be socially desirable, but that does not necessarily mean it is not the true self. Even though it is not fully actualised in the real world, the online self can have a very real impact on the person behind it (Zhao et al, 2008). With time and resolute action, it may be possible to close the gap between the 'virtual' and the 'real'.

It is clear that social media, and indeed location sharing systems, are almost ideal spaces for users to manage their self-presentation, and to modify it in response to feedback from their audience and environment. Similarly, they also provide tools for people to actively engage in impression management, inducing favourable reactions from others through their location and online activities. The next section discusses

identity management and the potential tensions experienced when managing multiple facets of the self in technology-mediated environments.

3.3.3 Identity Management in digital environments

A person's social media profile can be seen as a "digital body" where individuals essentially "write themselves into being" (Boyd, 2007). Through such profiles, people can express salient aspects of their identity for others to see and interpret. Users conceptualise an "imagined audience", similar to writers and actors, anticipating what content is appropriate and inappropriate for that audience. Just as writers fictionalise the audience within their writing, social media users speak directly to their imagined audience (Marwick & Boyd, 2010). However, rather than being a "faceless mass", like a TV broadcast audience for example, the social media audience contains familiar faces such as family and friends, making it potentially both public and personal (Marwick & Boyd, 2010).

Further, in navigating social situations, people read and interpret cues from the environment: facial expressions, body language, general atmosphere and present an identity most appropriate for a given situation (Boyd, 2002). In this sense, people maintain multi-faceted identities (Farnham & Churchill, 2011), modifying their behaviour depending on the context. In the absence of physicality, social media can collapse diverse contexts and audiences into one, a phenomenon known as the "context collapse", making it challenging for people to vary identity presentation, manage impressions and "save face" (Marwick & Boyd, 2010). Moreover, while in offline environments, we can visually detect who can overhear our speech, it is virtually impossible to fully ascertain who will be exposed to our expressions online. It also has the potential to be heard at a different time, place and context from when it was originally spoken (Boyd, 2007).

The homogenisation of diverse audiences (Lingel & Tech, 2014) can heighten tensions about sharing information online as a whole. When posting content becomes habitual, people rarely thing about why they are posting (Wang et al, 2011). Threats to individuals' online presence can stem from inability or lack of care in judging the potential audience for a post and its effects (Litt et al, 2014). There can be a fundamental mismatch between the size of the perceived audience and the actual audience in social media (Bernstein et al, 2013). Litt et al, (2014) find that users underestimate their audience on Facebook by a factor of four. This mismatch

between users' perceptions and reality may impact their behaviour, ranging from the type of content shared, frequency and the motivations to share in the first place. Not knowing who is in a potential audience for a post (Marwick & Boyd, 2010) makes it difficult to anticipate whether or not shared content is likely to present a "face-threatening" scenario (Litt et al, 2014). This is perhaps why social networking technologies have been branded as socially translucent rather than socially transparent systems (Bernstein et al, 2013).

To manage tensions about context collapse, users adopt a variety of tactics such as using multiple accounts, pseudonyms and nicknames to obscure their real identities (Marwick, 2005). Dimicco & Millen, (2007) found that participants were very conscious of giving the right impression and experienced tensions when balancing between a social and professional image. In their study, users crafted their profiles for both a professional and non-professional audience. One participant went so far as to purposefully "cleanse" all information about himself on social media, particularly photos of himself "drinking alcohol" in an attempt to avoid misinterpretations when transitioning into the world of work.

Stutzman et al, (2012) found that users of social networking sites maintained multiple profiles; this strategy enabled them to make disclosures to audiences they trusted, without the fear of repercussion. They find that the primary motive for this behavior was the need to manage identity in the eyes of others. Participants were particularly keen to separate their personal and work lives by creating distinct personal and professional identities. They found two primary forms of boundary regulation: the first was the creation of multiple profiles on the same site termed as "regulation by site" by the authors; the second was "regulation by linkage" where a connection was made between multiple identities that crossed an established boundary (e.g. retweeting between twitter profiles).

Farnham & Churchill, (2011) argue that life is segmented because various facets of our identity are "incompatible". Behaviour deemed appropriate to one identity or role might be harmful to another. Computer mediated environments can open the door for leakage between "public spheres that hither-to-fore would have been easily kept separate" (Farnham & Churchill, 2011). They discovered that levels of identity faceting correlated with the extent to which people tended to have incompatible roles and identities. Younger, working men without children reported the highest levels of incompatibility across facets; women with children showed lower levels of identity

faceting. Email and social networking were found to be two distinct communication tools. Participants used Facebook to keep in touch with extended networks; and used email for more private, bounded sharing across more diverse areas of their lives. People with higher levels of faceted identity interestingly had higher usage of social technologies but also expressed more worry about sharing overall. The authors conclude that while people may over share than not share at all, they would prefer to focus their sharing across different parts of their lives. Such tools may improve user experience of social media, they argue, because users would benefit from the advantages of broadcast, network-based sharing, and the control provided by contextual boundaries. Focused sharing is something that is specifically addressed in the field study detailed in chapter 6.

The theories of Farnham & Churchill, (2011) about faceted identity and bounded contexts are corroborated by other studies. Wang et al, (2011) conducted a study on regrets experienced when posting content on Facebook. They revealed that most of the regrets stemmed from sharing content on: consuming drugs and alcohol, sharing sensitive topics such as sex, religion and politics, venting personal and family issues, comments about work and others. One example of a regrettable post is a participant who posted a photo of himself smoking “hooka”, while not quite appreciating the diversity of his audience. This action led to him losing his job for projecting an unprofessional image. The authors observe that one of the causes for regrettable posts is because the “wrong self-image” reaches an unintended audience. Those who shared photos of themselves drinking alcohol for example, did so because it was the norm among their friends. However, while it was acceptable or even encouraged in some of their social circles, it clashed with the norms of other contexts (e.g. professional). Another cause was posting while in a “hot state” — highly emotional states such as anger or frustration or even positive emotions such as happiness, excitement or euphoria. These examples show the perils of sharing content in inappropriate contexts. The subsequent consequences may not just be minor misunderstanding or embarrassment but also more serious issues such as threats to relationships and loss of employment.

Similarly, Patil et al, (2012b), in their study of regrets in location sharing systems, found that more than a quarter of respondents had experienced regret over a previous decision to share location. The primary reason for this regret was disclosing location to an audience broader than intended. They argue that because location sharing is integrated into social media platforms, it associates one’s location with the

personal information and activities that are maintained by the host platform; this can in turn, exacerbate the problem of "secondary information leakage". Their study finds that the majority of regrets stem not from the act of sharing location per se, but from a "misalignment in the audience for which the information was intended. The seemless integration of location sharing mechansims with socal networking platforms can lead to the context collapse discussed earlier, resulting in regrettable disclosures. This echoes the views of Mancini et al, (2011) who claim that anxieties about how others may perceive or misperceive location is of very real concern to users. They observe that this could be a greater issue for "close social groups". The 'closeness' with a group increases the stakes in a relationship; the more one has to lose; the less one can act as an autonomous agent. They argue, therefore, that location sharing technology could, paradoxically make users more vulnerable (to misinterpretations) than they would be within less cohesive groups. As Brown et al, (2007) also observe, one's location can be an "accountable" matter in that people can be held to account for where and why they are in certain places at particular times.

Xinru Page, (2012) observe that privacy concerns about location sharing stem from a desire for boundary preservation. Online social interaction, they argue, manifests as a privacy issue if it renegotiates relationship boundaries offline. Their study reveals that concerns about boundary preservation have a large, significant effect on all location sharing privacy concerns. This also increases concerns about information overload (from others) and the concern about being compelled to interact with others. Their central argument is that oftentimes, the relationships with those in one's audience are subject to change; for example, someone transitioning from a friend to a colleague. This change in relationship can have implications about what is and what is not appropriate to share with that person. On the other hand, an acquaintance becoming a good friend can prompt increased sharing. In both cases, people defend relationship boundaries — the *who* may stay the same but the *relationship* can change, leading users to revaluate what is appropriate and suitable to share with certain people.

3.4 CHAPTER SUMMARY

This chapter presented an overview of the literature on digital location sharing and wider social media. The discussion of location sharing technology in urban environments revealed that technology is not external to urban space, but rather

situated within the space (Dourish, 2006). It is entwined and enmeshed in the social practice and culture of that environment (Williams & Dourish, 2006). This is reflected in the types of places people share, from the very mundane spaces to those out of the norm. Through the collective movement of people through space, technology, in turn, gives that space its life and meaning (Dourish et al, 2007). Further, location sharing technologies do not view urban spaces as chaotic, but rather as opportunities for interactive experiences that exploit movement and space (Dourish et al, 2007). In this sense, it could be argued that pervasive computing, and indeed location sharing services, are not proposals for how technology *should be*, but how they should be *experienced* (Dourish & Bell, 2007).

Genuine privacy concerns about location sharing have been revealed, mainly stemming from the potential misinterpretation of location by the audience shared with (Toch et al, 2010) and also the potential misuse of location data by the companies who might store it (Scipioni, 2012). People actively use privacy settings to manage their privacy accordingly, giving location access to the apps they feel most require it, and restricting access to others (Zafeiropoulou et al, 2013). However, similar to other forms of technology, there is evidence for the existence of a privacy paradox (Norberg et al, 2007), with an apparent inconsistency between users' perceived and actual behaviour (Barkhuus, 2004) .

Palen & Dourish, (2003) observe that privacy management is a "dynamic response to circumstance rather than a static enforcement of rules". Therefore, privacy concerns may not be constant but malleable, part of a process of "structuration", with certain location sharing decisions establishing new norms in privacy related attitudes and behaviour (Henne et al, 2013).

Participation in digital location sharing is driven by socially oriented motives (Tang et al 2010). The sociality in location sharing is perhaps one of the reasons for its currently wide adoption (Roback & Wakefield, 2013). The sense of enjoyment and feelings of connectedness derived from location sharing may explain its continued use and widespread popularity. Further, being seamlessly integrated into social networking platforms such as Facebook, location sharing is now an intrinsic part of everyday social media activity.

By sharing location, whether explicitly through software such as Foursquare, or through social media platforms such as Facebook and Twitter, users have access to

a vast audience. Research uncovers that this sense of “publicness” is influencing users’ behaviour on social media (Gonzales & Hancock, 2008). People actively engage in self-presentation techniques by “crafting” their online identities as well as generate favourable impressions through particular behaviour (Guha & Birnholtz, 2013). In location sharing systems, impression management techniques are particularly rife in dating applications (Birnholtz et al, 2014).

Rather than being idealised or self-centred, research suggests that participating in social media has emotional and psychological benefits (Burke & Kraut, 2013) including an increase in social capital (Cherubini et al, 2010), an increase in a sense of connectedness (Burke et al, 2011) and a positive impact on self-esteem (Toma, 2010). Further, online profiles may not always be representations of the idealised self, but rather as starting points in actualising the “hoped-for” self of the future (Zhao et al, 2008). In some cases, by constructing the online self and giving it exposure to a public audience, attributes crafted online may become internalised in users’ actual offline behaviour (Gonzales & Hancock, 2008). Therefore, social media may not just be a space for social interaction but also one for self-construction (Gonzales & Hancock, 2008).

Having said that, tensions exist in managing multiple facets of the self in digital environments (Farnham & Churchill, 2011). Sharing to a diverse audience in multiple contexts can lead to a “context-collapse” (Marwick & Boyd, 2010), resulting in not just minor misunderstandings but also serious consequences such as a breakdown of relationships and loss of employment. Patil et al, (2012b) reveal that people experience many “regrets” when sharing location, primarily because of a misalignment between the content and the audience for which it was intended. Although users might be conscious of the “imagined audience” (Marwick & Boyd, 2010), its diversity and complexity is not always truly appreciated.

By having access to a vast public audience, research suggests that location sharing is now a socially-driven activity, often motivated by a desire to connect with others in a social network. Through the sharing of location, users not only convey physical place but also express personality, moods and lifestyle (Barkhuus et al, 2008) (Cramer et al, 2011).

This thesis focuses on the sociality of location sharing and it is in this area where its contributions lie. Thus, it seeks to build on previous research by not only exploring

this territory further but also by framing it specifically in the context of the social identity theory. In other words, it investigates how social identity, the individual's public self, influences the action of sharing digital location and how, by means of that, the self is digitally expressed to others. It does so with the aim of understanding how aspects of offline social behaviour, particularly those discussed in chapter 2, translate and manifest themselves in location sharing systems. This has merit not just in contributing to digital social media research, but also in helping to inform the design of future location sharing platforms.

The objective of the first study is to understand how social identity is exhibited in current 'location aware' social media. Patil, (2012a), in researching the motivations behind location sharing, suggest that it can be motivated by a need to connect with one's social network. This can be interpreted as preliminary evidence that digital location sharing is a means of projecting social identity. While such research provides useful insights into some of the reasons for sharing location, there is much scope for studying the specific relationship between identity and place. What has not been explored is *how* individual identity is reflected through the locations shared on social media. In other words, is where you are a reflection of who you are as a person? In addition, what are the specific ways in which users convey their identity to others in their social network? These topics are some of the key aims of study 1.

Further, although Patil et al, (2012b) explored some of the regrets experienced when sharing location, the particular *methods* by which identity is actually managed in location sharing systems is yet to be explored. While Stutzman et al, (2012) offer some insight into this, they do so through the lens of wider social media and not digital location sharing. Investigating identity management in location sharing systems not only provides insight into the adequacy of existing systems from this standpoint, but also has the potential to uncover issues that could help inform the design of future systems. Digital identity management is a topic explored in both studies 1 and 2.

Finally, while impression management has been studied extensively in social networking platforms, it is rather understudied in location sharing systems. Tang et al, (2010), Lindqvist et al, (2011), Patil et al, (2012b) provide some preliminary evidence but only as minor findings emerging from wider research aims. Cramer et al, (2011) and Guha & Birnholtz, (2013), on the other hand, do explore some of the impression management strategies employed by location sharing users. There is

scope to build on this research, not just in understanding how digital locations are used for impression management purposes, but also in investigating the particular types of personalities more likely to exhibit this behaviour[10]. By doing so, it helps develop a deeper understanding of the transformation of location sharing from a largely passive activity — one done in response to specific requests — to one driven by particular social motives.

The relationship between location and identity, how identity is managed in location sharing systems, and how users engage in impression management through their location is the focus of the first exploratory research study of this thesis, as detailed in chapter 5. Exploring these topics is the first step in investigating how social identity is manifested in digital location sharing. The findings emerging from this study help determine the direction of subsequent research studies.

The next chapter discusses the methodology employed in this thesis. An overview is given of each method and a justification is provided for its relevancy during different stages of the research.

[10] It should also be noted that the first study of this thesis was conducted in 2011. Some of the papers cited in this chapter such as Patil, (2012a), Patil et al., (2012b) and Guha & Birnholtz, (2013) were published after this period. Although there might be some overlap in findings, the first study, together with the results emerging from it, should be interpreted as running in parallel with such research.

CHAPTER 4
RESEARCH METHODS AND APPROACH

4.1 RESEARCH APPROACH

To investigate how social identity influences digital location sharing, this thesis looks at the subject from both empirical and epistemological perspectives. At each stage of the research, appropriate methods were only selected after clear definition of the research questions. To answer these questions, a mixed methods approach was adopted throughout. While purists argue for either an exclusively quantitative or qualitative approach, a mixed methods strategy is regarded as the *pragmatism in the middle* (Johnson et al, 2007); one that combines quantitative and qualitative research, allowing both philosophies to peacefully co-exist. Mixed methods offer greater flexibility, enabling researchers to utilise the most suitable methods available to answer the research questions (Tashakkori & Creswell, 2008). Therefore, rather than an uncompromising allegiance to a particular methodology, this research is guided by the specific research objectives in each study, harnessing the benefits of both quantitative and qualitative methods where it is deemed most appropriate.

This chapter explains the research methods used in the thesis. Firstly, a table is provided (Table 4.1) that gives an overview of the specific methods used in each study. Then, each method is discussed in turn, highlighting their benefits, limitations and potential challenges. At the end of each section, a justification is given for why those specific methods were used during different stages of the research.

4.2 SUMMARY OF METHODS EMPLOYED

Method	Strengths	Purpose	Study employed in
Data Capture			
Web surveying	- Rapid, cost-effective method of reaching large audiences. - Potentially faster responses. Internet surveys can be completed in familiar environments and at participants' own time of convenience. - Digitised format eliminates need transcription or digitisation.	- To elicit user attitudes toward location sharing as it relates to social identity. - To disseminate survey to a large audience.	Study 1 (Chapter 5)
Interviews	- Useful in exploring participants' personal opinions and meaning of particular phenomena. - Encourages interviewee to generate ideas and share personal insights that can be difficult to capture using quantitative techniques.	- Used to provide further insight to quantitative datasets. - Helped explore users' subjective opinions and interpretations of the subject matter, thereby providing context to numerical data and a deeper understanding of the phenomenon being studied.	Study 2 (Chapter 6) Study 3 (Chapter 7)
Field studies	- Enables phenomena to be studied in real-world environments. - Users can take part in familiar settings rather than laboratory-based environments. - Can provide insights into actual user behaviour rather than that which is perceived.	- Used to deploy technology in a real-world setting and study actual user behaviour 'in the wild'.	Study 2 (Chapter 6)

Technology Probes	- Enables exploration of new technology ideas. - Focuses on experimentation rather than final implementation. - Technology probes can be thought provoking, encouraging reflection and exploration, thereby helping to formulate new design ideas and new forms of interaction.	- Used to experiment with two different methods of sharing location. - Ensured software functionality was only to a level sufficient for experimentation and thus void of any extraneous functionality that might bias study results.	Study 2 (Chapter 6)
Repertory Grid	- Means of understanding how people make 'sense' of things by eliciting people's inner perceptions, attitudes and conceptualisations. - Provides insight into people's 'unconscious' knowledge by surfacing interpretations that are not verbally articulated. - Encourages participants to explore their own thought processes with minimal input from the interviewer.	- Used to elicit users' inner perceptions and interpretations of different location sharing situations. - Helped develop a preliminary understanding of the personal meanings behind location sharing scenarios and helped reveal how locations are mentally categorised.	Study 3 (Chapter 7)
Data Analysis			
Factor analysis	- Useful in identifying key variables (factors) behind large items of data. - Can help reduce large data sets considerably.	- Used to analyse quantitative data emerging from web survey. Helped identify common variables (factors) in the data set. - Used to develop a measurement of location sharing attitudes.	Study 1 (Chapter 5)
Thematic analysis	- Useful in identifying patterns of similar semantic	- Used to analyse qualitative data in all three research	Study 1 (Chapter 5)

	meanings in qualitative data. Similar meanings can then be partitioned into themes as part of cohesive narrative. - Simple and effective means of analysing qualitative data.	studies. Helped identify common themes in data and uncover agreement between participants on relevant issues.	Study 2 (Chapter 6) Study 3 (Chapter 7)
Cluster analysis	- Can help uncover patterns of similar meaning, or clusters, in quantitative data. - Especially useful in analysing complex datasets by quickly revealing consistent patterns of data.	- Used to analyse quantitative data emerging from repertory grid. Helped uncover clusters of similar meanings behind location sharing scenarios.	Study 3 (Chapter 7)
Principal Components Analysis (PCA)	- Similar to cluster analysis, PCA reveals distinct patterns of meaning. - Unlike cluster analysis, data plotted visually on a grid. - Can help reveal interactions between different data points.	- Used as a follow up to cluster analysis, presenting results visually on a grid. - By revealing interactions between elements and constructs, helped identify how location sharing scenarios were mentally categorised.	Study 3 (Chapter 7)

Table 4.1: Summary of methods employed during different stages of research

4.3 MIXED METHODS RESEARCH

For over a century, quantitative and qualitative researchers have debated about the legitimacy of their own respective paradigms. As a result, purists have emerged on both sides (Johnson & Onwuegbuzie, 2004). Quantitative purists hold what is commonly known as a *positivist* philosophy (Yu, 2003). They argue that social science study should be objective, that researchers should remain emotionally detached from the objects of the study, and that social scientific outcome can be determined reliably and validly. Their preferred writing style uses the impersonal passive voice and technical terminology. On the other hand, qualitative purists incline

toward what is known as *constructivism* (Lincoln & Guba, 2000). Contrary to positivists, they argue that research is value bound, making it impossible to fully differentiate the causes from the effects; that explanations are generated inductively from the data, and that the knower and known cannot be separated because the subjective knower is the only source of reality (Guba, 1990). Qualitative purists prefer to write impassively; their writing tends to be rich, detailed descriptions and interpretations of the phenomena being studied (Johnson & Onwuegbuzie, 2004).

Mixed methods research seeks to find the middle ground between these two opposing positions. Rather than the puritanical approach to educational inquiry, mixed methods research seeks to blend the two paradigms, seeking to harness the strengths of both approaches. Mixed methods research is formally defined as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (Johnson & Onwuegbuzie, 2004). Johnson & Onwuegbuzie, (2004) further state that it sits at the middle of the continuum, and that "mixed methods research sits in a new third chair, with qualitative research sitting on the left side and quantitative research sitting on the right side". This stance is also called the *pragmatism in the middle,* enabling both quantitative and qualitative philosophies to peacefully co-exist (Johnson et al, 2007).

The central argument behind mixed methods research is that the methodology should be guided by the specific research questions, meaning the methods employed should be those that offer the best chance of answering those research questions. In other words, the methodology should *follow* clear definition of the research objectives. Further, the modern research world is becoming increasingly interdisciplinary, complex and dynamic, and as such, researchers need to have "a solid understanding of multiple methods used by other scholars to facilitate communication, to promote collaboration, and to provide superior research" (Johnson & Onwuegbuzie, 2004). Mixed methods research offers a pragmatic, balanced or pluralist position that helps improve communication among researchers from different paradigms as they attempt to advance knowledge (Maxcy, 2003).

Johnson & Turner, (2003) stress the *fundamental principle of mixed research,* which is that researchers should collect data from multiple methods and strategies so that the resulting combinations are likely to result in complementary strengths and nonoverlapping weaknesses. This is an important justification for a mixed methods

approach, because the argument is that the resulting product can be potentially superior to that produced by single, mono-method studies. For example, following up experiments with qualitative interviews can be used as a means of directly discussing the issues being studied, enabling the participant to elaborate and give their perspective and meanings, which may help avoid potential problems with the experimental method. Conversely, a mixed method researcher might want to supplement qualitative interviews with closed-ended questionnaires to quantitatively measure important factors found in the literature. The goal of mixing, therefore, is not to search for corroboration, but to expand one's understanding (Onwuegbuzie & Leech, 2004).

Johnson & Onwuegbuzie, (2004) propose that mixed methods research is of two types: mixed-model and mixed-method. In mixed-model, qualitative and quantitative approaches are mixed within or across stages of the research process. An example of this approach is a questionnaire that contains a (quantitative) rating scale and also one or more open-ended (qualitative) questions. In mixed-method, a qualitative and quantitative phase is included in the overall research study. For example, conducting a field experiment that collects quantitative data and then following up with a qualitative interview phase.

The mixed method approach to research is not without criticism. Some of the justifications for conducting mixed research can be problematic. One argument is that mixed methods provide an additional perspective (i.e. not just quantitative or qualitative but both). However, an additional data set relevant to the research question, or any additional analysis of a given data set would provide an additional perspective regardless. Therefore, the additional perspective is a necessary but insufficient condition for the justification of mixed methods research (Bergman, 2012).

It is also necessary to clarify *what* is being mixed and *how* it is being mixed. The mixing may be nothing more than the sequential use of different methods, or it may be that different methods are being fully integrated into a single analysis (Caracelli & Greene, 1997). Greene et al, (1989), following their review of 56 mixed methods studies concluded: "Our own thinking to date suggests that the notion of mixing paradigms is problematic for designs with triangulation or complementary purposes, acceptable but still problematic for designs with a development or expansion intent, and actively encouraged for designs with an initiation intent". An unclear purpose for

adopting mixed methods can also lead to confusion. Some studies may not be considered mixed method at all because they do not give recognition to the full contribution of each method (Patton, 1988).

If methods are mixed without careful consideration of the specific assumptions or rules on how they should be applied, “corruption of those methods can occur such that results obtained by them become subject to question” (Bazeley, 2004). If just a few qualitative interviews are conducted to supplement quantitative data, it can “cheapen” qualitative methods (Bazeley, 2004), and can, according to one author, be compared to the difference between loving intimacy and a one-night stand (Patton, 1988).

What is clear from the literature is that employing a mixed method approach should not be based, as tempting as it is, on the whim of the researcher; to merely supplement one method with the other, but rather through careful consideration of the strengths of each method in answering research questions. As such, the methodology should *follow* clear specification of the research objectives. In the presence of ardent disputes among purists, perhaps the middle ground is what Johnson & Onwuegbuzie, (2004) call the *contingency theory* which accepts that quantitative, qualitative and mixed research methods are all superior under different circumstances. Ultimately it is the task of the researcher to examine the specific contingencies and decide which approach, whether mixed or otherwise, is most appropriate to answering the research questions posed by a particular study.

How mixed methods were used in the research

This research is interdisciplinary in nature and therefore utilises a diverse set of techniques to achieve the research objectives. A flexible, pragmatic mixed methods approach meant that the research was guided not by any specific methodology, but by the research questions defined in each study. Appropriates methods were only selected following clear definition of the research questions. In the first study, a “mixed-model” approach (Johnson & Onwuegbuzie, 2004) was adopted; in addition to quantitative likert-scale items, qualitative open-ended questions were included at the end of the survey to explore the subject matter in greater detail. For example, although factor analysis was useful in quantitatively exploring topics like the projection of identity through location, impression management and identity management, open-ended questions aided in understanding *how* identity is projected

through location sharing, *how* people engaged in impression management and the specific *strategies* used to manage identity in digital location sharing environments. Such data would have been impossible to capture through quantitative methods alone.

In the second study, an experimental design investigating the impact of location sharing based on facets of identity, a "mixed-method" strategy was adopted, as described by Johnson & Onwuegbuzie, (2004). An interview phase was conducted after completion of a field experiment to elicit users' particular opinions and experiences of the mobile applications used in the study. It also provided insight into *why* certain quantitative results occurred. With the study being comparative, this helped in making inferences about the advantages and disadvantages of one location sharing approach in comparison to the other. Again, this level of insight would not have been possible through a solely quantitative approach.

In the third study, which was an exploration of the personal meanings behind location sharing situations, a "mixed-method" (Johnson & Onwuegbuzie, 2004) approach was adopted again by including a structured interview phase. This helped probe users' reasons and motivations for sharing to particular audiences over others, enabling participants to elaborate on why they made the choices they did during the lab session.

The mixed methods strategy employed in this research follows the principle proposed by Johnson & Turner, (2003), which suggests that the use of multiple methods should be inspired by a desire to increase the likelihood of achieving complementary results. Mixed methods provided the flexibility to select the most suitable methods for answering each research question in the thesis. It is acknowledged that both quantitative and qualitative methods, on their own, have many strengths. However, a combination of both perspectives empowers the researcher to harness the strengths of each in achieving their research objectives, and in doing so, they can enjoy 'the best of both worlds'.

4.4 SURVEYS

Surveys are a popular method for data collection across many fields including HCI. They are frequently used to analyse behaviours, to describe populations and to explore uncharted waters (Lazar et al, 2010). Surveys are essentially a set of written

questions that an individual is asked to respond to. They are usually self-administered without the researcher present.

In surveys, likert-scales are commonly used measure people's subjective interpretations, attitudes and opinions toward given questions. Questions are often in the form of statements such as "Mobile devices have positively contributed to my social life"; individuals then respond by indicating their level of agreement with a given statement on a scale anchored with verbal response descriptors such as 'strong agree', and 'strongly disagree. Scales are typically five point and seven-point (Lazar et al, 2010) and sometimes even ten and eleven point (Loken et al, 1987).

Until the 1980s, surveys were administered through face-to-face interviews (Groves, 2011). Up to the end of the 20th century, this method declined in favour of quicker and more economical techniques such as telephone surveys (Couper, 2011). Today, due to the ubiquity of the web, surveys are now typically self-administered online.

One of the key advantages of web surveying, is the potential access to large samples sizes that is difficult to achieve through traditional techniques. For example, Nosek et al, (2002) collected over 2.5 million responses in tests of implicit attitudes and beliefs. Internet surveys are also more cost effective than other techniques (Reips, 2002). Although they are typically administered through specialised survey software, the cost of email surveys are not dependant on the number of participants solicited (Matsuo et al, 2004).

The online survey can have other advantages such as the speed of responses. Matsuo et al, (2004) cites an example of an online survey project of 1870 respondents in which about 35% responded within 24 hours of receiving the bulk email; 25% within 48 hours; 20% within 72 hours and 15% within a week. Online surveys can be completed rapidly, sometimes while performing other tasks online, without having to break away from the current activity, as might be the case with a paper survey for example.

Data in an internet survey is by its nature, digitised. Software such as SurveyMonkey[11], Bristol Online Surveys[12], and Qualtrics[13] enable data to be

[11] https://www.surveymonkey.com
[12] http://www.survey.bris.ac.uk
[13] http://www.qualtrics.com

downloaded immediately, often in tabulated Excel format. Quantitative data can easily be imported into SPSS[14]; qualitative data such as responses to open-ended questions can be converted to MS Word. Alternative methods such as mail and telephone surveys often go through arduous data clean up, conversion, and transcription processes that have to be specifically planned for at the start of a surveying project.

Web experimenting can also benefit from ecological validity because participants remain in familiar settings, so any effects are not attributable to being in an unfamiliar surrounding (Reips, 2002). They also have a high degree of 'voluntariness' because of fewer constraints on the decisions made by participants and fewer pressures to continue experimentation. This makes web-based surveys more authentic and therefore generalizable to a large set of situations (Reips, 2002).

It can be argued that the greater pace of web-based tasks, especially in the presence of distracting factors (e.g. internet browsing, email browsing, music etc.) can result in a poor completion of the survey (Leeuw, 2005), (Heerwegh, 2009), (Heerwegh & Loosveldt, 2008). Traditional methods such as postal surveys, on the other hand, require specific time allocation, and are completed calmly without the same level of distractions. Some research has shown that internet surveys can have higher item non-response rates (Manfreda & Vehovar, 2002), higher drop-out rates (Brecko et al, 2006), and elicit more 'don 't know' responses (Heerwegh, 2009) in comparison to their traditional counterparts. So the question at this point is: does running an internet survey carry the risk of poorer quality of data?

Rada & Dominguez-Alvarez, (2013), in their study of the response quality of paper and web questionnaires, report that internet surveys are actually completed with higher quality. They found that web questionnaires had a lower number of unanswered questions, more detailed answers to open questions, and longer answers to questions than those generated from paper questionnaires (Rada & Dominguez-Alvarez, 2013). The richness of qualitative data from web questionnaires is also supported by Matsuo et al, (2004). In addition, the social desirability bias, where people try to portray themselves in a more favourable light, is reduced in internet surveys (Heerwegh, 2009).

[14] http://www-03.ibm.com/software/products/en/spss-statistics

Internet questionnaires do carry risks, chiefly higher item non-response rates and higher drop-out rates. However, such risks can be reduced through good planning and design (Reips, 2002). The potential benefits of web-based experimenting, namely: access to large sample sizes, speed of responses, cost-effectiveness, and the speed and precision of data compilations, make internet surveys a quick and reliable method of data collection for researchers.

How surveys were used in the research

The first study in this thesis is a user survey that explores the exhibition of social identity in location-aware social media. It is therefore self-reporting, probing users' attitudes toward location sharing vis-à-vis their social identity. The sample targeted includes users who share their location via Facebook, Twitter, Google+, Foursquare and other platforms that enable digital location sharing.

The survey was administered online and was advertised primarily via the web. The web surveying method had several advantages over alternative methods such as face-to-face, telephone or postal surveys. Firstly, the speed and convenience of this method meant that the survey could be constructed quite rapidly. Thus, efforts could be focused more on formulating appropriate questions for the survey without the need for a comprehensive, logistical survey distribution strategy that otherwise, would have to be specifically planned for as part of the study. The actual compilation of the survey carried no financial cost making it particularly cost-effective. Financial resources could therefore be reserved for other purposes such as participant incentives and subsequent research studies.

Secondly, because the survey was entirely web-based, it could be advertised in a number of places and a large audience could therefore be accessed. This was beneficial not only from a data collection standpoint but also meant that an adequate sample size could be attained for factor analysis. Adverts were distributed through online channels such as university mailing lists, online forums, Tweets, Facebook posts and Foursquare tips. Each advert contained a simple web link that provided immediate access to the survey. A web link was also printed on paper adverts along with a QR code, giving mobile users access via their mobile device. These were then placed in two campuses of the University of Nottingham. Other methods such as postal surveys would have been more challenging to plan and organise, not least

from a logistical standpoint. Even after adequate planning, for practical reasons, the sample size would also have been limited.

Thirdly, web survey completion statistics could be monitored during the data collection process. This meant that the distribution strategy could be modified if required. In our case, the number of distribution channels such as mailing lists, online forums and paper adverts were increased when completion rates experienced a steady decline during certain periods of data collection.

Fourthly, web surveying ensured that the data was, by its nature, digitised. This removed the need for arduous, time-consuming digitisation — tasks commonly associated with postal surveys for example. Quantitative data could be imported directly into SPSS for analysis. Qualitative data, in the form of open-ended questions, did not require transcription and analysis could begin soon after the data was collected.

Fifthly, as argued by Reips, (2002), web surveying can benefit from ecological validity because participants remain in familiar settings without the need to be physically present to take part in experimentation. Any effects, therefore, are not attributable to being in unfamiliar surroundings or being in the presence of a researcher. Participants were able to complete the survey in their own time, on both desktop and mobile devices.

As discussed, one of the disadvantages of web experimenting is the potential for higher non-response rates (Manfreda & Vehovar, 2002) and higher drop-out rates (Brecko et al, 2006). These drawbacks were managed by firstly ensuring that the survey could be completed as easily as possible. The survey was also entirely anonymous; no personally identifiable information about respondents was recorded. Although it could be argued that anonymity can increase the potential for participant withdrawal, it can also increase the sense of “voluntariness” (Reips, 2002) due to the absence of perceived compulsion to take part, as might be the case in face-to-face surveys for example. This can, according to Reips, (2002), make web surveying more generalizable to a large set of situations.

Furthermore, all open-ended questions were kept optional and placed at the end of the survey to reduce the risk of participant dropout. Participants were also incentivised with a potentially high financial reward (prize draw entry to win one of

three £100 shopping vouchers). Despite taking these precautions, drop-outs did occur, mostly at the beginning for the survey. However, the overall sample size was high and certainly adequate for factor analysis. In sum, the cost-effectiveness, potential access to a large sample size, ease with which surveys can be compiled and the speed of responses from participants made web experimenting the stronger option for our research purposes.

4.4.1 Analysing survey data: factor analysis

A common method for analysing survey data is factor analysis. Factor analysis is especially useful for analysing surveys that contain a large number of items (variables). It is considered the method of choice for interpreting self-reporting questionnaires (Williams & Brown, 2012). It can reduce a data set considerably, giving a clearer view of the data, thereby making analysis and interpretation easier. It does so by bringing intercorrelated variables together under more general, underlying variables called factors. Factor analysis also establishes underlying dimensions between measured factors and latent constructs, thereby allowing the formation and refinement of a theory (Taherdoost et al, 2004).

Factor analysis has origins dating back 100 years through the work of Pearson and Spearman (Spearman, 1904). However, it was not until the widespread availability of computers and modern statistical packages that it became popular as an analytical technique (Kieffer, 1999). It is commonly used in the disciplines of psychology, social science, and education.

There are two primary types of factor analysis: Exploratory Factor Analysis and Confirmatory Factor Analysis. Exploratory Factor Analysis is used when the researcher does not have any expectations of the nature or number of factors. It enables the exploration of the main variables in a data set to formulate a theory or model. In contrast, Confirmatory Factor Analysis is used to test a proposed theory, and as such, has assumptions and expectations on priori theory about the number of constructs, and “which construct theories or models best fit” (Williams & Brown, 2012).

One of the key steps in performing factor analysis is determining the adequacy of sample size. There are varying positions, and several guiding rules of thumb in the literature. This lack of agreement regarding sampling adequacy was noted by

Hogarty et al, (2005) who stated that these “disparate recommendations have not served researchers well”. Tabachnick & Fidell, (2007) suggest that at least 300 cases are needed for factor analysis; Hair et al, (1995) suggest that sample sizes should be 100 or greater. Comrey, (1973) rated sample sizes as follows: 100 as poor, 200 as fair, 300 as good, 500 as very good, and 1000 or more as excellent. However, MacCallum et al, (1999) state that such rules of thumb can be misleading because they often do not take into account the many complex dynamics of factor analysis. They state that when communalities are high (greater than .60), and each factor has several items, sample sizes can actually be relatively small. Guadagnoli & Velicer, (1988) state that solutions with correlation coefficients greater than .80 require smaller sample sizes, while Sapnas & Zeller, (2002) argued that even 50 cases may be adequate for factor analysis.

Although a popular statistical approach, factor analysis, particularly exploratory factor analysis, has come under some criticism largely because results are based on the subjectivity of the researcher. Tabachnick & Fidell, (2007) state, “decisions about number of factors and rotational scheme are based on pragmatic rather than theoretical criteria”. Thompson, (2004) claims that the ease with which factor analysis can be performed and reported can make it pleasurably “addictive”. Henson & Roberts, (2006) advise that to limit the subjectivity of factor analysis, “the researcher must be systematic, thoughtful, and apply sound judgement to latent variables and factor reduction and construction”.

The actual steps involved in performing factor analysis are discussed in detail in chapter 5.

How factor analysis was used in the research

In the first study, exploring the exhibition of social identity through digital location sharing, factor analysis was used to develop a measurement of location sharing attitudes among users of social media. It helped identify the main variables, called factors, in the quantitative data set; this gave insight into how social identity might be exhibited in location-aware social media platforms. The factors discovered included the projection of identity through digital location sharing, a self-awareness of how that location is interpreted and evidence for impression management. Open-ended qualitative questions were used to explore these issues in greater detail, revealing users’ personal opinions and perspectives about them.

The speed and convenience of the web surveying method resulted in an initial sample size of 241 responses. After removing incomplete surveys and responses from those who did not meet the survey criteria, the sample size was still a respectable 189 participants. More importantly, the sample was adequate for factor analysis; within the guidelines specified by Hair et al, (1995), and well within those suggested by Sapnas & Zeller, (2002).

As mentioned previously, factor analysis has received criticism partly due to its reliance on subjectivity during aspects of the analysis process. For example, although factor analysis can uncover underlying variables, it is left to the researcher to identify what those factors mean from a semantic perspective. The actual naming of factors, therefore, is quite a subjective process. To reduce the risk of bias, two independent researchers analysed the final items and provided their own independent factor names. The factor names were finalised only after discussions with these other researchers.

Through the discovery of primary factors, factor analysis was beneficial in the exploration of location sharing attitudes pertaining to social identity. A combination of quantitative factor analysis and qualitative open-ended questions helped establish a basis for the research. This was vital in not only facilitating an early stage exploration of the subject matter, but was also important in determining the direction of subsequent studies.

4.5 INTERVIEWS

The interview is a very useful qualitative data gathering technique involving direct communication between the researcher and participant. Direct conversations help obtain participants' views and perspectives on a subject matter and provide useful data that quantitative surveys may miss. Interviews can be used to explore meanings and attitudes to gain a better understanding of prior hypotheses. In this form, qualitative interviewing encourages the interviewee to share rich descriptions of phenomena while leaving the interpretation and analysis to researchers (Warren & Karner, 2009). Today, an increasing number of researchers are using interviews as part of a mixed-methods approach, such as *triangulation,* combining several methods to achieve broader and sometimes better results (DiCicco-Bloom & Crabtree, 2006). Interviews are used as a qualitative data capturing tool in a variety of disciplines including clinical sciences, sociology and HCI.

There are numerous forms of interviews. The most common type is individual, face-to-face but they can also take the form of face-to-face group interviewing (also known as focus groups), or telephone interviewing (Fontana & Frey, 1994). The degree of structure imposed on an interview can vary along a continuum but there are mainly three main types: structured, semi-structured and unstructured (Fox, 2006). Structured interviews use a rigid script, presenting questions in a well-defined order; the script is followed throughout the interview with no room for asking questions out of order or adding questions not found in the script. Semi-structured interviews have more flexibility. The interview may start with a list of questions, but the researcher is free to "let the conversation go where it may" (Lazar et al, 2010) and can ask probing questions and even omit questions if the situation requires. Unstructured interviews offer the greatest level of flexibility and can simply be based on a list of topics or questions known as an interview guide (Robson, 2002). An initial question may be used as a prompt to start the interview but the researcher can then listen and allow the interviewee to discuss topics of their choosing, within the confines of the subject matter, and respond as they see fit.

The primary advantage of interviewing is the ability to "go deep" (Lazar et al, 2010). Interviews allow detailed questions to be asked and can explore a wide range of issues about the subject being discussed; interviewees can therefore provide thorough, insightful responses that can otherwise be very difficult to capture. Questions can trigger reflection and consideration, thereby encouraging participants to generate ideas and share insights that would have been lost to surveys (Lazar et al, 2010). The qualitative interview can also contribute to a body of knowledge that is conceptual and theoretical, based on the meanings that life experiences hold for the interviewees (DiCicco-Bloom & Crabtree, 2006). By allowing people to 'speak for themselves', they can also potentially increase the validity of data (Fox, 2006)

Interviews can, however, present the challenge of controlling potentially unbounded discussions (Lazar et al, 2010). They require skill, both interpersonal and research-oriented, to know what questions to ask and what issues to probe, and can therefore be much more difficult to conduct than surveys. Interviews are also typically quite long in duration, usually one hour or more, which means that the sample size is relatively small when compared to surveys. Analysis can be long and tedious; transcribing personal notes and interview data can take a great deal of time, as much

as 10 hours for single hour of audio recording (Robson, 2002), before any analysis can be performed.

To conduct interviews effectively, it is important for the researcher to rapidly establish rapport with the interviewee (Douglas, 1985). Establishing rapport involves having trust and respect for the participant and the information they share; it is also a means for creating an environment that the participant feels comfortable in to share their personal experience and knowledge.

The interviewer is required to play a neutral role, known as 'balanced rapport'; which means that he or she must be casual and friendly on the one hand, but also directive and impersonal on the other (Fontana & Frey, 1994). This requires perfecting a style of "interested listening" that rewards the respondent's participation but does not evaluate responses (Converse & Schuman, 1974). Nonverbal elements are also important because they inform and set the tone for the interview: looks, body postures, long silences are all significant during the interview process (Fontana & Frey, 1994). As Fontana & Frey, (1994) observe, interviewers cannot remain "objective and faceless", but must treat the interviewee, as obvious as it may sound, as a human being whose individual perspective on the world must be valued and respected. They state that "as long as many researchers continue to treat respondents as unimportant, faceless individuals whose only contribution is to fill one more boxed response, the answers we, as researchers, will get will be commensurable with the questions we ask and with the way we ask them."

One of the most common types of techniques for analysing interview data is content analysis (Corbin & Anselm, 2008). Interviews are examined for patterns of usage, including frequency of terms, that provide indications of the important concepts in the text and the relationships between them (Lazar et al, 2010). The structure of the interviewee's responses can provide meaningful hints about what they find important and why (Robson, 2002). For example, Magenheim et al, (2010) used content analysis to analyse expert interviews. Related to content analysis is thematic analysis which is a method for identifying, analysing, and reporting patterns, known as themes, within data (Braun & Clarke, 2006). The data is initially coded and then similar codes are sorted to identify overarching themes that closely reflect the content. Alternative methods for analysing qualitative data are Interpretative Phenomenological Analysis (IPA) and Grounded Theory. IPA is a suitable approach to explore in detail how participants make sense of their personal and social world; it

enables the analysis of the personal meanings that particular experiences, events and states hold for participants (Smith & Osborn, 2007). Like thematic analysis, the analysis procedure involves identification of themes directly emerging from qualitative data that are then expanded upon as part of a cohesive narrative. However, the objective of IPA is to provide a very detailed interpretative account of individual cases, and as such, is recommended for use with very small sample sizes; some arguing that a single case study is sufficient (Smith, 2004), others suggesting samples as small as five or six cases (Smith & Osborn, 2007). Grounded theory (Charmaz, 2006), on the other hand, stem from a broad theoretical framework. The purpose of grounded theory is to develop theory about social phenomena, with that theory being grounded in and emerging from systematic analysis of data (Goulding, 1999). Software tools now exist to perform qualitative analysis including Atlas.ti[15] and NVivo[16].

Although the sample size for interviews is usually considerably lower than surveys, how many interviews are actually enough? With qualitative interviewing, the number or type of respondents cannot be entirely specified in advance. The details of who is to be interviewed, how respondents are to be found and what will be asked, may all emerge during the study (Seidman, 1998). There is a temptation to conduct as many interviews as possible, for example all surgeons in a hospital, but this can be very wasteful. It is entirely feasible that after interviewing three people, all subsequent data becomes repetitious (Fox, 2006). This process, where interviews stop yielding new types of information can be termed as *empirical saturation,* and ending studies at that point is standard practice (Francis et al, 2010). However, there is no formal definition to identify saturation, leaving researchers to identify it through mere intuition (Witschey et al, 2013).

Others suggest more specific figures, in the range of between a dozen and 60, with 30 being the mean (Baker et al, 2012). Warren, (2002) suggest that the minimum number of interviews need to be between 20 and 30 for an interview-based qualitative study to be published. Gerson & Horowitz, (2002) suggest that “fewer than 60 interviews cannot support convincing conclusions and more the 150 produce too much material to analyse effectively and expeditiously”. On the other hand, there have also been seminal works based on a long interview with just one person (Baker et al, 2012). These contrasting positions suggest that there is quite a lot of variety in

[15] www.atlast.ti
[16] www.timberlake.co.uk

what is believed to be the minimum requirement. Psathas, (1995) states that sampling from a population is not an issue because it is never possible to say in advance what an instance is a sample of. The aim is not for empirical generalisation, but rather, each analysis must be fitted to the case at hand, and each must be studied to provide an analysis that is "uniquely adequate" for the particular phenomenon being studied (Psathas, 1995). Therefore, the sampling adequacy, at least in the case of qualitative analysis, is not guided by specific figures, but rather through the type of question being addressed and the methodology being proposed. A very small sample can produce a study with depth and significance; it largely depends on the research questions being investigated, and how the researcher conducts the study and constructs the analysis (Baker et al, 2012).

How interviews were used in the research

As discussed, the primary advantage of interviews is the ability to "go deep" (Lazar et al, 2010). Qualitative interviews were used in both the second and third studies of this research. In the second study, interviews were conducted following technology deployment in the field to capture users' individual experiences of using two mobile applications. The interview phase augmented the quantitative data collection phase by providing context to quantitative results. It helped assess the effectiveness of each mobile app in the areas being studied, and also helped capture users' overall experiences of using the software over a 14-day period. The interview was semi-structured: this enabled particular research themes to be explored while also providing flexibility for users to expand and elaborate on other related issues that were of interest.

In the third study, the repertory grid (see section 4.7) was supplemented with a contact sorting exercise that aimed to discover the particular audiences attached to different location sharing scenarios. At the end of the session, an interview was conducted to understand the specific reasons and motivations for sharing location in different situations. This meant that users could elaborate on why certain audiences were chosen over others. It also helped uncover some of the key factors influencing location sharing decisions. On this occasion, the interview was structured so that specific questions could be asked and participant responses, in relation to the research questions, could be kept structured and organised.

All qualitative data was analysed using thematic analysis. Thematic analysis enables theories and interpretations to be devised through exploration and analysis of qualitative data. It can be more thorough than content analysis because it allows patterns of semantic meaning, or themes, to be discovered from the data being analysed. Information can be partitioned into groups of similar meaning and then presented as part of a clear, coherent narrative. In all three studies, thematic analysis was used to discover similar interpretations of phenomena and identify agreement between participants on relevant issues. This facilitated the discovery of salient issues in the research and aided in making inferences about how they might be influencing users' location sharing behaviour.

Although alternative methods such as IPA also involve the identification of themes in qualitative data, as previously mentioned, the objective of this method is to provide a rich, detailed, interpretative account of how individual cases perceive and make sense of their personal and social world. As such, authors argue that this can only realistically be done with very small sample sizes (Smith & Osborn, 2007). When analysing qualitative data, the objective in all three research studies was to explore individual experiences and opinions across a range of participants, with a sample size much larger than that recommended for IPA. This made IPA unsuitable for the purposes of this research. Other methods such as grounded theory carry the objective of formulating a theory that emerge directly from rigorous study of qualitative data. Because this research focused on the exploration of social identity in digital location sharing environments, and not the development of a theory per se, thematic analysis was deemed sufficient to answer the research questions of this thesis.

4.6 FIELD STUDIES

User-centred design emerged in the late 1980s. Usability evaluations with real users became a key part of product development (Oulasvirta, 2012). Such evaluations provided valuable insight into the 'usability' of a prototype by answering important questions such as "How useful will this product be in the marketplace?" Usability testing was done mainly in a laboratory setting, where users' performance and experience with predefined tasks was measured. Usability evaluations are now an integral part of the software design process and are used to build rich user experiences, web services and information systems.

However, the pervasiveness of context-aware mobile devices has given rise to a polarising debate: should the usability evaluation of a mobile system be conducted in a laboratory or out in the field? After all, mobile devices are inherently portable, making it particularly challenging to study how users interact with their environment. Usability evaluations in the field means that mobile devices are tested *in situ* and can therefore reveal problems, potentially influenced by contextual factors, that are difficult and even impossible to capture in a laboratory setting (Oulasvirta, 2012).

There has traditionally been a reluctance to conduct studies in the field. Kjeldskov & Graham, (2003), in their review of mobile HCI research methods found that 41% of research involves evaluation of systems, of which 71% is done through laboratory experiments, and only 19% through field experiments. These results suggest a clear preference for lab studies among (mobile) usability researchers. Field studies can be expensive and time consuming; data collection can be complicated and the researcher also has less experimental control. Lab studies, on the other hand, are quick to set up, relatively cheap and assume perfect randomization and control (Oulasvirta, 2012). With the researcher present, the usability lab can give insight into what happens *during* interaction, a phenomenon that is difficult to accurately capture with portable devices. Furthermore, some research has shown that field studies offer little added value (Kjeldskov & Stage, 2003), (Esbjörnsson et al, 2003). Kjeldskov et al, (2004) discovered the exact same usability problems in the laboratory as in the field, questioning whether conducting field evaluations is really “worth the hassle” at all?

The key strength of field studies is the potential for studying contextual, environmental factors that are difficult to replicate using traditional indoor techniques. Rogers et al, (2007) found that in situ studies revealed a host of unexpected, context-based usability and user experience problems. They argue that the field study enabled them to critically reflect upon their prototype, revealing how it *would,* rather than should, be used in practice. Nielsen et al, (2006) found that field evaluations revealed significantly more usability problems when compared to the laboratory setting, particularly problems related to cognitive load and interaction style. They conclude that field studies are worthwhile, despite their complexity, because of their added value in revealing usability problems not detectable through lab studies.

Studies in situ have advantages not just in terms of usability evaluation, but also in experimentation. By experimenting, one is “causing a change in a phenomenon in

order to observe its consequences" (Oulasvirta, 2012). Experiments seek to disentangle causal relationships from incidental occurrences. Modern day users of mobile devices can use mobile applications for a variety of purposes: from tourists using location features to search for sights in a city to commuters watching TV on demand on the train. If causalities in such situations occur outside the human-computer feedback loop, then there are strong reasons for studying phenomena in the field. According to Oulasvirta, (2007), there are two conditions for preferring a field study: "first, an interest toward a causal agent that operates *external* to the human-computer loop, and/or a suspicion thereof, and second, a belief that the causal chain wherein that agent operates cannot be properly reproduced or staged in the laboratory". Simply put, field studies become necessary if external factors, such as those influenced by the environment, cannot be adequately replicated in the laboratory.

Experiments 'in the wild', by definition, will be subject to random, sometimes uncontrollable events. They will inevitably mean sacrificing some experimental control, and may also bring threats to validity. The imperfection of field experiments, not least the lack of experimental control, has lead to them being termed as *quasi-experiments* (Cook & Campbell, 1979). Oulasvirta, (2007) state that the uncontrollable events emerging from research in the wild should not only be treated as confounding factors but as opportunities for interesting research. The reward of improved realism brought about by experimenting the field, they claim, is only achieved by sacrificing some experimental control.

Venturing outside the comfort of a usability lab brings about challenges, as has been discussed. One such challenge is how to accurately record user data when users are out in the field. Mobile contexts are dynamic and complex and users go through different contexts while performing mobile tasks. This in turn influences their behaviour and satisfaction of mobile applications (de Sá, 2011). This context changeability is generally non-existent in fixed solutions (Nakhimovsky, 2009). To overcome these challenges, designers sometimes use shadowing techniques — following users outdoors, observing and inquiring, while they go about their daily activities and tasks. While this can provide rich data, it raises privacy and ethical concerns; obtaining agreements from end users to be constantly monitored can be extremely difficult, and successfully carrying out such observations can be very complex. (de Sá, 2011).

To overcome these issues, active data gathering techniques (de Sá, 2011) can be useful in obtaining data from users in the field. They do not rely on technology but instead involve the end user in the evaluation process. Because users are capturing information by themselves, the effect on user behaviour of having an observer present is minimised. One such example is the Experience Sampling Method (Consolvo & Walker, 2003) that uses questionnaires to gather information from users in natural settings. This is often applied by designing mobile applications to prompt users with questionnaires at specific times to capture usage data during interaction. Similar to this is another technique called dairy studies (Palen & Salzman, 2002), (Sohn et al, 2008). Users again evaluate their own experiences by taking notes and recording their thoughts, usually in a paper diary, during and after interaction with a system. Active data gathering techniques can provide rich, detailed information about a system but can also be burdensome for the user, making it difficult for the researcher to get the user to fully engage with the activity, and can also lack applicability (Oulasvirta, 2007).

In contrast, passive data gathering techniques do not require intervention from the user and are often technology driven. The primary advantage of this approach is that the technical device replaces the researcher in the task of data collection. They also enable researchers to capture interaction as it happens, and can potentially be cheaper than having human recorders. Passive data gathering techniques can also have ecological validity because automatic data collection is performed throughout the user's everyday life with minimal intrusion (de Sá, 2011).

One example of passive data gathering is background logging. Custom mobile applications can be designed to capture numerous aspects of mobile usage (Hagen et al, 2005). Current programming tools enable software to be developed that access the user's phonebook, location, calendar events, mobile accelerometer and social media feeds. With sufficient technical expertise, a wealth of rich usage data can be gathered which would be almost impossible to obtain using traditional methods. Background logging has been used successfully in Roto et al, (2004) and Henze et al, (2011).

Studies that are technology-assisted can be vulnerable to the failures of that technology as well. Loss of mobile signals, insufficient battery life, and faulty equipment can all result in loss of valuable data resulting in incomplete datasets. Studies should take into account that remote real-time observation is not always

possible (Oulasvirta, 2007). Furthermore, some users may be unfamiliar with equipment such as modern smartphones. This unfamiliarity may scare some users and may influence the way they use the device, which in turn, would influence how well they engage with a study. Having said that, active data gathering techniques are not immune from the potential for data loss. In diary studies for example, participants may forget to record information at key points in the study. Worse still, they may become frustrated at the intrusion of keeping a diary log, resulting in them not fully engaging with the study or withdrawing entirely. While both passive and active data gathering methods have their strengths, the potential pitfalls need to be thoroughly planned for, particularly through appropriate pilot studies, to ensure that the research objectives are not hampered by the tools used to achieve them.

4.6.1 Technology Probes

Technology probing is a research method used to experiment with new technologies in real-world user environments. Originally introduced by Hutchinson et al, (2003), technology probes are “simple, flexible, adaptable technologies” that combine the “social science goal of understanding the needs and desires of users in a real-world setting, the engineering goal of field testing the technology, and the design goal of inspiring users and researchers to think about new technologies”. According to the authors, a probe is “an instrument that is deployed to find out about the unknown — to hopefully return with useful or interesting data”. It is a means of experimenting with technology, not necessarily toward a goal for final implementation, but to encourage the reflection and exploration of design ideas and to inspire ideas for new technologies. Thus, unlike prototypes which are usually part of a wider system implementation cycle, technology probes are meant to be thought-provoking — a means of formulating new ideas and thinking about new forms of user interaction.

According to Hutchinson et al, (2003), technology probes can be distinguished from prototypes in five different ways. The first difference is *functionality:* Technology probes should be as simple as possible, with one or two main functions. This is unlike prototypes that might have layers of functionality that address a number of design goals. The second difference is *usability:* Technology probes are not primarily concerned with usability, at least not in the HCI interpretation of the term. They are not part of a process of iteration, where the design might be changed in response to user feedback. Technology probes might be void of fully-fledged features in order to help users focus on the concept or idea without being preoccupied with the details of

specific functionality. The third difference is *logging:* Technology probes are data collection tools that record user data, helping both users and researchers generate ideas for new technology. The fourth difference is *flexibility:* Technology probes should be designed to be "open-ended with respect to use". This means that probes should be flexible enough to be reinterpreted by users, possibly in new and unexpected ways. The fifth difference is in regard to the *design phase:* Technology probes are introduced early in the design process as tools for generating ideas and thinking about future designs and interactions. They can be used by individuals or groups of people and can deployed in a range of settings, from homes to 'in the wild' field environments.

Technology probes have been implemented in a number of research projects. Hutchinson et al, (2003) produced a simple application called "messageProbe" that used digital Post-It notes in a zoomable space to gather data about family communication patterns and to inspire new forms of communication. The system was deployed in three households and used for a period of six weeks. The probe prompted playfulness among family members through simple doodles and drawings and was also used for family coordination such as picking up children from school. Similarly, the authors also deployed a "videoProbe" as a method for sharing impromptu images among family members living in separate households.

O'Brien & Mueller, (2006) developed a technology probe to "better understand if and when intimate couples desire to hold hands when apart". In their study, the technology probes were yellow, deformable, hand-size balls that each contained an embedded microchip. When a participant felt the need to hold their partners hand, they squeezed the ball, which triggered the microchip to log the time and increment the number of "handholding" instances. Huang et al, (2014) designed a wearable technology probe that helped physical therapists monitor patient exercise compliance and performance. The wearable technology was a head cap fitted with an iPod Touch 4G and a custom software application. It was worn by patients when performing specific head-related exercises and recorded the times of exercise, exercise duration, average head-turn velocity and turns-per-second.

Each of these studies illustrate that technology probes are primarily tools for exploration and discovery. They often deliberately omit fully-fledged functionality to facilitate this process, helping researchers to probe ideas at an early stage in the design process and potentially help pave the way for future systems and interactions.

How technology probes (deployed 'in the wild') were used in the research

The second study is an experiment conducted in the field; it explores the impact of targeted sharing, based on facets of identity, on location sharing behaviour. Although lab experiments have their strengths (Frishberg & Carolyn, 2006), the field experiment enabled the study to be conducted in a real-world context, thereby collecting data on *actual* user behaviour rather than that which is *perceived,* as would have been the case if carried out in a lab setting. Two fully functional mobile applications, acting as technology probes, were designed to compare two different forms of sharing location: broadcast sharing and targeted sharing based on facets of identity. Although Hutchinson et al. (2003) argue that technology probes should be kept as simple as possible, the added functionality was necessary to: a) replicate the conventional location sharing experience as closely as possible, b) to study the impact of targeted-sharing *in situ* and c) to collect usage data in real time. Fully functional technology probes meant the apps felt familiar as location sharing software. Further, users could share their location in the same environments in which they would do so normally. The purpose of the study was not to introduce a radical, new form of interaction but rather to experiment with an alternative form of sharing location. The technology probes also acted as passive data gathering tools (de Sá, 2011), effectively taking the place of the researcher, collecting data in the background without the need for potentially intrusive and expensive observational methods. These benefits were difficult to achieve with probes of lesser functionality. In the presence of sufficient resources and adequate technical knowledge, fully functional technology probes were deemed, quite clearly, the stronger option.

Having said that, both apps only included features that were absolutely necessary to answer the research questions. Thus, functionality was limited to the basic sharing of location and the ability to group phone contacts according to the two different methods being compared by the experiment. No extraneous features were added that might have biased the experiment in some way. This approach meant that causal relationships could, effectively, be disentangled from incidental instances; thereby helping to assess the impact, if any, of sharing location according to facets of identity on user behaviour.

The technology probes were tested in pilot studies prior to starting the research. Any technical flaws identified were rectified before starting the actual study.

4.7 REPERTORY GRID

The repertory grid technique is primarily a means of "surfacing people's perceptions, attitudes or concepts in an uncontaminated way" (Honey, 1979). It was first developed by George Kelly as an extension to the Personal Construct Theory (Grill et al, 2011). Kelly proposed that rather than treating people as 'subjects', they should instead be treated as 'scientists' who are constantly making sense of the world around them (Hogan & Hornecker, 2013). The repertory grid is a way of capturing those theories and meanings and analysing them through both qualitative and quantitative techniques (Rogers, 2007).

The repertory grid is a means of tapping into an individual's 'unconscious' knowledge. The standard interview only probes the conscious, rational and logical mind of the interviewee (Björklund, 2008). The respondent may want to please the researcher by telling them what is appropriate, logic and sound rather than admitting reality. However, there is knowledge that is maintained unconsciously, often outside our own awareness, which is difficult to elicit by introspection. This is because that information is not stored in verbal form; people may not always know why, but intuitively may know what is good, bad, beautiful, sloppy, clear or original (Björklund, 2008). There may also be subjects that interviewees find difficult to conceptualise or articulate. For example, when participants are asked why they preferred one design over another, the reply could be "I just did" or "I felt more comfortable with that". Some responses, therefore, could be rationalisations rather than explanations of decisions (Rogers et al, 2007).

Kelly's Personal Construct Theory tried to explain why people have different views and attitudes towards events in the world. During their upbringing, people make use of very personal criteria, termed as 'personal constructs' by Kelly, to make sense of their surroundings. These constructs are constantly re-evaluated in light of the individual's life experiences, and whether in his or her judgement, the original perceptions still seem valid or need revision (Harter et al, 2004). Constructs can be understood as expressions of intuitions, "gut feelings," and perceptions which the individual uses as a guide to action (Björklund, 2008). Further, these personal constructs are bi-polar, such that the good only has meaning when compared to the alternative, the bad. For example, we do not know what a 'good teacher' is unless we are aware of its opposite otherwise 'goodness' is practically meaningless (Hogan &

Hornecker, 2013). A person's experience therefore, arises from the interaction of multiple personal constructs (Fallman & Waterworth, 2010).

Although initially proposed as a method to be used within clinical psychology, repertory grid has been used in many different research fields such as education, politics and marketing (Hogan & Hornecker, 2013). Since the 1980s, it has also been employed in HCI, albeit quite sparsely (Fallman & Waterworth, 2010). The potential for capturing underlying meanings behind people's experiences makes it a particularly powerful tool for HCI researchers wanting to study user experience with technology. More recently, there have been several HCI studies that used repertory grid as a means of capturing user experience including: the evaluation of web site designs (Hassenzahl & Trautmann, 2001), understanding the subjective aspects of immersive virtual reality (Steed & Mcdonnell, 2003), investigating the emotional attachment to digital and non-digital artefacts (Turner, 2011) and understanding the design space of shape-changing interfaces (Kwak et al, 2014).

The repertory grid is conducted as a structured interview (Steed & Mcdonnell, 2003) . Constructs are discovered through what is known as the 'elicitation' process. Participants are asked to compare a set of *elements,* which are the instruments or artefacts used to elicit constructs, in a structured, reflective process. Through a procedure called *triading,* participants are shown three elements at a time and asked to specify which two elements are similar and different from the third. A construct then, is essentially a single dimension of meaning for a person, allowing two phenomena to be seen as similar and thereby different from a third (Fransella & Bannister, 1977). This process is repeated with different combinations of elements until construct generation is exhausted.

The final stage involves the participant subjectively rating each element on each bi-polar construct. The rating can be as a dichotomy, to either one of the two poles, or more commonly, on a continuous scale between the poles, a likert scale of 5,7,9 or more (Björklund, 2008). While constructs give insight into *how* a person thinks, the ratings of elements give insight into *what* a person thinks (Jankowicz, 2004). The scores can then be subjected to a series of statistical analyses to determine to what extent the participants (collectively) agreed on constructs (Alexander & Loggerenberg, 2005). Because the literal constructs are qualitative data and the ratings quantitative data, the repertory grid is characterised as being on the border

between qualitative and quantitative research: a hybrid, “quali-quantitative” approach (Tomico et al, 2009).

Repertory grids are primarily analysed using a combination of cluster analysis and principal components analysis. Cluster analysis is a quantitative technique for “highlighting the relationships in a grid so that they become visible at a glance” (Jankowicz, 2004). It can be used to find patterns of similar meanings, known as clusters, between the constructs elicited from a participant. For multi-participant data, specialised software packages can be used to combine separate grids into a single “great grid” (Marsden & Littler, 2000) which is then subjected to the same analysis. In this case, finding patterns in constructs elicited from multiple participants can indicate a coherence in experience, even though they may have been semantically expressed differently (Fallman & Waterworth, 2010).

Principal components analysis is an alternative form of analysing repertory grid data. It identifies distinct patterns of variance on figures in a grid, and works out the extent to which ratings are similar to each other (Marsden & Littler, 2000). It iteratively attributes as much of the total variance to each distinct pattern as possible. Both the elements and constructs are then plotted on a graph of two components that represent the two highest patterns of variance. Unlike cluster analysis which mainly identifies clusters of data, principal components analysis can also identify *interactions* between both elements and constructs.

The Repertory grid, as a technique, does have some drawbacks. It requires substantial effort by both the researcher and participant to properly elicit constructs. As a result, participants may not want to concentrate and quickly develop a habit of consistently providing moderate answers, or always fully agreeing or disagreeing with their own constructs (Fallman & Waterworth, 2010). Moreover, the repertory grid only represents meaning in tiny fragments of language (Marsden & Littler, 2000). Participants can have misconceptions about the topic being discussed leading to invalid conclusions even when constructs are elicited one by one and discussed in some detail (Alexander & Loggerenberg, 2005). Respondents may lean toward physically descriptive constructs rather than value-based ones, although these can be overcome by specific laddering techniques (Rogers et al, 2007). It also presents the challenge of retest. George Kelly theorized that people learn and develop from experience, orienting toward the future rather than the past; constructs therefore may change over time making retesting difficult. (Rogers et al, 2007).

Despite its shortcomings, the repertory grid can be very useful when there is a need to understand the personal perceptions and meanings of research subjects. Its idiosyncratic nature means that interviewees use their own words to describe their interpretations of artefacts, with the reassurance that only their own opinions are being sought, with no right or wrong answers (Björklund, 2008). The interviewer/observer is forced to keep quiet, while the rigour of compare and contrast techniques gives interviewees the opportunity to explore their understanding of their perceptions and elaborate about them at length. From a HCI perspective, this is a particularly important strength because system designs can be evaluated according to how users intuitively understand them with little or no input from the researcher. It is a very flexible method and can be used in a variety of areas, eliciting rich qualitative and quantitative data. Given its strengths, the repertory grid offers a wealth of possibilities for computer scientists and HCI researchers alike.

How repertory grid was used in the research

The repertory grid was used in the third study to elicit users' internal perceptions and interpretations of different location sharing situations. It also provided insight into how such situations might be mentally categorised, and whether the facets of identity used in the second study were representative of how location sharing scenarios are inherently perceived. By working with a number of participants, data could be gathered on a range of personal interpretations. The personal constructs were then used as a basis to study how user behaviour, particularly in regard to motivations for sharing location, might change as different facets of identity are enacted.

The elicitation of this type of data would have been very difficult to capture using standard interviews, which are more concerned with the conscious, rational mind of the interviewee as has been discussed. Thus, their strengths lie in capturing a person's experience and opinions, and not in uncovering the intuitive, often unarticulated perceptions that were sought in the third study.

In the repertory grid sessions, input from the researcher was kept to a minimum. The final repertory grids consisted entirely of users' own meanings of scenarios, with almost no input from the researcher in the formation of those meanings. Participants were engaged in a personal, reflective process, often contemplating deeply before providing responses. In this sense, the researcher was merely present to clarify and record constructs. In line with the observations of Marsden & Littler (2000) — in

practice, the construct elicitation process was very much one that involved the participant and researcher talking *with* one another in the identification of constructs rather than *to* one another as might be the case with standard interviews.

4.8 CHAPTER SUMMARY

This chapter has introduced the main methods and techniques used at each stage in the research. It has provided the primary reasons behind the use of each technique. A background to each method was also provided, highlighting the benefits, limitations and inherent challenges they present.

The methods employed in this thesis were guided by the specific research questions in each study. To answer these questions as thoroughly as possible, a mixed-methods approach (Johnson & Onwuegbuzie, 2004) was adopted throughout. Rather than an uncompromising allegiance to a particular methodology, this strategy enabled both quantitative and qualitative research methods to be combined (Johnson et al, 2007) depending on the goals of the study.

In the first study, a user survey, distributed on the web, was created to elicit users' location sharing attitudes as they relate to social identity. The speed and cost effectiveness of this method meant that could be produced rapidly, with no financial cost. By virtue of it being internet-based, it could be distributed in a variety of ways through mailing lists, paper adverts and Foursquare tips. This ensured that a large audience was reached, which had merit not just on its own, but also in helping reach an adequate sample size for factor analysis. Quantitative data emerging from the survey was analysed using factor analysis that identified common variables (factors) in the data set, uncovering salient issues regarding social identity and digital location sharing.

The second study, an experimental design that compared two different types of location sharing methods, was a field study that employed technology probes (Hutchinson et al, 2003). This approach meant that behaviour could be studied in situ, deriving insights into actual usage behaviour rather than that which is perceived. Technology probes offered a flexible solution in terms of technology design; the mobile applications developed were void of any extraneous features that might introduce bias in the experimentation, ensuring that both apps only included features that were absolutely necessary to answer the research questions.

The third lab-based study, investigating how location sharing scenarios are cognitively perceived, used the repertory grid technique to elicit users' personal perceptions of different sharing situations. Unlike standard interviews, which might probe the conscious, rational mind of the interviewee (Björklund, 2008), the repertory grid enables the surfacing of knowledge that is held unconsciously (Honey, 1979), that which might be felt intuitively but not verbalised. Thus, the repertory grid technique was highly suitable for probing the inner meanings and interpretations behind varying location sharing scenarios.

User interviews were conducted in both studies 2 and 3 to elicit users' personal experiences and opinions, thereby providing context and further empirical insight to quantitative data. The resulting qualitative data was analysed using thematic analysis (Braun & Clarke, 2006), enabling patterns of semantic meaning to be derived and then presented as part of a consistent, cohesive narrative.

The next chapter describes the first study of the research: a user survey designed to explore the how social identity is exhibited through digital location sharing.

CHAPTER 5
EXPLORING HOW SOCIAL IDENTITY IS EXHIBITED THROUGH DIGITAL LOCATION SHARING

5.1 INTRODUCTION

So far, we have seen that digital location sharing has transformed from a one-to-one purpose-driven activity to a one-to-many socially driven one. It is now very much a familiar facet of social networking systems. Users can self-report their whereabouts, and through systems like Facebook and Twitter, they have access to a potentially vast audience. Similarly, we have also seen that social networking platforms can be ideal tools for constructing online identity and managing an appropriate self-presentation. In the absence of the physicality of offline interactions, people can selectively choose which parts of themselves to present and which ones to withhold. Thus, there is evidence that social identity, in addition to being a pervasive part of offline interactions, may also be exhibited in social networking environments. The objective of the forthcoming studies, then, is to investigate how social identity, the exhibition of the public self, is transferred from the offline world into digital location sharing systems and how, specifically, it influences the action of sharing one's digital location.

To begin this endeavour, the first exploratory study investigates social identity in the realm of current location sharing systems. Indeed, the research cannot be advanced without first understanding how social identity is manifested in current platforms. Subsequent studies then seek to build on the findings that emerge. The first study, therefore, aims to answer the first research question of the thesis:

RQ1: How is individual-level social identity exhibited through the digital sharing of location in current 'location aware' social media?

As discussed previously, what is meant by individual-level social identity is a person's individual self-perception. This can include societal roles (e.g. father, husband, academic), leisure activities and personality, amongst others. 'Location-aware' social media means any social networking software that allows users to share their location. This includes location-based social networks such as Foursquare, more popular social networks like Facebook and Google+, and those that allow the 'tagging' of location like Twitter. The first study is an online survey analysing attitudes

toward location sharing and focuses on three areas in particular: the relationship between location and identity, identity management and impression management.

The first research question is distilled into the following study specific questions:

1) How is identity reflected in the digital locations that are shared on social media?

Although previous research such as Tang et al, (2010) and Cramer et al, (2011) have presented preliminary evidence for the sociality of location sharing, the first question seeks to understand the *relationship* between social identity and place. In other words, is where you are a reflection of who you are (as an individual)? By sharing location, are users sharing parts of their identity? If so, how is identity reflected in the locations people share? The first question is fundamental in understanding how social identity is exhibited through the digital sharing of physical place.

2) How do people project their identity through their digital location?

Digital location can be shared in a variety of ways. Building on the works of Barkhuus et al, (2008) that revealed location sharing to be a means for conveying lifestyle and events, the second research question seeks to understand the specific means by which identity is projected in location sharing systems. In other words, what are the particular methods employed to convey identity (e.g. moods, activities, experiences etc.)?

3) How do people digitally manage their identity across different groups within their social network?

Farnham & Churchill, (2011) observe that rather than being singular, people have multi-faceted identities and that social behaviour varies depending on the context. Social media, on the other hand, assumes that users have a unified identity that fits all situations (Farnham & Churchill, 2011). It also collapses multiple, diverse audiences into one (Marwick & Boyd, 2010) Some research has found that the misalignment between the content and the audience can have serious consequences (Wang et al, 2011). With location sharing systems, this problem can be exacerbated because such systems convey not only personal information but also physical whereabouts. Thus, how do users manage different facets of their identity in location sharing systems? Are there conflicts in managing different parts of life in such digital

environments? If so, what are the specific methods and strategies employed to manage these conflicts?

4) How do users engage in impression management when sharing digital location?

As discussed in chapter 2, managing self-presentation is an everyday part of social interaction. Goffman, (1959) posits that social interaction is a type of performance that is tailored depending on the audience and context. As discussed in chapter 3, social media platforms can be ideal in enabling people to selectively self-present — accentuating their positive attributes and concealing their less desirable traits. With digital location sharing, one's physical place can add an extra layer to the notion of identity performance. Thus, the final research question seeks to explore how people engage in impression management through the locations they share. In addition to uncovering the particular strategies employed, the types of personalities more likely to exhibit such behaviour are investigated.

The first study aims to investigate these topics on an exploratory level. This is done not only to establish a basis for the research but also to uncover salient issues surrounding social identity and digital location sharing. Some of the key issues emerging from the first study are then used to determine the direction of subsequent studies.

5.2 METHOD

5.2.1 Participants

An online survey consisting of 74 items (61 closed, 13 open-ended) was created and distributed to a range of location sharing users. This included users of Foursquare, Facebook and Twitter. Participants completed the survey anonymously.

The survey was distributed to students, academics, and business professionals alike. To target students and academics, online adverts were distributed via mailing lists in two universities. Paper adverts were also posted throughout the campuses of University of Nottingham. For business professionals, online ads were posted in appropriate group forums on the LinkedIn website. In addition, advertisements were placed in a number of online forums that related to location sharing. Advertisements were also sent to social media companies via Twitter; these were then re-tweeted to

a relatively large audience. Finally, Foursquare users were targeted specifically by placing tips at various places in campuses of the University of Nottingham.

241 participants responded to the survey. However, a number of participants completed less than 20% of the survey; others had never shared their location on social media at all. Both groups were subsequently removed from the analysis. Participants that completed at least 80% of the survey and shared their location at least 1-3 times a month or more were included in the final analysis. This brought the final sample size to 189.

5.2.2 Measures

The survey contained both open and closed questions. Open questions were kept optional and included at the end. The survey first asked a series of personality related questions with the aim of assessing both extraversion and self-monitoring. Measures of the big-five personality scale were extracted from Gosling et al, (2003) and self-monitoring from Lennox & Wolfe, (1984) respectively.

The survey next asked for basic demographic information including particular location sharing software used, frequency of use and number of friends (on the most frequently used software).

Next, participants were asked questions related to the four main research questions. All questions, excluding items pertaining to the big-five personality and self-monitoring, were on a 5-point likert scale. Given the exploratory nature of the study, the term ‘identity’ was not defined in any specific way. Instead, the collective responses from participants, particularly to open-ended questions, were used to form a working definition. While it is acknowledged that this approach made the responses more idiosyncratic, the intent was to encourage participants to be more open and personal, to respond to the topic as it is understood by them, rather than being restricted by specific definitions.

5.3 RESULTS

5.3.1 Basic technology usage

Generally, participants were frequent users of location sharing software. 23% reported using location sharing software 1-3 a month, 8.5% more than 4 times a

week, 19.6% once a day and 25.9% more than 4 times a day. On the software that each user used the most, 78.6% stated having 100+ friends, 6.4% 51-100, 1.1% 31-50, 3.7% 21-30, 3.2% 11-20 and 7% 1-10.

In terms of specific software used, the vast majority of participants were Facebook users (57%) with Twitter second (16%) and Google+ third (11%). Fig 5.1 depicts percentages of all software used.

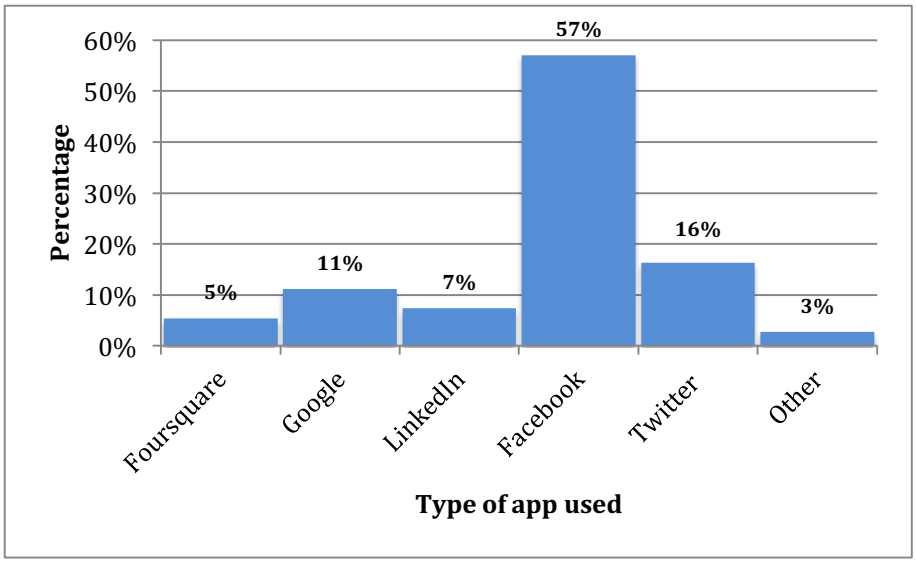

Fig 5.1: Specific software used most frequently to share location

Participants were also asked to indicate the types of places they shared location. They were free to choose more than one category. The majority of respondents shared at locations related to Arts and Entertainment, with travel second most popular, food third and nightlife fourth, as depicted in Fig 5.2 below.

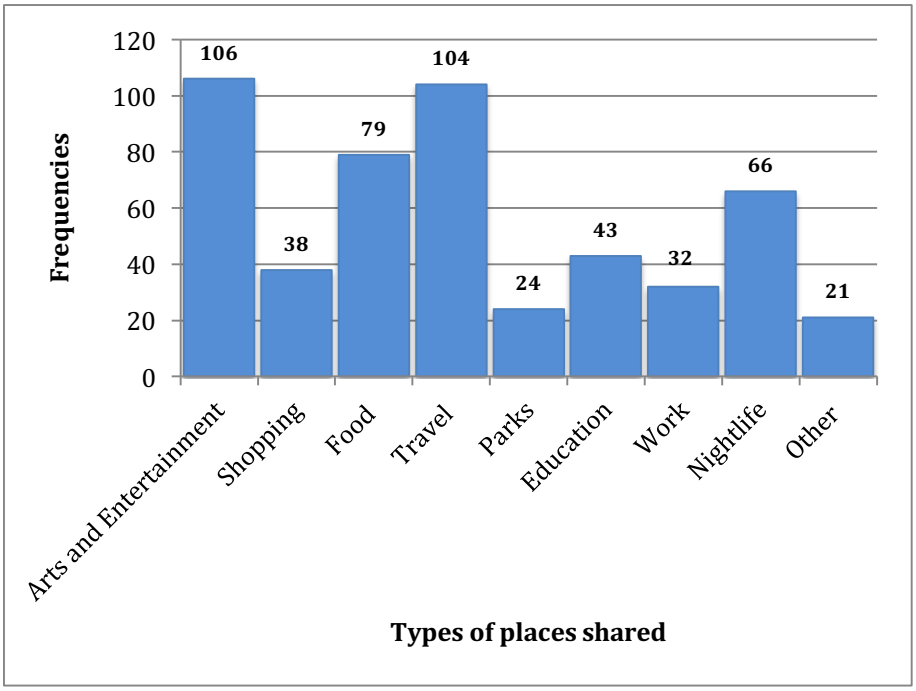

Fig 5.2: Types of places where location was shared

5.3.2 Method used for factor analysis

The items probed various manifestations of social identity. Specifically, they were based on three thematic areas: the relationship between identity and location, identity management, and impression management. These questions formed the basis for factor analysis and enabled the exploration of the emergent factors associated with identity and the sharing of digital location. All of the items were on a 5-point likert scale.

Relationship between identity and location:
Items assessing this area included “I feel that my location is a representation of my identity (who I am)”, “I check in to or share different locations to project different aspects of my identity.” Items measuring how identity is projected were also included, “When sharing my location I sometimes convey my current mood i.e. how I am feeling at the time”, “When sharing location, I actively project my identity through my current activity” and “When sharing my location, I sometimes express it as a story.”

Identity Management:
Participants were asked whether current location sharing software was adequate in helping them to manage their identity. Items included, “I feel that location sharing

adequately helps me segment different parts of my life e.g. family life, work life, social life etc.". Related to this were measures of general anxiety about sharing and how check-ins would be interpreted, "I am conscious about how my location is read and interpreted by others." and "I am conscious about my location being misinterpreted by members of my social network."

Impression Management:
Items were included to assess whether users engaged in impression management when sharing location. This included actions to maintain self-image as well as deliberate acts to enhance self-presentation, "I am reluctant to check-in to or share places that would make me look 'boring' to others", "When at a prestigious location, I often try to be very specific about where I am", and "I sometimes use my location to increase 'my standing' in my social network."

5.3.3 Reliability analysis

Before actually conducting the Factor analysis, a reliability analysis was performed to determine whether individual items were measuring the same underlying dimension (of questionnaire). In other words, individual items should produce results that are consistent with the overall questionnaire. When this test is performed, a corrected item-total correlation coefficient is obtained for each item in the questionnaire. Items with very low item-total correlations should be considered for removal. Field, (2013) recommends that items with a correlation of below 0.30 should be removed. Loewenthal, (1996) recommends anything below 0.15 should be removed. In this case, Field's higher correlation of 0.30 was adopted. A total of seven items were removed as summarised by Table 5.1. Their removal resulted in a notable increase in the cronbach alpha as indicated by the last column.

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q28	171.35	1348.689	.068	.958
Q61	171.65	1338.276	.220	.957
Q64	171.64	1338.852	.201	.957
Q65	171.63	1349.235	.054	.958
Q68	170.64	1352.455	.031	.957
Q69	170.52	1354.521	.002	.958
Q70	171.28	1348.281	.073	.958

Table 5.1: Item-total correlations

Next, as part of the test of reliability, inter-item correlations were also obtained. This differs from the corrected item-total correlation test performed earlier in that it tests whether pairs of items are measuring the same concept. In other words, whether such pairs are asking the same question. Ferketich, (1991) recommends that items with inter-item correlation above 0.8 should be removed. Items with correlations between 0.7 and 0.8 should be *considered* for removal. Thus, all items above 0.8 were removed from subsequent factor analysis. For items between 0.7 and 0.8, one item (in item-pair) was removed. Table below shows the results.

Item	**Inter-item correlation**
19. I sometimes use location-software to project different personas **20.** I check-in/share my location at different places to project my different personas	.867
35. When I'm at a place that I consider 'boring', I '"would not"' want my '"friends"' to know about it **36.** When I'm at a place that I consider 'boring', I '"would	.822

not'" want my '"colleagues"' to know about it	
36. When I'm at a place that I consider 'boring', I '"would not'" want my '"colleagues"' to know about it **37.** When I'm at a place that I consider 'boring', I '"would not'" want my '"acquaintances"' to know about it	.902
15. When I'm at a place that reflects my personality/identity, I share it with others **16.** I check in to or share different locations to project different aspects of my identity	.765
25. When I'm at a prestigious place i.e. top restaurant, bar, I want others to know about it **30**. If I'm at a prestigious place e.g. top restaurant, I want my '"friends"' to know about it	.773
31. If I'm at a prestigious place e.g. top restaurant, I want my '"colleagues"' to know about it **32.** If I'm at a prestigious place e.g. top restaurant, I want my '"acquaintances"' to know about it	.750
31. If I'm at a prestigious place e.g. top restaurant, I want my '"colleagues"' to know about it **33.** If I'm at a prestigious place e.g. top restaurant, I want '"everyone"' to know about it	.725
36. When I'm at a place that I consider 'boring', I '"would not'" want my '"colleagues"' to know about it	.759

38. When I'm at a place that I consider 'boring', I "'would not"' want "'anyone"' to know about it	
41. When sharing my location I sometimes convey my current mood i.e. how I am feeling at the time **43.** When sharing location, I actively project my identity through my overall experience at the location i.e. what I'm feeling and doing at the time of sharing location	.761
53. I try to obtain game-based rewards e.g. badges, mayorships to enhance my standing in my social network **55.** When I earn a game-based reward (e.g. badge, mayorship), I want others to know about it	.734
56. I would not check-in or share my location if I had no friends in my friends list **57.** I would not check-in or share my location if no one could view my check-ins	.783
55. When I earn a game-based reward (e.g. badge, mayorship), I want others to know about it **73.** When I earn a mayorship (e.g. in Foursquare), I want others to know about it	.734

Table 5.2: Inter-item correlations

Interestingly, questions relating to different groups within a social network (e.g. friends, family, colleagues etc.) had high correlations; this was particularly the case between “colleagues” and “acquaintances” and “colleagues” and “everyone”. Examples are items 31, 33 and 36, 38. This indicated that participants might not have made a distinction between these different groups. Since this problem was

largely occurring with the “colleagues” group, all items referring to this group were dropped. This meant that the social network was divided into four distinct groups “family”, “friends”, “acquaintances”, and “everyone” rather than five as was initially the case. Incidentally, at the time of writing, this division closely resembles that of Google circles.

At the end of the reliability analysis a total of 12 items were removed from subsequent factor analysis: 28, 65, 68, 69, 70, 19, 57, 73, 36, 31, 61, and 64.

5.3.4 Performing Factor analysis

Exploratory factor analysis was performed on the remaining items using the principle components method with oblique rotation (oblique oblimin). The objective of this method was to find a small number of variables that account for most of the variance in the original items. A Kaiser-Meyer-Olkin (KMO) test was performed to assess the sampling adequacy and resulted in a value of KMO = .892. A value of between .8 and .9 is deemed as ‘great’ by Hutcheson & Sofroniou, (1999). Barlett’s test of sphericity was significant ($p < .001$). This indicated that the sample size is adequate for factor analysis.

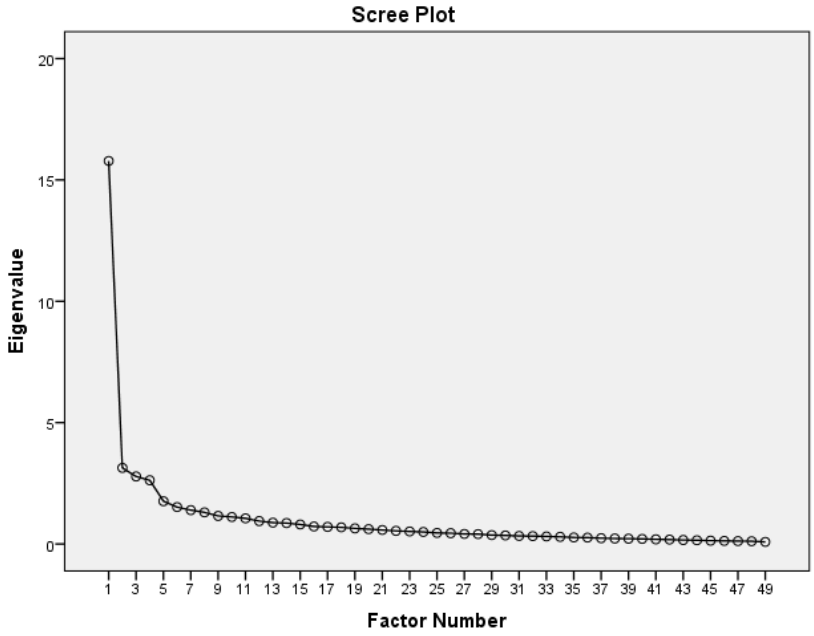

Fig 5.3: Scree plot showing different factors

A scree plot was examined to ascertain how many factors to extract. A total of five factors emerged as depicted in Fig 5.3. The factor loading of 0.4 was adopted to

determine appropriate variable loading on to a factor. There was only one item, question 50, that cross-loaded on two factors.

A reliability analysis was conducted to determine cronbach alpha values for each factor. Four factors had very high reliabilities, cronbach alpha > 0.8, with one factor at 0.71. Values above 0.7 are considered acceptable by Kline, (1999).

To name individual factors, two other researchers with experience of factor analysis were consulted. After discussion on the most appropriate descriptions, the following five names were agreed upon:

- FACTOR 1: Using location to project identity/personality/persona
- FACTOR 2: Using present location to maintain personal image
- FACTOR 3: Using present location to enhance personal image
- FACTOR 4: Deliberate behaviour to enhance social standing
- FACTOR 5: Self-awareness of how location is interpreted

Each factor together with its corresponding cronbach alpha is shown below.

FACTOR 1: Using location to project identity/personality/persona Cronbach's alpha (0.900)			
Item	**Mean**	**SD**	**Loading**
41. When sharing my location I sometimes convey my current mood i.e. how I am feeling at the time	3.21	1.09	.749
15. When I'm at a place that reflects my personality/identity, I share it with others	3.21	1.16	.740
16. I check in to or share different locations to project different aspects of my identity	2.98	1.18	.690
43. When sharing location, I actively project my identity through my overall experience at the location i.e. what I'm feeling and doing at the time of sharing location	3.06	1.16	.625
24. I feel that location sharing apps allow me to properly	2.69	1.04	.541

control my sharing across different parts of my life e.g. family life, work life, social life etc.			
17. I push my 'special check-ins' or locations to Twitter, Facebook or another Social-Networking site	2.72	1.19	.530
14. I feel that my location is a representation of my identity (who I am)	3.09	1.16	.487
20. I check-in/share my location at different places to project my different personas	2.23	1.11	.486
60. I sometimes look at friends' profiles to find out where they are or where they've been	3.35	1.20	.486
40. When sharing location, I actively project my identity through my current activity i.e. what I am doing at the time	3.28	1.08	.476
39. I sometimes use my location to actively project my identity (who I am)	2.86	1.19	.466
63. I do not mind checking-in or sharing my location in '"front of other people"' (physically)	3.37	1.05	.463
42. When sharing my location, I sometimes express it as a story	2.72	1.15	.413
27. I feel that location sharing adequately helps me segment different parts of my life e.g. family life, work life, social life etc.	2.50	1.03	.408

Table 5.3: Using location to project identity/personality/persona

Factor 1, which accounts for the most variance overall is largely focused on using location to project identity, personality and persona. This factor indicates the use of location to convey identity to others as inferred by items 14, 15, 16, and 39. Interestingly, this factor also includes the various methods employed to convey

location with current mood, activity, stories and overall experience all legitimate means.

Furthermore, this factor also includes items more closely related to identity segmentation. When taking into account that identity can be multi-faceted, this factor indicates the sharing of different locations to express different facets of identity or indeed even persona as inferred by items 16, 20, 24, and 27.

FACTOR 2: Using present location to maintain personal image (Cronbach's alpha: 0.895)			
Item	**Mean**	**SD**	**Loading**
37. When I'm at a place that I consider 'boring', I "'would not"' want my "'acquaintances"' to know about it	2.79	1.04	.892
35. When I'm at a place that I consider 'boring', I "'would not"' want my "'friends"' to know about it	2.73	1.09	.882
38. When I'm at a place that I consider 'boring', I "'would not"' want "'anyone"' to know about it	2.65	1.01	.871
34. When I'm at a place that I consider 'boring', I "'would not"' want my "'family"' to know about it	2.34	.94	.717
58. I do not check-in to share the location of places that I consider 'boring'	2.92	1.17	.651
26. I am reluctant to check-in to or share places that would make me look 'boring' to others	2.90	1.21	.498

Table 5.4: Using present location to maintain personal image

Factor 2, again with a very high reliability is concerned with the maintenance of personal image. Specifically, all items indicate a general reluctance to share location

at so-called ‘boring places’. This factor includes places that the individual user considers ‘boring’ as well as those that would make them look ‘boring’ to others.

FACTOR 3: Using present location to enhance personal image **Cronbach’s alpha (0.871)**			
Item	**Mean**	**SD**	**Loading**
33. If I'm at a prestigious place e.g. top restaurant, I want '"everyone"' to know about it	2.56	1.09	.752
32. If I'm at a prestigious place e.g. top restaurant, I want my '"acquaintances"' to know about it	2.38	1.09	.714
25. When I'm at a prestigious place i.e. top restaurant, bar, I want others to know about it	3.14	1.24	.709
30. If I'm at a prestigious place e.g. top restaurant, I want my '"friends"' to know about it	3.35	1.16	.699
29. If I'm at a prestigious place e.g. top restaurant, I want my '"family"' to know about it	2.91	1.12	.500
74. When at a prestigious location, I often try to be very specific about where I am	2.83	1.18	.414

Table 5.5: Using present location to enhance personal image

Factor 3 is the complete opposite of factor 2 with location being used to *enhance* personal image. This factor does not indicate deliberate behaviours to enhance personal image but more an eagerness to share location when at so-called ‘prestigious places’, as indicated by item 25.

FACTOR 4: Deliberate behaviour to enhance social standing **Cronbach's alpha (0.791)**			
Item	**Mean**	**SD**	**Loading**
53. I try to obtain game-based rewards e.g. badges, mayorships to enhance my standing in my social network	1.80	1.06	.677
76. I'd go to a prestigious place just to check-in or share that location	1.71	.921	.584
46. If I'm near a prestigious place, I check-in or share my location even though I'm not physically there	1.76	.850	.484
50. I sometimes use my location to increase 'my standing' in my social network	2.14	1.03	.465
55. When I earn a game-based reward (e.g. badge, mayorship), I want others to know about it	1.93	1.05	.449
18. I have a number of different 'personas'	2.79	1.25	.406

Table 5.6: Deliberate behaviour to enhance social standing

Factor 4 is focused around *deliberate* behaviours to influence others opinion of you. This is different from Factor 3 in that the actions are calculated rather than triggered by merely being present in a particular location. This factor indicates that it is plausible for users to take deliberate measures to enhance social standing such as obtaining game-based rewards and purposefully checking in to prestigious places. Item 46, uncovers the potential for more unscrupulous activities (i.e. sharing location at places where one *is not* physically present). Apps like Facebook and Foursquare do not require a user to be actually present at a given location, making this practice more tempting to those wanting to increase their status within a social network.

FACTOR 5: Self-awareness of how location is interpreted **Cronbach's alpha (0.902)**			
Item	**Mean**	**SD**	**Loading**
51. My location sharing decisions are influenced by who I think might be viewing my location data	2.72	1.28	-.709
59. I sometimes check-in or share my location to enhance my self-presentation	2.62	1.13	-.662
44. I sometimes use my location to draw attention to myself	2.79	1.20	-.660
50. I sometimes use my location to increase 'my standing' in my social network	2.14	1.03	-.590
77. I am conscious about how my check-ins (location-history) are perceived by others	2.90	1.17	-.570
48. I am conscious about how my location is read and interpreted by others	2.86	1.22	-.553
54. I sometimes check-in or share my location at places that would enhance my image among my social network	2.40	1.78	-.542
52. I sometimes check-in/share my location at places to suit a particular audience e.g. specific friends, colleagues etc.	2.70	1.21	-.505
49. I am conscious about my location being misinterpreted by members of my social network	2.75	1.11	-.415

Table 5.7: Self-awareness of how location is interpreted

Factor 5 is concerned with a conscious awareness of how others may interpret location. Unlike the previous factors, the majority of items in this factor are less about the opinions of the individual user and more *about the opinions of others* within a social network.

Item 51, with the highest loading, shows that location sharing decisions can be influenced by an awareness of who might be viewing the location data. Item 52 indicates that location can be shared to suit particular audiences. Items 48 and 77 show self-awareness of how one's location is perceived by others. Item 49 shows a consciousness of location being misinterpreted.

This is intertwined with items 44, 54 and 59 which are related to enhancing self-presentation. However, unlike factors 3 and 4, this may be influenced by the *perceptions and opinions of others* rather than the conscious motives of oneself.

5.3.5 Correlation analysis

At the beginning of the survey, a number of personality scales were presented including the self-monitoring scale and a (shortened) measure of the big-five personality scale. Items were extracted from Lennox & Wolfe, (1984) and Gosling et al, (2003) respectively. A pearson correlation was performed to assess the relationship between these scales and each factor extracted from the factor analysis. Results are depicted in Table 5.8. Significant values are in bold ($p < 0.05$).

	FACTOR 1: Using location to project identity/ personality/ persona	FACTOR 2: Using present location to maintain personal image	FACTOR 3 Using present location to enhance personal image	FACTOR 4 Deliberate behaviour to enhance social standing	FACTOR 5 Self-awareness of how location is interpreted
SELF MONITORING	**.179**	.000	.077	-.017	-.030
EXTRAVERSION	.071	.090	**.156**	-.010	.090
AGREEABLENESS	**.163**	.054	**.210**	.005	-.082
CONSCIENTIOUSNESS	-.029	-.017	.030	**-.190**	.082
EMOTIONAL STABILITY	-.029	-.040	-.110	.029	.035
OPENNESS TO EXPERIENCE	**.148**	.013	.045	-.042	.050

Table 5.8: Correlational analysis between factors and personality scales

A significant relationship was found between self-monitoring and Factor 1 (using location to project identity), r = .179, p (two tailed) < 0.01. This indicates that people of higher self-monitoring may use location sharing software to project their identity to others within their social network. Similar results were also found for those open to new experiences (part of the big-five personality scale), r = .148, p (two-tailed) < 0.05.

A significant relationship was also found between extraversion and Factor 3 (using location to enhance personal image), r = .156, p (two-tailed) < 0.05. This indicates that extraverted individuals may be using location to enhance their image, sharing their location particularly at so-called 'prestigious places'.

As part of the big-five personality scale, a measure of agreeableness and conscientiousness was also included in the survey. Agreeableness is a tendency to be compassionate, sympathetic and warm. People with high agreeableness tend to have more empathy for others. Conscientiousness on the other hand, is a tendency to show self-discipline, act dutifully, and aim for achievement against measures or outside expectations.

A positive correlation was found between agreeableness and Factor 1 (using location to project identity), r = .163, p (two-tailed) < 0.05. Interestingly, a positive correlation was also found between agreeableness and Factor 3 (using location to enhance image), r = .210, p (two-tailed) < 0.01.

A negative correlation was found between conscientiousness and Factor 4 (deliberate behaviours to enhance self-presentation), r = -.190, p (two-tailed) < 0.05.

It should be noted, however, that the correlations are relatively minor and only indicate correlation and not causation; as such, they should be taken with caution.

5.3.6 Qualitative analysis

At the end of the survey, participants were asked a series of open-ended questions to provide context to quantitative results. Thematic analysis was used to analyse the data. The methodology employed was the one outlined by Braun & Clarke, (2006). Answers were initially coded and an initial set of themes were developed. The

material was then analysed again and the themes were revised. This process was repeated until a final set of themes were developed that closely reflected the content.

There were a total of 12 open-ended questions. The questions probed a range of topics including identity and location, identity segmentation, what prompts people to share location, how location is conveyed and more. It should be noted that some questions were answered much more thoroughly than others. Where answers were found to be brief, simple content analysis was deemed adequate due to the lack of data.

For the sake of brevity, only data that is directly related to the four research questions are presented. The remainder are given in appendix B.

5.3.6.1 The Relationship between identity and location

In the open-ended questions, we asked participants how they felt their location was linked to their identity (if at all). The most common emergent themes are presented below.

Location is a reflection of person/identity

Many participants remarked that location can be an external representation of identity. Location can sometimes act as 'window into a person's life', revealing a lot about the individual. Others observed that location reflects different aspects of a person's life and can help inform others opinion of you.

One participant mentioned that location can somehow brand you as a person and reflect the different stages you are in your life,

"*My location reflects the stage I am at life and in that way brands me as a person, the fact I'm at University reflects my stage in my work life."* They go on to mention that location can somehow represent your class position in society, *"if someone's location was The Ritz (highly regarded restaurant in London) then you would assume they are wealthy. To some extent it marks your class position within society, as well as who you are as a person. It's due to the perceptions we have of certain places within society which then bounce off onto you as a person."* The reference to 'perceptions of place' is interesting. Factor analysis revealed factors relating to maintenance of

image, enhancement of it, and self-awareness of how location is interpreted. These three factors are closely related with how certain locations are perceived which may be a salient factor when choosing to share location.

One respondent observed that individual personality can influence the types of places likely to be visited, *"Location must be somewhat linked to identity as parts of your personality that make up your identity would make you more or less likely to go somewhere."*

A number of respondents acknowledged that identity can be faceted and that various locations can represent different facets. One respondent mentioned, *"My identity at University is different to my identity at home. Who I am surrounded by and their values alongside the opportunities available have an impact on my identity."* Equally not every location is a reflection of identity as another participant observed, *"by going into University for a while, I'm getting in touch with the part of me which values education highly. Also, when at my flat at University, I'm surrounded by the things I enjoy doing which make me who I am. Alternatively, I don't think that all locations are relevant to my identity. e.g. going to the supermarket, or shopping in town."*

Identity is reflected by the significance of the place being shared

This was another common theme. Many participants felt that the significance of particular locations can reflect a person's identity.

One participant remarked that identity is shaped by your 'sense of place' and 'belonging to that place'. As a result, places that were particularly significant to identity (e.g. personal hometown locations) were more likely to be shared. *"Your identity is shaped by your sense of place and belonging to that place. Certain objects or places that have the most significance to my identity, for example, objects such as Henderson's Relish or Stones Bitter from my hometown, are things that I would be most likely to use the location software for or create a Facebook comment."*

One participant explained that identity is fluid and ever evolving. As such, identity is linked to location because it is merely where you are at a given time. Being present at different places allows you to use different parts of identity within you, *"Being in a different city merely allows me access to different things that will reflect, enhance or make use of different parts of what is already me. Identity is fluid and ever evolving in*

the slightest or more abrupt ways, and can be linked to location merely because that is where you are at a given time, or that is somewhere with memories, history, family etc."

Hobbies/Interests, Events and Activities are a reflection of identity

A number of participants believed that identity is comprised of the events in one's life, the activities they engage in and their general hobbies and interests. While these components may not represent identity as a whole, for many participants, they do represent an important part.

One participant said *"I characterise my identity as being a combination of my personal details: my name, my age, where I live (details you would find on a passport for example), my interests in tv/music/film etc, the things I do and my relationships with others. When I tag a location in a post on Facebook it is often to send a message to my social network about these aspects of my identity -e.g. the type of music venue I'm in conveying my musical interests, the fact that I am being social and the friends I have chosen to be with. Location is a big part of my identity as it defines the events that occur in my life, which expresses who I am in a more up to date way than static personal details and lists of interests. It allows you to project your identity to your audience not for necessarily for prestige but to inform their opinion of you."*

5.3.6.2 Methods employed to convey location and project identity

Participants were also asked about the methods they used to convey location to others (e.g. through current activity, emotions, through a story etc.). The most common themes are summarised in Table 5.9 below.

Theme	Description	Quotes
Through moods and emotions	Moods and emotions are popular means of sharing location. Quite often, they are tied in with the overall experience.	*"Often say what I am doing at that location and then the emotions involved. For example, on a date at (wherever) - great evening."* *"I mainly do it to promote an event I'm involved in. So I'd convey a positive mood, atmosphere and give details for people who may want to join."*

Through current activity and overall experience	General description of (current) activity is communicated. Again, tied in with overall experience. Findings consistent with Tang et al, (2010) and Hardy et al, (2011).	*"I portray what I am doing, where I am and who I am with by a short sentence…sometimes with humour."* *"I would usually only share my location if I am excited about the place that I am, and I would usually convey that and why/what I am doing there."*
Through stories	Location conveyed through short anecdotes or stories.	*"I'd like to put a story into checkins, but only with a close friend who I value."* *"Maybe a funny story about my activities or what i am currently doing."*
Through people you are with	Location conveyed by mentioning people co-present.	*"If I was out for drinks with a friend at a bar, would use one word 'cocktails', tag the person I was with and then add the location."* *"A note on what I am doing or who I am with, then tag my location."*

Table 5.9: Methods used to convey location

5.3.6.3 Identity management when sharing location

Participants were also asked how they managed different facets of identity. This was to understand how people segment different areas of their lives and the potential conflicts that exist, if any.

Careful selection of audience

Many participants mentioned that they often target their sharing to particular groups within their social network. One participant was very meticulous with their sharing, maintaining different lists for each group, *"I have multiple friends lists split into "family", "friends" and "acquaintances". By default, "friends" and "family" can see pretty much everything. "Acquaintances" see very basic information. 99% of my activity is shared with "friends" and "family" only, "acquaintances" are only shared with for big events I'm hosting/promoting or any update I perceive to be as important but not private (such as moving, relationship status, photos from a cool holiday etc)."*

Other users were very selective about who is on their friends list, ensuring that anyone outside this group cannot view location. "*With Facebook I have it so that only*

my direct facebook friends can see my check ins. If I don't want people seeing my check ins I don't add or accept them as facebook friends"

Careful selection of platform

Some participants used different platforms for different modes of sharing (i.e. social v professional). This indicates a very strong awareness of facets of identity and a concerted effort to prevent any conflicts, *"I see LinkedIn as a professional network, facebook as a personal network and twitter as bridging the two (I tweet mainly work related things with hints of the person behind the tweets). I have friends and colleagues on LinkedIn; friends, colleagues and strangers on twitter and only friends on facebook."*

It is interesting that users distinguish between the different mechanics of each platform. Although features such as public announcements are possible on most social network platforms, the perceptions users have of each platform differs significantly. For example, Facebook is largely perceived as a social platform whereas LinkedIn a professional one. For some users, this is an obvious way of placing boundaries between different facets of identity.

Share only appropriate content

Some users were very careful what content is posted publically, *"I never share anything that anybody would consider inappropriate for any of the groups, or that I think is too private."* Another participant echoed the same view *"I try to restrict the amount of information available about me on these sites. I do not want colleagues to see photos for me with friends, on holiday etc. I only share locations which are appropriate to all the people I have within my social network".*

Sharing content that is appropriate only to specific audiences is not as easy as it sounds as Wang et al, (2011) discovered. Their research found that users can sometimes share content in what they term as 'hot states' (i.e. anger, frustration or extreme excitement). In such states, users can unwittingly post inappropriately without fully considering the consequences.

5.3.6.3.1 Adequacy of existing platforms to manage sharing across different parts of life

Building on the theme of identity management, we also asked participants whether they felt existing systems were adequate in managing sharing across different parts of life.

A number of users stated that they did not feel that location sharing apps were adequate in identity segmentation. Some raised a number of concerns including apprehension about mixing work with social life.

One such participant remarked, *"I find that sharing my location can be a problem when both family and friends are able to see it, as I have two different roles for each of these."* This is an obvious example of conflicts between personal and social life. Another participant stated that there is no way of differentiating between different groups within your social network, "*Not at all, I find it more a generalisation. It doesn't segment my life, it sort of brings everyone all together into one app"*. This was echoed by another participant, *"Unless contacts are already grouped, which has other difficulties, it is difficult to post locations to specific people."*

5.3.6.4 Impression management through location sharing

Reasons for sharing at prestigious locations and specific audiences shared with

In order to probe deeper into whether people engage in impression management when sharing location, participants were asked which specific audiences they would share with when at so called 'prestigious locations'. A number of respondents said that they would share their location in such places. Some participants regarded them as opportunities to enhance social standing whilst others, by virtue of them being 'out of the norm', saw them as special occasions to share with people.

To improve image/social standing

There were a number of participants who were quite open about their sharing habits. They mentioned quite explicitly that they would share with everyone to increase social status, to show off and to seek attention. One participant said, *"Everyone because if the place is prestigious then I presume that it would improve my social*

standing among all groups of people." Another participant similarly stated the prestigious location can aid in improving a person's image, adding that it is a common action in society, "*Everyone probably that I'm connected with on my social network, its a common thing to do in today's society. Prestigious locations are highly regarded, so in that way it could make you seem a little more elevated in today's society."*

For most respondents, prestigious locations were mainly shared to friends. This was done to express excitement and to seek attention from this group. One participant mentioned, *"(Would share with) Friends. It is because I would like to seek attention and I would like to make myself seems more experienced than them."*

Another participant remarked, *"I would want to share it, because it would make you seem like you knew (about) which places to go – (you) would come across as sociable and to an extent would make you seem prestigious".*

To share special occasions

For other participants, enhancing image was less of a concern. Prestigious locations can be special occasions and present rare opportunities. One participant said, "*Yes. It is something special and as I don't have many opportunities to go to such places, I would want to share it."* Another participant remarked, *"That depends on how you qualify "prestigious." If I were receiving an award, say the Able Prize in Mathematics or the Noble Prize in Physics, then I would want everybody to know. Beyond that, I don't care much. As for why, because they are rare occasions that only happen once in a lifetime."*

Reasons for not sharing at 'boring' locations and specific audiences not shared with

Participants were also asked the same question but this time with so-called 'boring places' and the specific audience they would *not* share with.

Would not share at boring places

To preserve self-image

A number of respondents were reluctant to share 'boring' locations for fear of ruining personal image. This was particularly the case with friends. These findings are consistent with Lindqvist et al, (2011).

One participant said, *"(I would not share with) friends. I would like my image to be positive/social and do not wish to check into boring places, such as my room/random restaurant/fast food shop."* Another participant agreed, *"Friends, in case I came across as a boring and uninteresting person as a result."* One participant was particularly concerned about the impact of sharing at such places, *"Friends, as it may make them not want to spend time with me!"*

Would share at boring places

For self-expression purposes

Some respondents stated that despite a location being 'boring', they would still share it with everyone. One participant said, *"I would share it with everyone. Boring might be a part of my identity."* Another participant said that they simply did not care whether others deemed it as boring, *"I would still share it, as I don't mind if they see it as boring. It's usually a funny comment on why I'm there."*

Certain locations, despite being mundane and boring, can be opportunities to express mood. One participant said, *"It depends on how it was boring. If I was bored in a long queue, for example, I suppose I could vent my frustration through a check-in. Another sense of boring locations is one that you visit every day - there would be no point checking in and sharing my location every day that I spend at work or in a train station, for example."*

5.3.6.5 Summary of emergent themes

The major themes emerging from open-ended responses can be summarised as follows:

Relationship between identity and location

- Identity reflected in physical places, particularly those of significance such as places of birth, upbringing etc. Such places are more likely to be shared.
- Physical places can also reflect personality, character and a person's hobbies and interests. These can, in turn, influence the types of locations visited and shared.
- Location can be used to control how the self is perceived by others. It can also, according to some participants, be used to indicate social class.

How identity is conveyed and projected

- Physical location provides the context for sharing. Identity and the self are primarily conveyed through activities, moods and emotions, by mentioning people co-present, stories and overall experiences.

Identity management when sharing location

- Tensions exist about managing different areas of life in location sharing systems.
- Some participants believe that location sharing systems are not adequate for identity segmentation because they bring multiple audiences into one space. As a result, difficulties are experienced when wanting to share to specific people.
- Participants are tentative about accepting invitations. Some are quite meticulous about maintaining segmented friends lists.
- Participants are careful about content shared, ensuring that it is suitable for their audience.
- Multiple platforms are sometimes used to segment different areas of life (e.g. Facebook for social interaction, LinkedIn for professional networking).

Impression management through location sharing

- Prestigious locations are sometimes used to enhance self-presentation, increase social standing and seek attention from others. This behaviour is mainly exhibited when sharing with friends.
- Participants expressed a reluctance to share places that might be perceived as 'boring', in order to preserve established self-images. For others,

regardless of the nature of the location, places can be used for self-expression through humour and storytelling.

5.4 DISCUSSION

Exploratory factor analysis revealed a number of related factors. Factor 1 indicates the use of location to project identity. There were three factors that were closely related to impression management. Factor 2 was a reluctance to communicate present location in order to maintain a particular self-image. Items in this factor related to a reluctance to share when at so-called 'boring places'. These findings corroborate previous research including Lindqvist et al, (2011) and Tang et al, (2010). Factor 3 indicates the use of present location to enhance personal image; items included sharing location when at so-called 'prestigious places'. Factor 4 indicated deliberate behaviour to enhance social standing such as obtaining game based rewards to increase social standing or *deliberately* going to prestigious places to check-in there.

Factor 5 was a self-awareness of how location is interpreted (or misinterpreted). Items in this factor suggest that this self-awareness may be explicitly or implicitly influencing location sharing decisions. This may be a desire to increase social standing by sharing at places to suit a particular audience or even a reluctance to share at all for fear of check-ins being misinterpreted e.g. by colleagues, acquaintances; this is especially the case when socialising.

As part of open-ended questions, participants were asked whether they felt location was related to identity. Most participants stated that identity can be linked to location in a variety of ways. It is particularly the case if someone has a personal attachment to a place i.e. place of birth, childhood memories, reflecting particular stages of life. Participants remarked that these types of locations were more likely to be shared. Furthermore, many participants acknowledged that identity is faceted and that different locations are shared to convey different aspects of life.

It is interesting to note, however, that the definition of identity is quite subjective and open to interpretation. Given the exploratory nature of the study, we decided not to define the term in any specific way. For some participants, identity was very static and for that reason the variety of locations were not necessarily a reflection of the

individual. For many others, identity was fluid and ever evolving. For them identity is comprised of personality, hobbies and interests, relationships held with others, events and activities partaken in. All of these factors can help build an identity. As such, any locations that reflect these factors can therefore reflect a picture of identity and indeed be a part of it. This interpretation of identity is consistent with the sociology-based definition of social identity which can include not only societal roles, but also personality and leisure activities (Thoits & Virshup, 1997). Further, one participant acknowledged that through location, one can learn a great deal about a person's life. As Cramer et al, (2011) found, location can sometimes act as a 'window' into someone's life. Location history can therefore be quite intriguing not just to friends but to the social network at large.

What is clear from our findings is that while location may not reflect identity in its entirety, it may very well be a significant part. The particular places someone visits, the people they choose to share that experience with, the events and activities they choose to partake in are all segments of who they are as individuals.

Previous studies such as Guha & Birnholtz, (2013) revealed that location sharing systems can be platforms for impression management. Our results corroborate this view. We strove to dig deeper into these findings by seeing whether this behaviour was more likely with certain personality types. A significant positive correlation was found between extraversion and Factor 3 i.e. using location to enhance personal image. Surprisingly, this was also the case for those with a higher degree of agreeableness. Extraverted individuals are naturally quite gregarious and prefer sociable environments; those with higher agreeableness are known to be sympathetic and warm. For these types of personalities, sharing location when at prestigious places for example, might be a way of increasing social-status in the eyes of others and thereby increasing their 'likeability'. On the other hand, a negative correlation between the same factor and conscientiousness was also found. Individuals displaying this trait show self-discipline and have a preference for planned rather than spontaneous behaviour. This may make them less likely to carry out actions to enhance their self-presentation. However, these results are correlational and should therefore be taken with caution.

We also asked several open-ended questions as to *how* people engaged in impression management; specifically, whether users share at so-called prestigious locations and whether they were reluctant to share at 'boring places'. Participants

were quite open in their responses. Many said that they would share at prestigious locations to maintain or enhance their social standing. This was particularly the case with friends. One participant remarked that the perceptions we have of such places can be used to create a positive image in the minds of others. Location was also a way of seeking attention, again especially from friends.

Further, many participants expressed a reluctance to share at boring places for fear of ruining self-image. One participant said that doing so would make them look 'boring' and, consequently, their friends might not want to socialise with them. But interestingly, there were also many participants who said that they would not mind sharing at these 'boring places'. They said that such places could be opportunities to convey a particular mood or express a funny story. Such factors could therefore turn a boring place into something that others would find interesting. A funny story, or a witty remark can sometimes be just as effective in projecting a positive image as sharing at a prestigious location. This reveals the rather 'playful' side to location sharing, a way of conveying aspects of oneself to others in a rapid, episodic fashion. It is also further evidence that location sharing is less about the place itself and more about the overall experience.

It was anticipated that people with high self-monitoring were more likely to engage in behaviour to enhance self-presentation. This was not found although a significant correlation was found between self-monitoring and Factor 1 i.e. using location to project identity/personality/persona. This suggests that high self-monitors might use location to actively share different parts of their life with others.

In line with previous studies, users can employ a number of methods to convey location including current mood, activity, stories and overall experience. Indeed, moods, emotions and activities are all prompts to share location in the first place. This can be positive emotions such as happiness and excitement but also negative feelings such as anger and frustration. For many participants, location was simply a way of sharing what was happening in their life and how they were feeling at the time. Patil et al, (2012b) conclude that users favour explicitly-initiated episodic location disclosure rather than constant automated broadcast. Findings from this study seem to corroborate this view. Other prompts to share location included being at an interesting or unusual location, to seek attention and seeing others post. All such prompts are transient to a particular time or place rather than surfacing through constant broadcast.

Moods and emotions, by their very nature, can be random and spontaneous. Therefore, they can themselves lead to unintended sharing. Wang et al, (2011) found that one of the reasons why people made regrettable posts on Facebook was because they shared while in a “hot state”. A “hot state”, in their definition, was a highly emotional state or while under the influence of alcohol or drugs. Location sharing can exacerbate this problem because physical location is also being shared. Mechanisms such as delayed disclosure, or conflict detection algorithms are possible opportunities for technology solutions.

Part of the research was also to investigate how identity is managed in location sharing systems. A number of studies have focused on online social networks and their rather problematic assumption of a uniform identity, Farnham & Churchill, (2011). Palen & Dourish, (2003) observe that the public nature of online systems means that content shared may persist beyond the scope of conversation and reach unintended audiences. This type of content can potentially have serious repercussions as Wang et al, (2011) found. In one case, misinterpretation of a status update led to breakdown of a relationship. In another case, a teacher was forced to resign because she posted a picture on Facebook in which she was holding a glass of wine and a mug of beer. Similar findings have been made when sharing location, Patil et al, (2012b). But as Patil et al, (2012b) discuss, the majority of these regrets stem not from the act of sharing location but from a misalignment in the audience. As they state, “the audience to which the location was available was not well-matched with the audience for which the information was intended”.

Building on from previous research, this study sought to investigate the specific methods used to manage identity in location sharing systems. In an attempt to avoid conflicts in identity, some participants actively screened their content before posting, ensuring that the location was appropriate for the intended audience. Others maintained different friends lists depending on their audience (e.g. friends, family, acquaintances etc). But most respondents were simply very careful about who they befriended on social media. They were very meticulous, even tentative when accepting invitations. This corroborates the conclusions of Stenros et al, (2011), with some of their participants accepting Facebook invitations once every month, and in one case, once every year.

The same research also found that for Facebook users, maintaining different 'friends' lists' was tedious and cumbersome. However as they acknowledged, Facebook is an evolving platform making its usage subject to change. Long-term users of Facebook are accustomed to using the platform in a certain way and may not be interested in the newer features of the software. For them, carefully choosing whom to accept on social networks may be an obvious way of managing identity, not necessarily because it is the optimum solution, but because it is the most familiar and convenient one on that particular platform. When targeted sharing features are built as part of the system from the outset such as Google circles, users find it much more useful. Kairam et al, (2012) found that for Google+ users, 74.8% targeted their sharing to particular groups within their social network.

In our research, some users even used different platforms to manage different parts of their life (e.g. Facebook for personal, social use and LinkedIn for professional networking). As aforementioned, this may be down to the perceptions users have of each platform. Although Facebook is simply a platform to communicate and share information, and can be used professionally, it is perceived by many as more social oriented. Mixing work with pleasure especially when you have such a varied audience can be quite perilous, as we have seen.

5.5 LIMITATIONS OF STUDY

- Study was self-reporting and therefore did not study actual location sharing behaviour. Further research is required to understand whether results match actual practice.
- No specific demographic groups (i.e. based on age, gender etc.) were researched. Repeat studies are required to determine location sharing attitudes of particular groups.
- Any results obtained through correlational analysis are indeed correlational and as such, no causal inferences can be made.
- The survey was advertised in a number of UK cities and therefore results may only apply to the UK population. Repeat studies are required to gain insights into usage from other countries.

5.6 CONCLUSION

Results from this study indicate that social identity does influence the digital sharing of location. Social identity and location sharing seem to have a close relationship. Social identity can influence the types of locations visited and shared; those locations, in turn, can represent who that person is as an individual by reflecting facets of their personality, character and particular hobbies and interests. Participants acknowledged that places that had sentimental value such as those reflecting upbringing, those carrying childhood memories, or those that reflected personality were more likely to be shared.

To this end, results support previous studies about the social-driven aspect of location sharing. Similar to the findings of Cramer et al, (2011) and (Patil et al, 2012b), location sharing has many social motivations; it is less about alerting others of physical presence and more about using location to achieve socially oriented goals. Through their moods, activities and experiences (when at particular places), people actively convey and project themselves to an online audience. Sometimes, location can also be used to enhance self-presentation as both quantitative and qualitative results have revealed.

Another key observation emerging from the study is that relating to digital identity management. Firstly, self-awareness of how location is interpreted emerged as a distinct factor in factor analysis. Secondly, in open-ended responses, participants acknowledged that they had different roles depending on the context of social interaction. As such, many participants employed careful strategies to appropriately segment different parts of their life; this was mainly to prevent any crossover between incompatible facets. These strategies included choosing their online friends very carefully; actively screening their content to ensure it was appropriate for the audience and even using different platforms to segment different facets of identity (e.g. social v professional). Although not articulated explicitly, participants recognised the notion of a multi-faceted identity. For example, one participant remarked, “I find that sharing my location can be a problem when both family and friends are able to see it, as I have two different roles for each of these.” The observation that family and friend relationships occupy “different roles” is indicative of the multi-faceted nature of a role-based social identity, as posited by Hogg et al, (1995).

Further, a number of participants remarked that location sharing systems were not adequate for identity segmentation. For example, comments such as “there is no way of differentiating between different groups within your social network” and “I find it more a generalisation. It doesn’t segment my life, it sort of brings everyone all together in one group” illustrate how multiple, diverse audiences are made homogenous, indicating the potential for a context-collapse as posited by Marwick & Boyd, (2010). Even those who did not find any conflicts in identity management acknowledged the need to make content more relevant to their audience.

These examples illustrate that the ‘share all or nothing’ approach of conventional location sharing systems is problematic. By not recognising a multi-faceted identity, multiple audiences are collapsed into one, which can increase the chances of misalignment between the content and the audience. This can, in turn, heighten tensions about identity management and sharing location as a whole. In light of this, there is potential to develop a system that recognises multi-faceted identity at its core. Such a system might be useful not just in terms of making content appropriate to the audience but also relevant. This endeavour is the focus of the next chapter.

5.6.1 Key outcomes emerging from study 1

- An understanding of how identity is reflected in the digital locations shared on social media. Namely, digital location can give an insight into people’s backgrounds, personality, character and interests.
- An understanding of how digital location is used to convey and project identity. Physical place provides the context for location sharing. Identity, however, is conveyed through moods, emotions, activities, stories and experiences.
- An analysis of how identity is managed in location aware social media.
- The discovery of the tensions in negotiating different facets of identity in digital environments. Users actively screen content, tentatively accept friendship invites and also use multiple platforms to segment different areas of life (i.e. social v professional).
- The discovery of impression management strategies employed by location sharing users. Digital location can be used for self-presentational purposes, particularly when at places perceived as ‘prestigious’ by others.

CHAPTER 6
EXPLORING THE IMPACT OF TARGETED SHARING, BASED ON FACETS OF IDENTITY, ON LOCATION SHARING BEHAVIOUR

6.1 INTRODUCTION

Results from the first study indicate that users encounter problems in identity management, stemming primarily from a mismatch between the context of the location and the intended audience. Rather than the dominant 'share everything or nothing at all' approach of conventional location sharing systems, there is a need for more targeted sharing. But a question arises at this point: how can we effectively design mechanisms to help users target their sharing to specific audiences? Ozenc & Farnham, (2011) discovered that people organise their social worlds based on certain 'life modes'. A life-mapping activity revealed that the most common modes were social, work (i.e. professional) and family. Other areas of life branched out from these three main facets.

These life modes provide a useful framework in which to categorise online audiences. Other platforms such as Google+ organise the audience based on relationships (e.g. friends, family, acquaintances). This study takes an alternative approach by organising sharing based on the life facets of the individual user.

By designing mechanisms that enable targeted sharing, this study addresses the second overall research question of the thesis:

RQ2. What is the impact of targeted sharing, based on facets of identity, on location sharing behaviour in comparison to broadcast sharing?

To address this question, the study takes an experimental approach. Two location sharing apps are designed. In one app, users share to a generic 'friends' list as is the case with most location sharing platforms. In the other app, the audience is organised around three main 'life facets' namely social, professional, and family — similar to the ones described by Ozenc & Farnham, (2011). The objective is to understand the impact of this method on location sharing behaviour in comparison to the broadcast sharing approach of explicit location sharing systems. The terms 'life

facets' and 'life modes' as in Ozenc & Farnham, (2011) are used interchangeably throughout this section.

Moreover, unlike previous studies such as Wang et al, (2011), Patil, (2012a), and Patil et al, (2012b) that explored location sharing behaviour through self-reporting studies, this study focuses on actual user behaviour by directly comparing usage on two different types of location sharing systems.

This study aims to answer four specific research questions:

Q1: What is the impact of targeted sharing, based on facets of identity, on the number of locations users share?

In contrast to conventional location sharing systems, this study, via technology probes, builds software that is based on a multi-faceted identity. By doing so, the aim of the first research question is to ascertain the impact of this approach on the number of locations shared by users. With sharing segmented into different life facets, are users more liberal with their sharing habits (i.e. do they share more)?

Q2. What is the impact of targeted sharing, based facets of identity, on the types of places people share?

The first study revealed concerns about locations, particularly those that are social, being misinterpreted by their audience. With the audience segmented according to distinct life facets, what impact will this have on the types of places people share? For example, will this approach make users more inclined to share social locations given that they are able to target their sharing according to different parts of their life?

Q3. How effective are targeted sharing and broadcast sharing in enabling self-expression?

The first study found that expressing mood, emotions and activity are the primary means for expressing location. They also act as prompts to share location in the first place. However, as discussed previously, people's behaviour tends to differ depending on the situation and context (see chapter 2). The particular language used in one context, might be entirely inappropriate in another (e.g. loose talk in social contexts and professional language at work). In the absence of the bounded contexts

found offline, social media can make the management of appropriate behaviour in different contexts more challenging. Thus, how effective are the two systems in facilitating self-expression? In particular, given that in one app, users are able to target their sharing to particular audiences, will they be more comfortable in this environment and hence use more loose, candid language when communicating with social audiences?

Q4. By introducing targeted sharing, can we reduce anxieties about location being misinterpreted?

The first study uncovered general anxieties about location being misinterpreted; this was a distinct factor in the factor analysis. It was also corroborated in qualitative analysis with participants revealing concerns about being perceived negatively in social situations. Can we reduce such anxieties by enabling users to target their sharing to particular audiences?

The second study takes a very egocentric approach i.e. getting the user to think about how their sharing relates to their *life* as opposed to their *relationship* to a social network. It aims to make users more conscious of the different parts of their life by making life facets explicit. By aligning the audience more closely with specific facets of identity, it may help reduce any conflicts in that identity. But it is not purely a reactionary approach. Having clearly defined parameters when sharing may also help users in *expressing* and *projecting* their identity in a manner that is meaningful to them. This may help to share content that is not only *appropriate* to the audience but also *relevant*.

6.2 METHOD

Two fully-functional location sharing apps were designed. A total of 27 participants, all of whom were familiar with location sharing, then used both apps for a period of 14 days. Their general usage including locations shared, status updates, and longitude and latitude values of each location were recorded on a backend server. After the study, participants were invited for face-to-face interviews to probe their experiences further.

6.2.1 The apps

Both apps were designed as technology probes. As discussed in chapter 4, technology probes are particularly useful when experimenting with new technology. The goal of the apps, therefore, was not to demonstrate final implementations but to experiment with an alternative form of location sharing and directly compare usage against conventional broadcast sharing mechanisms. Although both apps were fully-functional, the level of functionality was restricted to only that which was necessary for answering the research questions. This does not mean that the apps were not designed to look and feel like location sharing software. Indeed, this was a design consideration. However, both apps were void of any extraneous features that might introduce bias in usage, and therefore potentially jeopardise the overall experimentation goals of the study.

Both apps enabled users to share their location as well as a small status update (description) of each location. However, unlike conventional social media, contacts were selected from the user's phonebook. Location updates were sent via SMS (see section 6.2.1.2). The apps were built natively using the Android SDK and were targeted to Android 2.1 and above.

The Locshare app

In the first app, named 'Locshare', sharing was restricted to a generic contact list termed 'my friends' (Fig 6.1). Users selected contacts from their address book (Fig 6.2). They were asked to select a mix of social, professional and family contacts at the start of the study. This was done to mimic the functionality of a typical 'friends list'.

Users were free to either share their location to everyone or keep their location private. If shared to everyone, the app would send individual text messages to each contact on the user's friends list. If the user chose to keep things private, the location would be stored on the phone and logged on the server, but not sent to any contact.

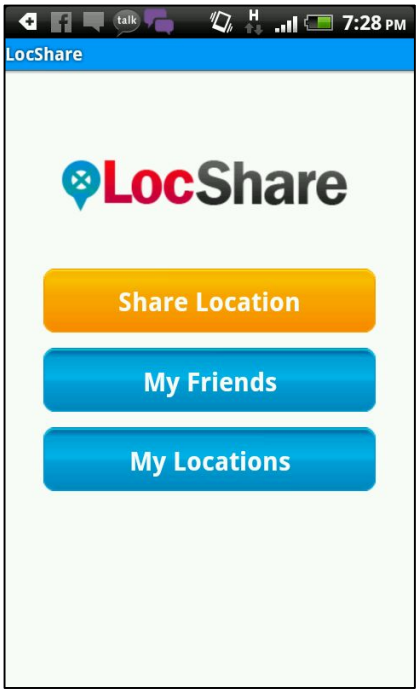

Fig 6.1: Locshare app home screen

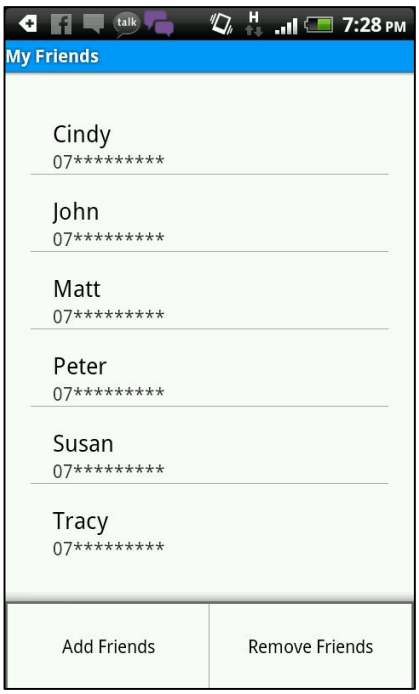

Fig 6.2: Friends list (Users share to one generic group of contacts)

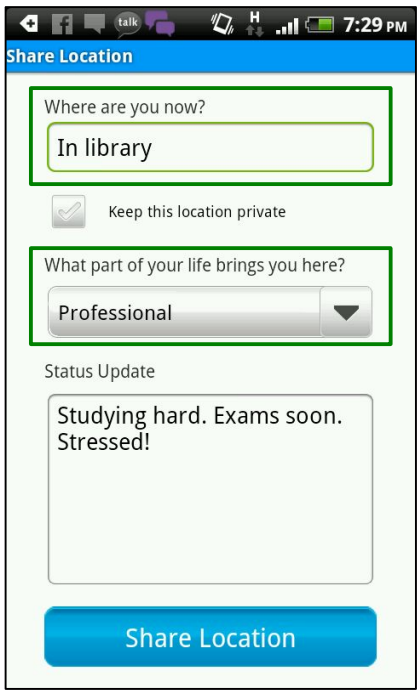

Fig 6.3: Share location screen. Users type in location and status update. Also specify what life facet location is related to

As highlighted in Fig 6.3, users could type their location in the free-form textbox. The status update box at the bottom of the form behaved in the same way. Users were also asked how the location related to their life and were given four options: social, professional, family and other. This was done to categorise locations around different facets of life as opposed to type of location (e.g. entertainment, travel, work etc.). It was recorded as metadata and was not sent to phone contacts as part of the location update.

The FacetID app

The second app, named 'FacetID', behaved much the same way as the first but with one key difference. Rather than share to a generic friends list, users could now separate their phone contacts into three distinct groups: social, professional or family (Fig 6.4 & Fig 6.5). At the point of sharing, users were free to share to one or more of these groups, or share to everyone at the same time (Fig 6.6). Like the previous app, they were free to keep their location private if they wished.

Fig 6.4: FacetID home screen

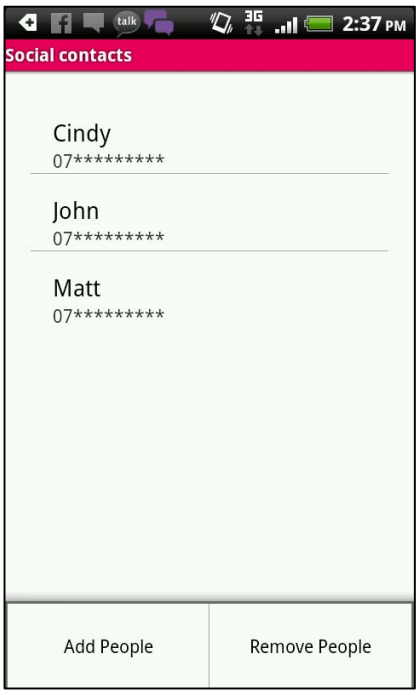

Fig 6.5: Contacts split into three distinct 'life facets': social, professional and family

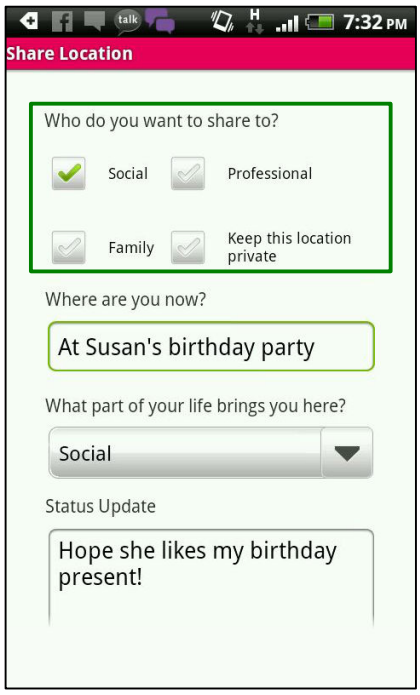

Fig 6.6 Users target their sharing based on three facets — sharing to one or more groups

6.2.1.1 How data was stored

When sharing a location, three types of information were recorded: the actual location (inputted in free-form text box), the description of the location (status update) and the physical GPS co-ordinates (long and lat values). This information was stored on a web server. For this purpose, the apps required access to either 3G or WiFi.

The location, together with the status update was sent as a text message to all phone contacts selected by the user. This was done using an external SMS service. The general data flow between the apps and the server is illustrated in Fig 6.7.

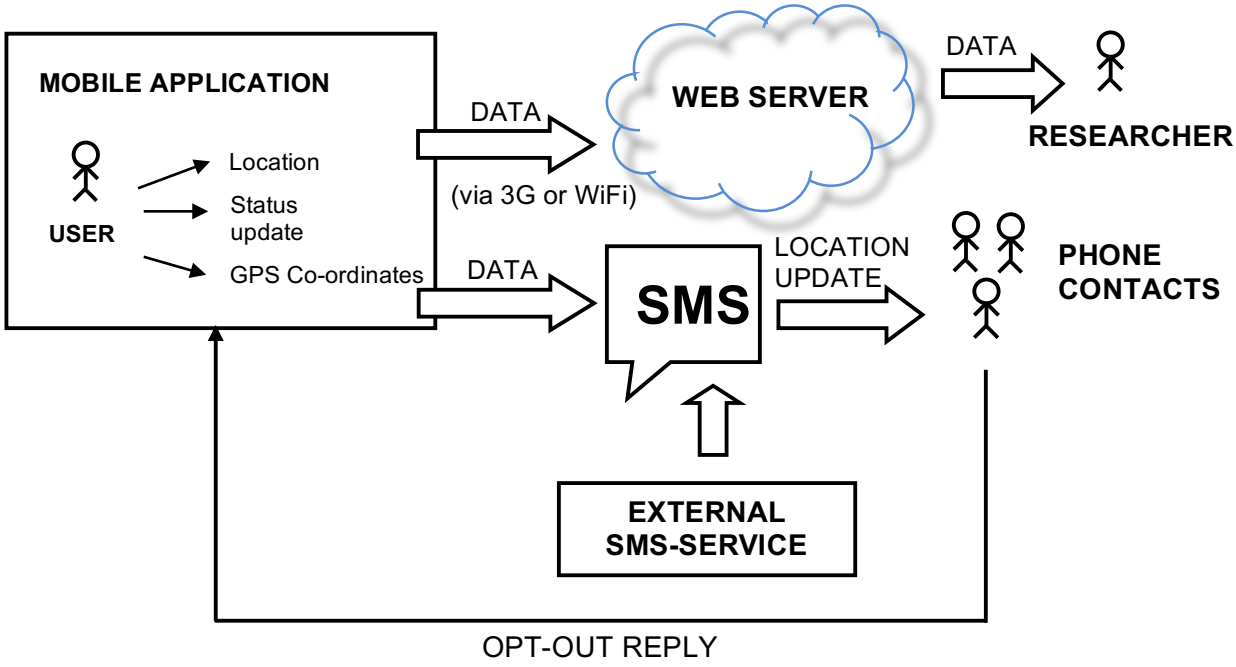

Fig 6.7: Data architecture diagram showing data flow

6.2.1.2 Sending location via SMS

Location updates were not shared through a post or tweet, but rather through SMS. This approach ensured that the study could access as much of the user's social network as possible. Another approach would have been to build the apps on top of an existing social media platform (e.g. Facebook). However, since Facebook is considered largely a social platform, a wide sample of the user's social network could not be guaranteed. Therefore, the user's phonebook was deemed most suitable for this study. This strategy also ensured platform independence, ensuring that the sample was not restricted to users of a particular system. Fig 6.9 illustrates the appearance of a typical location update.

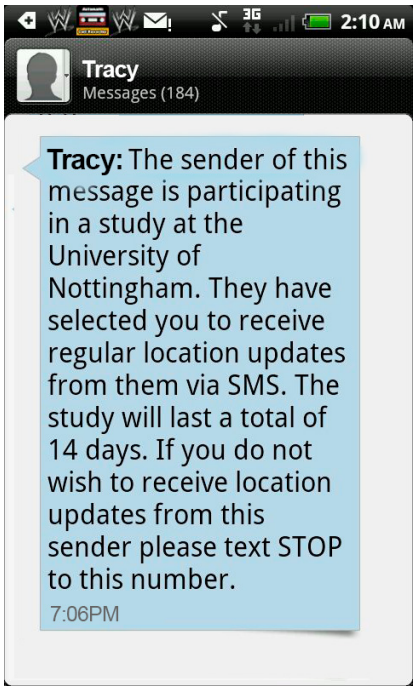

Fig 6.8: Opt-out message sent to recipients

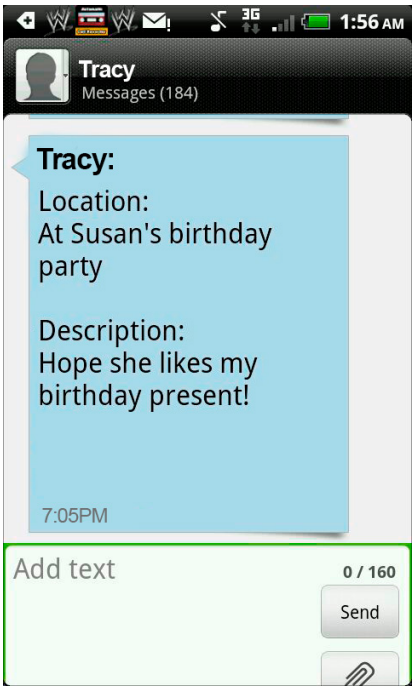

Fig 6.9: Typical location update message

An opt-out message was sent simultaneously with the first location update, giving instructions on how to stop receiving messages (Fig 6.8)

6.2.2 Participants

Recruitment took place through placing email adverts on university mailing lists. Paper adverts were also placed in the campuses of the University of Nottingham. Participants were recruited from three universities. The adverts stipulated that respondents must be users of 'location-aware' social media including Facebook, Twitter, Foursquare or others, sharing their location regularly on such platforms.

Participants were offered a £20 Amazon voucher for completing the study. A further £10 Amazon voucher was offered for attending the post-study interview. A total of 32 participants responded to the adverts. Three of those respondents withdrew from the study early on. A further two were removed for not sharing regularly. Therefore, a total of 27 participants were included in the final analysis.

6.2.3 Procedure

Participants were initially invited to a briefing session held at the University of Nottingham. It was conducted over the phone for those who could not attend in

person. The purpose of this session was to give an overview of the study and to provide general instructions (e.g. minimum number of times required to share, how long to use each app etc.). Both apps were then installed on each participant's phone.

The study was a within subjects design with all participants using both apps for 7 days each. It lasted a total of 14 days, similar to that of Barkhuus et al, (2008). Users were instructed to share their location at least 2-3 times a day. They were sent regular reminders via SMS to do so throughout the duration of the study. Participants were also counter-balanced with half starting with the Locshare app first and the remainder with the FacetID app.

Support was provided for all users throughout the process. Any questions, whether technical or otherwise were answered as promptly as possible.

All participants were invited to a post-study interview; a total of 18 responded to the invite. The interview was semi-structured and probed various issues including: evaluating how comfortable users were when using both apps, the effectiveness of each app in enabling self-expression, how effective the apps were in managing different facets of life, and others. The semi-structured format enabled related issues to be discussed further as and when they arose during the session.

Interviews were recorded with the participant's consent and then later transcribed. This formed the basis for thematic analysis, similar to study 1.

6.3 RESULTS

6.3.1 Participants/Demographics

The majority of participants were students, with the remainder academics/researchers. 59% (N=16) were male and 41% (N=11) were female. All participants were below the age of 35, with 44% (N=12) between 18-24 years and 56% (N=15) between 25-34 years.

6.3.2 Number of locations shared

In total, over 600 locations were shared over a 14 day period. Fig 6.10 below depicts the mean number of locations shared with each app. These numbers only include locations that were actually shared to phone contacts and not those that were kept private. Overall private locations for each app were analysed as separate variables.

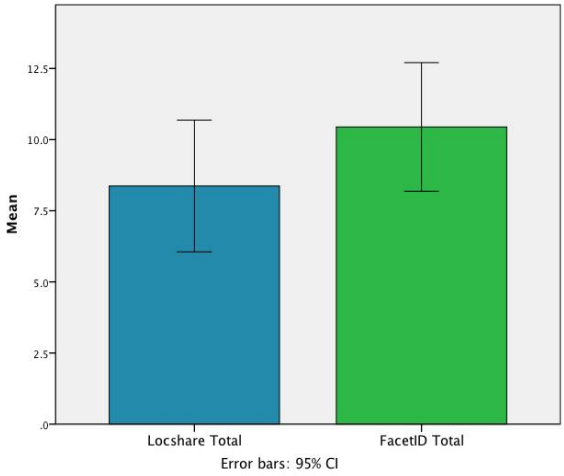

Fig 6.10: Mean number of locations shared with the Locshare and FacetID apps

When sharing a location (on both apps), users were asked to indicate what part of their life the location related to. They were given four options: social, professional, family and other. Fig 6.11 illustrates the mean number of locations shared with each 'life facet'. The number of private locations are included also.

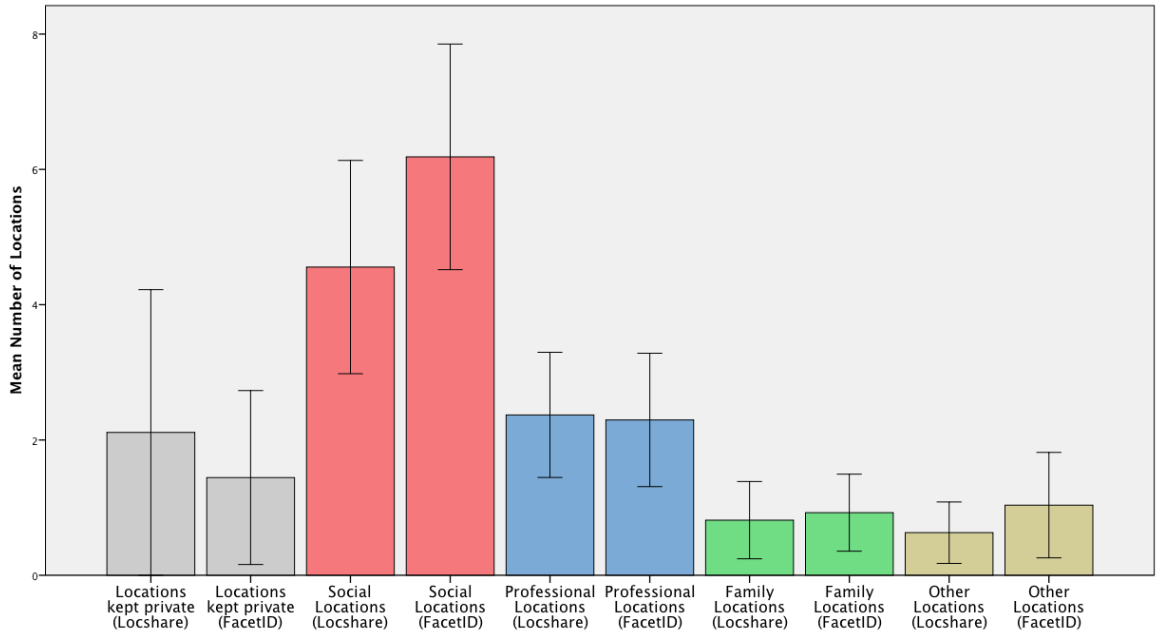

Fig 6.11: Mean number of locations shared with each 'life facet'

A multivariate analysis of variance (MANOVA) was conducted on the number of locations shared on both apps (Locshare v FacetID). Using Wilks's lamda, there was a significant effect of app used on the number of locations shared, $V = 0.86$, $F(1, 26) = 4.39$, $p < 0.05$. A supplementary paired samples t-test on the total number of locations shared confirmed that users shared more with the FacetID app ($M = 10.44$, $SD = 5.71$) than the Locshare app ($M = 8.37$, $SD = 5.85$). This difference was significant, $t(26) = -2.095$, $p < 0.05$.

In the same MANOVA, differences between each 'life mode' i.e. social, professional, family and other were also tested. Using Wilks's lamda, there was a significant effect of 'life mode', $V = 0.42$, $F(3,24) = 11.22$, $p < 0.05$. Pairwise comparisons revealed significant differences ($p < 0.05$) between each life mode, with users sharing more social locations than professional, family or other. More professional locations were shared than family or other, with these differences again being significant ($p < 0.05$).

The MANOVA also tested the interaction effect between app used and life mode. No significant differences were found.

6.3.3 Correlation analysis

	LOCSHARE TOTAL	PRIVATE LOCATIONS (LOCSHARE)	SOCIAL LOCATIONS (LOCSHARE)	PROF. LOCATIONS (LOCSHARE)	FAMILY LOCATIONS (LOCSHARE)	OTHER LOCATIONS (LOCSHARE)
EXTRAVERSION	.308	-.271	.377	-.029	.196	.263
AGREEABLE	-.348	.237	-.396	-.115	.239	-.065
CONSCIENTIOUSNESS	.063	-.019	.007	.051	.241	.316
EMOTIONAL STABILITY	**.511**	-.209	**.637**	.248	-.147	.067
OPENESS TO EXPERIENCE	-.057	-.157	.027	-.213	.046	.228
SELF MONITORING	.256	-.395	.399	.008	-035	.097

Table 6.1: Pearson correlations between Locshare and big-five personality and self-monitoring scales. Items in bold are significant at p < 0.05

	FACETID TOTAL	PRIVATE LOCATIONS (FACETID)	SOCIAL LOCATIONS (FACETID)	PROF. LOCATIONS (FACETID)	FAMILY LOCATIONS (FACETID)	OTHER LOCATIONS (FACETID)
EXTRAVERSION	.323	-.181	.141	.057	.279	.168
AGREEABLENESS	-.255	.200	-.379	-.290	.284	.049
CONSCIENTIOUSNESS	.166	.040	-.082	.202	.234	.238
EMOTIONAL STABILITY	**.414**	-.088	**.606**	-.007	-.096	-.243
OPENNESS TO EXPERIENCE	-.140	-.216	-.042	-.251	.125	.096
SELF MONITORING	.177	-.278	.383	-.058	.003	-.049

Table 6.2: Pearson correlations between FacetID and big-five personality and self-monitoring scales. Items in bold are significant at p < 0.05

At the start of the study, participants were asked to fill in a brief measure of the big-five personality scale and the self-monitoring scale. Items were taken from Gosling et al, (2003) and Lennox & Wolfe, (1984) respectively. Correlations between these scales and the overall usage results of both apps (Locshare v FacetID) was analysed. A pearson correlation was used to perform the analysis. Table 6.1 and

Table 6.2 depict the correlations between the Locshare and FacetID apps. Significant correlations at $p < 0.05$ are in bold.

Significant positive correlations were found between emotional stability and the total number of locations shared with both Locshare and FacetID, and the number of social locations shared with both apps.

6.3.4 Attitudes toward location sharing

Participants were also required to complete three surveys: one before the study, one after using the first app and the last after using second app (depending on the counter-balance group). This was to analyse any significant differences in attitudes toward location sharing before and after using the apps. Items were the five factors that emerged from the first study. No significant differences in attitudes toward location sharing were found.

6.3.5 Qualitative analysis

6.3.5.1 Categories of locations shared

In both apps, locations were entered through a free-form text box. This approach differed from that used by platforms such as Facebook and Foursquare, where locations are selected from a pre-defined list (based on proximity). A textbox was used to give users as much freedom as possible in defining location names and to allow users control over the granularity of location disclosure. This ensured that names were expressed in ways that were personally meaningful to users, rather than being limited to generic labels imposed by the system. This approach is similar to the one used by Barkhuus et al, (2008).

To categorise the types of locations shared, data was analysed using conventional content analysis. The method was similar to that used by Kairam et al, (2012), based on the definition of Hsieh & Shannon, (2005). A sample of 100 locations were selected at random to create overall codes that best described each location. The remaining data was then coded based on these categories. Care was taken to identify any new codes that did not fit into the initial set. A total of 8 categories emerged as illustrated in Table 6.3

Category (Code)	**Example(s)**
Personal	"Home", "House", personal addresses
University	"University", Campus names e.g. "Jubilee", Specific dept/building names e.g. "Portland Building", "Trent Building", "Med school", Library
Work	"Work", "Office"
Entertainment/Social Venues	"Johnson's arm pub", "Bonzai", "Tarn Thai Restaurant", "Bottesford club", "Goose fair"
Location + Activity (Both specified)	"At home playing Diablo III", "Home, playing Call of Duty", "In the car, driving into Friday fun", "Home, in front of Youtube"
Places/objects around the house	"In da kitchen", "Bathroom", "Sofa", "In bed", "Desk", "Computer", "PC",
Quirky/Humorous	"Somewhere in between dimensions", "Earth", "Arkham City", "Land of confusion", "The matrix"
Mundane/Shopping (Errands)	"Post office", "Lidl", "Tesco", "Sainbury's"

Table 6.3: Categories of locations shared

The majority of locations fell under the 'Personal', 'University' and 'Work' categories. However, the freedom to define custom locations lead users to be more creative with their names. As seen in Table 6.3, many users specified not just the physical location but also their current activity. This result is similar to Lehikoinen & Kaikkonen, (2006) who found that both activity and place can be jointly used to communicate location.

Quite often, location names were used as a basis to provide context to status updates. Certain posts started with the location name and then continued in the status update. Sometimes, locations were not real at all but merely starting points for jokes. This was particularly the case for locations under the 'places/objects around the house' and 'quirky/humorous' categories. For example, the update "In da kitchen" was followed by the status update "I'm trapped by dishes!" Further, a post named "The Matrix" was followed by the status "I chose the wrong pill" and "Land of confusion" followed by "Forgot to take my memory pills".

It is interesting that the freedom to define custom locations encouraged creative and quirky location names. Such humour was used as part of the repartee among friends,

similar to the findings of Barkhuus et al, (2008). In some cases, this facilitated a two-way communication between users and their social network, as will be explained in the interview section.

Further, in most cases, participants chose not to reveal personal addresses when sharing private residences, which suggests the use of location blurring. Users were keen to express their lifestyle through location, but not in a format that might compromise their privacy. This was not the case for public venues where threats to privacy might not be as high.

6.3.5.2 Categories of status updates

Users could enter status updates along with every location shared. This was essentially a description that supplemented the location being sent.

Status updates were categorised using the same method described in section 6.3.5.1. Messages tended to be quite short and can be compared to tweets in terms of length. Most updates consisted of no more than a few words; others were whole sentences. Due to the variation, some messages were assigned to more than one category. However for the sake of brevity, the most common examples, along with their respective categories, are given in Table 6.4

Category (Code)	**Example(s)**
Activity	"Reading, writing and coding" "Drinking + being social :O :-D "Watching it piss it down :-\" "Catching some morning rays :)" "Waiting for someone to bring me breakfast in bed. No success so far."
Emotions/Feelings	"Excited (in my pants) to see A*** and C** later" "Feeling quite awesome" "Super happy" "Very angry" "Happy not to be in hospital any more" "With a terrible flu :/ for your own good get away from me!"
Overall experience	"Great party yesterday"

	"What an awesome gig! Two great bands to share the stage with, and friends gave us 8.5/10 not bad at all! :)" "First good lecture in a while" "First attempt at making soda bread from scratch = not bad :)!" "Just discovered that you can get a veggie wrap at McDonald's. Seems to be falafel-like!"
Humour/Anecdotes	"Remember, you can't say happiness without penis :)" "Wishing my gf the best so she doesn't slap me with a wet fish because she's both high and in pain. <3" "Expanding time and reusing. Reticulating splines. Uninstalling the colour yellow, reinstalling the colour yellow" "Killing bitches left and right, spookin bitches on my trike" "(In reference to Diablo III video game) My Level 12 Witch doctor is the bees knees ^_^" "It's completely acceptable to fall asleep on the floor on the train, right?" "Trying to stop procrastinating and having no luck at all" "chooo chooo"
Announcements	"Hello there! We're happy to announce that we've gotten our very first Christmas tree! It's awesome! x" "Wanna walk around and eat? Come with me?" "Happy weekend all :)" "Goodbye Nottingham, hello Wolverhampton!" "Had a tenner on United city shatkar psg and Munich, got back 125 :)"
Simple update on Location	"Friends place" "Kitchen"

	“lecture:algorithmic problem solving” “Just in now :/”

Table 6.4: Categories of status updates

As aforementioned, status updates were used to give context to location names. Posts started with the location name and then completed with a status update. The results corroborate the findings of our first study, namely that location is primarily conveyed through current activities and emotions/feelings. This was also found in Barkhuus et al, (2008). However, the freedom to specify custom locations gave rise to other categories such as ‘humour/anecdotes’ and ‘announcements’. This is not to say that such updates are not possible using pre-defined locations. But custom names gave users freedom to express location more openly, giving rise to humour, quirkiness and individuality.

6.3.5.3 Post-study interviews

Following 14 days of software usage, all participants were invited to take part in a post study interview. The main purpose was to better understand their experiences of using the software and to ascertain specific differences in usage between the Locshare and FacetID apps.

A total of 18 participants responded to the invite. Interviews were semi-structured and were voice-recorded with the participant’s consent.

Several topics were explored including how comfortable users were when using the apps, how locations were described between both apps, how effective each app was in supporting self-expression, the effectiveness of each app in the management of identity and other related questions.

The data was analysed using thematic analysis. The coding process was the same as outlined in section 5.3.6. Since the interviews were semi-structured, some questions were answered more thoroughly than others. This meant that, in a few cases, they contained sufficient information to answer the questions posed later in the interview. Thus, for questions that had little content, simple content analysis was deemed adequate.

Two major themes are presented: the general experience and level of comfort when using both apps, and the effectiveness of both apps in aiding self-expression, together with their related sub-themes. For each major theme, the Locshare app is discussed first and then the FacetID app. Users' views on the specific life facets used in the FacetID app are presented at the end. The interview also probed other issues such as participant feedback regarding the design and functionality of each app. This data is presented in appendix C.

6.3.5.3.1 General experiences and level of comfort when using the Locshare app and sharing to a mixed group of contacts

Participants were asked how comfortable they were when using the Locshare app, particularly in light of sharing to a mixed group of contacts. This lead to several themes mainly relating to four areas: general tensions about broadcast sharing, the reasons for why such tensions existed, the actions taken to avoid these tensions, and the potential advantages of broadcast sharing.

General tensions about broadcast sharing

When using the Locshare app, participants were instructed to include a mixture of social, professional and family contacts in their contact list. Having such a wide variety of people made many participants apprehensive about sharing. Although sharing this way is common to many social media platforms, participants remarked that sharing to everyone was difficult and not always appropriate.

One participant stated, "*It was difficult because you had a mixture of so many different people. So there were occasions when I hesitantly thought 'Should I be sharing this with my family?' That was a concern because you had professional contacts, people from my childhood, and my family all mixed into one"*.

Broadcast sharing can be problematic because of the variations in 'tie-strength'. For example, the relationship with a friend is different to that of a professional colleague or family member. The way in which you present yourself and communicate with each group can subsequently vary.

For one participant, professional contacts presented the largest problem, "*It did make me think twice about, if they read it, how they were going to perceive what I was up to. If it was a certain time of the day for example and I was working late, they might*

think 'oh, she's working late, I better find out more tomorrow.' It was maybe just awareness of the context of message and not just the message itself."

Some participants had certain regrets when sharing, "*Sometimes I'd forget who my contacts were on Locshare, and then sending it to everyone and then thinking 'Hang on…what have I just sent?*" Another participant echoed similar regrets, "*I remember one time when it was 2 o'clock in the afternoon and I was still in bed. I remember sending this to a few people in the office. I regretted sending that. I sent it without actually realizing who I'd sent it to.*"

Such consequences are similar to the regrets experienced when sharing on Facebook (Wang et al, 2011). Although participants pre-selected the contacts on their list, it is sometimes difficult to keep track of everyone chosen, especially if the list is quite large. A lapse in memory or concentration can have regrettable consequences, even perilous in some cases, as previous research has shown.

Location sharing can differ from conventional forms of social media because physical whereabouts are being shared. Such information is considered much more sensitive and personal than a simple post or message. Previous research has shown that location sharing can act as a 'window into people's' lives, revealing much about their movements, activities, hobbies and interests (Kinsella et al, 2011). Not having control about who sees what and when can exacerbate anxieties about sharing location in general.

Reasons for why anxieties existed

Although some reasons have already been touched upon, there were several common reasons as to why these anxieties existed.

Locations not always relevant to everyone

Participants observed that not all locations were relevant to everyone. By relevancy we mean some locations would simply not interest those being shared to. Some participants were very conscious of how their audience would respond to receiving location updates. Although it is difficult to predetermine what that response may be, it is the *perception* that users have that is most salient.

One participant remarked, "*I couldn't target my audience. I think that was a problem because sometimes the location I was present at weren't always applicable or relevant to everyone from my social, professional or family groups. Sometimes I might send out updates that were related to my work which my social contacts wouldn't be as interested in as my professional contacts.*"

Locations not appropriate

Apart from not being relevant, some locations may not be appropriate to share to everyone on a social media list. Where relevancy is about how applicable the content is to its intended audience, appropriateness is about ensuring that the content is suitable. This is an issue that mainly affected the sharing of social locations. One participant stated, "*If I'm at a social location, I don't think it's always appropriate for that to go to your professional contacts.*"

Behaviour deemed appropriate in one context may be entirely inappropriate in another. For example, previous studies have shown the perils of sharing social locations, particularly those that involve drinking, to a professional audience. One participant expressed a discomfort sharing social-oriented locations to parents, "*If I wanted to make a reference to clubbing or going out, then I would mention it to my friends, but I wouldn't be comfortable sharing it with my parents.*"

To avoid annoying audience

Sharing to a mixed audience means that you cannot always control how people will react to your content. Some participants were particularly careful to avoid annoying people, "*I have to admit, I was quite reluctant because I remember who my contacts were and I did not want to annoy them too much...because I had my mum and dad there as well. I had a few texts from my parents saying "what are you doing?*"

Participants could select which contacts they wanted on the friends list but were instructed to include a mixture of social, professional and family contacts. Having known each contact personally on some level, participants

were naturally concerned about people's reactions, "*On reflection, I though maybe people are getting a bit tired of it! I was comfortable sharing some things over others. When sharing, it made me think twice about how much it would matter to them and whether they'd ignore it."*

This is not dissimilar to conventional social networks which may have mixture of friends, colleagues, acquaintances etc. The fact that some contacts are known on some personal level can often influence what is shared publically.

Actions taken to avoid anxieties

In order to avoid difficult situations, participants took several actions. Some simply didn't share certain posts at all, "*There was no way to designate (target) specific groups of people. You'd find yourself not going ahead with (sharing) certain posts because you didn't want everyone to know.*"

Other participants were very careful when constructing their messages, "*I was bit more selective about the people within the group. I think it (Locshare app) was harder to use because you had to think carefully before sharing to a mixed audience.*" Another participant had similar concerns which made them share less, "*I found it less comfortable to share because I had to think very carefully about what message to write. It's think kind of concern that made me share less (with this app).*"

The above forms of self-censorship are not dissimilar to those found in Sleeper et al, (2013). With an audience so broad, sending a message with the right balance and tone, such that it is suitable for everyone, can be difficult. This 'all or nothing' approach means that to avoid difficult situations, it is better to not share at all. One participant strongly raised this point, "*I don't it was good in this respect. You mix all the people. There may be some occasions when you want to share with say 80% of the people in that generic group. Even then, I wouldn't share at all because I wouldn't want to give the wrong impression to the other 20% that were in that group."*

It is interesting that even a small minority of (inappropriate) contacts can be the difference between sharing and not sharing at all.

Advantages of broadcast sharing

Although sharing to a mixed audience can be problematic, there are some advantages also. One such advantage is speed, "*It was faster (than FacetID) because I didn't have the option to tailor the audience.*" Lack of tailoring options made the sharing experience more enjoyable for one participant, "*I had a lot of fun with this one (Locshare). Because I didn't have to think about who'd see the message, everyone could see it! I knew what I was sharing and who I was sharing with.*"

The lack of group sharing options made sharing more rapid. Specifying particular groups to share with may be advantageous but does require more thought and hence more time. The difference in time taken to share a message between the two apps may only be minimal, but since location sharing is generally a rapid, episodic process, a few seconds can seem significant.

6.3.5.3.2 General experience and level of comfort when using the FacetID app and sharing based on facets of identity

In the FacetID app, users could organize their sharing around three distinct facets of life: social, professional and family. They could target their messages to a specific group or share to everyone. In the interviews, users were asked the same question, namely how comfortable they were using this app and sharing in this way.

Life facet groups offered greater level of control

On the whole, most users were very comfortable using this app. Targeting their sharing to specific facet groups brought a greater level of control not offered by the broadcast sharing app, Locshare. This level of flexibility to essentially choose your audience was greatly welcomed by users.

"*I was very comfortable (using the FacetID app). I preferred FacetID's layout because I could change the options to suit the status updates I was sending out. I was able to target my message to the audience that would best be suited to it.*"

For one participant, the ability to target sharing to particular groups helped make content more personal, "*I preferred this app (FacetID). You could make this more*

personal because you're targeting it more specifically and it's not just going to all groups at the same time, I really liked that. You could also choose to share to 2 or more groups if you wanted. So you had the option to send what you wanted to who you wanted."

Specific positive actions taken because of targeted sharing

The greater level of control encouraged some participants to share more because they knew who the recipients were, "*I shared a lot more (with this app), particularly with my friends because I knew who it was being sent to*. I *felt more comfortable doing that.*"

Other participants were more open to share things that they felt uncomfortable sharing with Locshare, "*With drinking, which I do occasionally, I'd feel more comfortable sharing that with this app (FacetID).*"

Giving users greater control over their sharing, namely to share around three life facets, helped make content more relevant, appropriate and personal. All of these issues were problematic when sharing to a mixed audience. Users felt that the FacetID app offered flexibility in separating their contacts into groups. The result was a more satisfying experience overall.

Negative feelings towards targeted sharing

One participant mentioned that maintaining different group list proved burdensome, "*To be honest, it was quite burdensome (to use this app). While I like the idea of having different groups it was annoying to manage them…I like the app because it gave you more options. But having more options can be difficult because you have more things to think about.*"

Another participant agreed in principle, "*I preferred targeting my sharing to certain groups over others. I definitely appreciated that. At the same time, it did make me think more about what I was writing. With the Locshare app, I was more 'happy go lucky' saying 'I'm doing this, I'm doing that!*'

Giving users more options when sharing can make the process easier. But it can be argued that effectively managing different group lists can be time consuming.

Ironically, while targeted sharing can reduce anxieties about location sharing; for some, selecting each group individually may require more thought when sending a message.

6.3.5.3.3 Effectiveness of Locshare app in enabling self-expression

Building on from level of comfort, the next major theme relates to the effectiveness of each app in aiding self-expression. Regarding the Locshare app, three sub-themes emerged and are discussed below.

More careful with descriptions on Locshare

With the Locshare app, some participants said that they had to think carefully about their messages, and hence wrote in more detail. This was not necessarily to convey more information, but to ensure that the message was suitable for a mixed audience, "*When I was using the general one (LocShare), I was a lot more careful! Because I knew that it was going out to everyone, so it must be appropriate to professional, family, everybody. While with the general one (LocShare), I had to explain very well what I was trying to say and at the same time not over do it.*"

Self-expression inhibited

Some participants felt they were more restricted in their expression when using the Locshare app.

"*I think with this app I was restricted. There were things you wanted to say but they may have been too rude or perhaps out of context for some people contained within the same generic list of contacts... In Locshare, you'd have to 'tone' your language down and have to think hard about how you want to describe yourself."*

One participant observed that behaviour changes depending on the context, "*It's harder to express yourself...because people behave very differently depending on who they're talking to. So it was a bit more difficult to express yourself because you were trying to 'please' these different groups rather than tailoring it to specific people.*"

6.3.5.3.4 Effectiveness of FacetID app in enabling self-expression

Message intimate, less formal

Participants generally stated that they were more comfortable and 'loose' in their descriptions when using the FacetID app.

One participant said, "*With FacetID, your recipients understand what you're saying and where you are. I didn't have to think about things too much, I could just say what I wanted to say and use "loose type" language. Now that wouldn't make sense to a family member perhaps, but it would do to a friend who's interacted with you and understands how you act/behave.*"

The FacetID app enabled participants to be more casual and aided the repartee among friends, "*In the FacetID app, depending on who I was sending it to, it could be a bit more specific. For example, with my family, I was inclined to use a different language to what I would use with my professional contacts. With friends, I guess you invent words that only they can understand."* Lastly, one participant summarised it quite well, "*Because I could target my sharing, I could be as casual as I wanted, and thus I conveyed more of my 'truer self'*."

This sense of conveying your 'true self' was common among many participants. Since groups were carefully separated, participants felt that they could be more open in their expression, felt less inhibited and did not have to 'overthink' their messages. This was particularly the case when sharing social locations where perhaps the risk of inappropriate sharing is highest.

Less inhibition, better self-expression

The greater level of comfort offered by focused-sharing meant that users felt less inhibited. One participant said, "*It was definitely more effective. Because you could tailor it to specific groups and can be more 'how you are normally' e.g. with friends or family."*

Another participant similarly agreed, "*I think it was better (than Locshare). When sharing with your work colleagues or family, you adopt different languages to*

communicate with them. Having groups makes it easy to speak with them in the same language rather than a general group you'd always choose to behave respectfully. You cannot be that 'free' in expressing yourself."

One participant said that they received a lot of feedback which made the experience more engaging, "*Well first I thought, "Oh my God, I'm going to annoy my friends!" But to be honest, I had some cool feedback. For example, some replied "What you sent last night, I was laughing my ass off!" It went surprisingly positive, which was nice."*

6.3.5.3.5 Feelings toward specific groups names used in FacetID: Social, Professional and Family

Users were asked about the specific group names i.e. Social, Professional and Family and whether this categorization was a good representation of their lives.

Intuitive, good representation of life

Many participants said that the facets available on the app, namely Social, Professional and Family were a good representation of life, "*I found them intuitive. I think they were a good representation of my life. It meant that if I was sharing something social and didn't want my family to know, I could do that!*"

One participant however said that the professional group could cause issues for younger users, "*I think it was natural because having been in university for a year, you begin to develop these groups. However, for the younger generation, I think the professional group might be a bit difficult. For example, primary and secondary school who have access to social media wouldn't have professional acquaintances to share with. All they'll potentially have is their mum and dad who they wouldn't want to talk to, and their friends. They wouldn't have a professional side. So it depends on the age of the user."*

Life facets could be split up into sub-groups

Although most participants agreed that the three life facet groups were a good representation of life on a 'top level', many said that they could be split up into further groups. One participant in particular said when referring to the family group, that sharing with your parents is not the same as sharing with your siblings. Naturally, any

groups beyond the top three life facets would be user-defined and as such potentially idiosyncratic. Users were asked which specific groups they would define if they had the choice. This was done only to get an indication of how groups could be further categorized. Responses were quite varied, ranging from hobbies and interests to specific relationships. Some of these groups are discussed next.

Social group

The term social of course carries different meanings to different people. The purpose here is merely to give an indication of the most common sub-groups users suggested. For many participants, the social group invariably included friends, particularly those that did not have any professional relationship with the user. Some participants were keen to make a distinction between 'close friends' and acquaintances (e.g. those known through sports clubs, social clubs etc.).

'Closeness' or 'tie-strength' was a recurring theme, with participants wanting to make a distinction between 'university friends' and 'friends from back home'. Some participants who were international students wanted to separate international friends and UK friends, saying that the same content would not suit both groups; for example, sharing 'studying at library' would not be particularly relevant to international friends.

When talking about 'closeness', this included closeness by relationship, but also closeness in terms of physical distance,

"*For social, I have friends in different cities. So those that live in the same city as me, I have different experiences with them because I see them very often. Therefore, I'd have a different set of things I'd want to share with them, as opposed to people that live far away. For instance, there's some people I know from my husband's workplace who I'm close friends with. The things I'd share with them would be things like events or issues that they're aware of but that other people wouldn't understand. I'd like to have the option of grouping people according to closeness (to me) and also hobbies and interests.*"

Professional Group

Quite a few participants were students and therefore did not have a 'professional life' in the business sense of the word. Contacts in this group were not part of the user's social life in any way. For most participants, this included employers, colleagues, lecturers and university colleagues. Although a few participants considered some university colleagues to also be friends, others suggested that their relationship did not extend beyond university (e.g. might be on the same course).

Participants were also keen to make a distinction between university-related contacts and those associated with others forms of business (e.g. previous/current employers, former colleagues etc.).

Family Group

Some participants were also quite careful about what they shared with this group. As aforementioned, for one participant, sharing with parents is not quite the same as sharing with siblings. The main distinction was made between 'parents', 'siblings', and 'other relatives'. One participant observed, "*I would divide the family group further into 'parents' and 'other relatives'. Sometimes I might share my location with my parents to let them know where I am. This wouldn't be as relevant to my relatives. But there are times when I find it more comfortable to share certain things with my relatives than with my parents.*"

6.3.5.4 Summary of emergent themes

General experience and level of comfort when using apps

Locshare app (Broadcast sharing)

- Tensions experienced when sharing location because of multiple audiences existing in one friends list.
- Greater thought required to ensure content was suitable for all three groups (social, professional family).
- Sharing to a generic friends list also presented challenges in making content relevant to audience and to avoid sharing unnecessary information.

- Due to the discomfort and anxiety experienced in this environment, some participants reported sharing less to avoid the consequences of inappropriate sharing.
- Broadcast sharing does have advantages, however, particular in the speed with which information can be disseminated. Some participants felt this approach was faster and more convenient than tailoring options.

FacetID app (Targeted sharing)

- Participants reported greater level of comfort when using the FacetID app.
- Participants felt that the app enabled more control by enabling targeted sharing to specific audiences.
- Offered greater clarity when sharing because users had knowledge of which particular audiences were being shared to.
- This environment helped make content more suitable, relevant and personal.

Effectiveness of apps in enabling self-expression

Locshare app (Broadcast sharing)

- Participants reported inhibitions in self-expression because of sharing to multiple groups.
- Greater thought was required when constructing messages, with some participants having to 'tone down' their language to make it suitable for a general audience.
- Some participants, however, welcomed the opportunity to broadcast information rapidly to large groups of people.

FacetID app (Targeted Sharing)

- Users reported fewer inhibitions when using the FacetID app.
- Messages were less formal and more intimate because of tailoring options.
- Users felt that it offered more freedom to communicate in a form that was most suitable to the audience being targeted.

Views toward faceted identity grouping (social, professional and family)

- Participants felt that the groups were a good top-level representation of their lives.
- Suggestions were made to split the groups into nested groups, particularly based on tie-strength and hobbies and interests.

6.4 DISCUSSION

Quantitative results revealed that users tended to share more locations overall with the FacetID app than with the Locshare app. This difference was found to be statistically significant. Similarly, users shared more social locations than professional, family or other (on both apps). Again, this was statistically significant.

The significant differences in the overall number of locations shared indicate that users were generally more open to sharing location when given the option to target their sharing around life facets. The findings are in line with Sleeper et al, (2013) who found that participants would have shared approximately half of unshared content on Facebook if they had been able to target their audience. In our case, because the audience was more clearly defined, it perhaps facilitated greater alignment between content and audience.

Participants were asked to complete a brief measure of the big-five personality test and the self-monitoring scale. Although no correlations were found with self-monitoring, several positive correlations were found for the 'emotional stability' trait. Emotional stability is associated with those who are calm and emotionally stable as opposed to those who are anxious and easily upset; traits commonly associated with neuroticism. Positive correlations existed between emotional stability and the total number of locations shared on both apps as well as the number of social locations shared. These results are of course correlational and should therefore be taken with caution. Moreover, they do not contradict the tendency for users to share more with the FacetID app. Such findings should be interpreted in light of other quantitative tests, which showed significant differences in the total number of locations shared.

Qualitative analysis of locations revealed that names generally fitted into the personal, work, university and entertainment/social venue categories. Status updates, which were used to add more detail to location names, generally included

activities, emotions and feelings and overall experiences. These findings corroborate the results of study 1, which found these categories to be the most common ways in which location is conveyed. However, the ability to define custom location names encouraged users to be more creative and quirky with their posts. Some locations names were entirely fictitious (not real locations), used only as a basis for humour. It was clear that through location, users were actively engaging with their social network by expressing their personality and character. Although similar posts are possible with pre-defined locations, the flexibility of custom names facilitated more openness, witty humour and imagination.

Further, for residential venues, most participants chose not to reveal personal addresses. Although terms like 'home', 'kitchen', 'bathroom' represent personal locations, they were shared not necessarily to convey location but to elaborate on current activity. Further, through this method, private locations were deliberately made generic, similar to Lehikoinen & Kaikkonen (2006)**.** This suggests use of location blurring: participants sharing location to express personality and lifestyle, but concealing sensitive information to preserve their privacy. It also corroborates findings of Lin et al (2010) who observe that when people have more flexibility over location disclosure, they prefer not to share exact location. Location blurring, however, was not used for public venues such as universities and restaurants where threats to privacy, due to their public nature, are not as high as private residences.

The content of status updates sent on both apps were analysed to spot any significant *differences* in language. It was difficult to understand the context of the message because most often, they consisted of only a few words. This is in contrast to interview data, which is of course is lengthy, thus enabling the analysis of more nuanced factors. Although discernable differences in language could be seen from some participants, when the data was analysed as a whole, it was unclear whether these differences were significant. This problem was suspected prior to the study, which is why the differences in status updates, and the effectiveness of each app in enabling self-expression were asked as direct questions in the interview. Participants clearly responded that they felt more comfortable with the FacetID app and were able to express themselves more freely. Whether this translated into actual usage (in status updates) is unclear. Perhaps the context was more clearly understood by the particular social network (i.e. those who knew the sender in some way). Nonetheless, the fact that users perceived the FacetID app to aid self-expression is perhaps most

salient. Ultimately, it is about creating an environment in which users feel comfortable. It is clear that the FacetID was quite effective in this regard.

Post-study interviews showed that there were anxieties when sharing to a mixed audience (on Locshare). The primary issue was the inability to distinguish between different types of people. This was problematic because the 'tie strength' and 'closeness' with each contact varied considerably. Participants repeatedly pointed out that the relationship between friends, colleagues, employers and family was very different. Being forced to share to all of them at once heightened tensions about sharing as a whole.

There were also concerns about the relevance of the content being shared. Participants were keen to ensure that whatever was shared was relevant to their contact list in some way. This was manifested as simply a general reluctance not to annoy people with unnecessary messages. There were anxieties about how their social network would react to receiving such location updates. At the same time, it was also important that the content of each message was *appropriate*. A message deemed suitable in one context could be entirely inappropriate in another. Participants were especially concerned about sharing social locations to professional contacts for fear of giving the wrong impression.

To ensure that the content was both relevant and appropriate, users felt they had to think more carefully about each message. Locations were generally described in more detail in an effort to avoid sounding vague. One participant remarked that messages were difficult to construct because of the need of having to 'please everyone'. Users also felt more restricted when sharing; they felt they had to 'tone down' their language and acknowledged that people behave differently depending on whom they are talking to. There was almost a requirement to behave respectfully in every context.

Due to the general anxieties experienced, some users decided not to share some messages at all. One participant felt strongly that content deemed unsuitable to only 20% of contacts meant that the message was not shared at all. The 'all or nothing' approach of broadcast sharing means that avoiding the consequences of inappropriate sharing can sometimes take precedence over the need to share.

When using the FacetID app, and sharing based on facets of identity, participants welcomed the greater level of control. Users pointed out the advantage of being able to 'tailor' messages to the audience that was best suited to it. Participants also observed that the anxieties experienced during Locshare were reduced by this app. Perhaps this is why users shared more locations overall, as quantitative results have shown.

Sharing based on facets of identity created an environment in which users felt more comfortable. As a result, participants felt that they could be more open and intimate. Some remarked that they could adjust their language and tone depending on the group being shared to. This was especially the case when sharing to social contacts. Sharing messages required less thought, with informal language used with social contacts and more 'serious' descriptions given when sharing to professional contacts. As one user put it, they felt they could behave "how they were normally" and convey their "true self", rather than having to adapt their personality to suit the audience.

There are certain occasions when broadcast sharing is advantageous. If content is deemed useful to a general audience, broadcasting a message is fast and convenient. Some participants said that the Locshare app was quite enjoyable because of the speed with which messages could be sent. Ironically, one participant said that this was due to the "lack of tailoring options". Although the FacetID app gave users the option to share to all groups (social, professional, family), the physical act of selecting each group was time-consuming for some. In other words, it made some users think more carefully about each group rather than the 'happy go lucky' approach of Locshare. While this mental process may only require a few more seconds, it may be significant considering the rapid, episodic nature of location sharing.

The FacetID app organised sharing around three life facets, namely social, professional and family. Participants generally found them to be a good representation of their lives. They said that sharing this way offered more flexibility because contacts could be placed into appropriate groups, and more clarity because they knew exactly who they were sharing to. While such groupings were good at the top level, many participants suggested sub-categorisation. Social contacts were found to vary in terms 'tie-strength' (e.g. 'childhood friends' and 'university friends'). Participants also suggested categories based on different hobbies and interests (e.g.

'sports activities', 'social clubs' etc.). Similarly, some users thought that the professional and family groups could be sub-categorised also.

Of course, any sub-groups defined would be user-driven and potentially quite idiosyncratic. However, while static groups can provide the basis for organisation, they cannot be sufficient for every need. Indeed, the very goal of organising around life facets is to ensure that the user's life is reflected as closely as possible. Flexibility in customising static groups further, according to personal needs, may be another step in that direction.

6.5 LIMITATIONS

- Recruitment primarily took place at universities. The majority of participants were students and did not have a 'professional life', at least not in the strict sense of the word. Although students defined university-related content as professional, results may have differed if participants were working professionals.
- All participants were below the age of 35. This obvious age skew means that our results may lack broad generalizability.
- Significant findings on personality traits are entirely correlational and as such, should be taken with caution.
- The study lasted for a short period of 14 days, with each app being used for 7 days exactly. Naturally, this is only a small snapshot of people's lives. More longitudinal studies may have an impact on results.
- Introducing a new method of interaction, in our case targeted sharing, can potentially leave the study vulnerable to experimental effects such as the Hawthorne effect (subjects changing their behaviour because they know they are being observed). However, participants were counter-balanced to reduce the likelihood of this. Further, in user interviews, participants gave specific reasons as to why they felt targeted sharing was stronger (than broadcast sharing), namely: it enabled them share to specific groups, which made content more relevant and appropriate for each audience and also mitigated the risks of unintended sharing.
- The majority of participants had face-to-face interactions with the researcher. This was especially the case during briefing sessions. Participants also had

knowledge that all locations shared were being recorded. This may have made them less likely to share sensitive or embarrassing content.

6.6 CONCLUSION

The motivation for this study was to address the tensions surrounding identity management uncovered in the first study. This was done through a demonstration of software that recognised multiple social identities at its core. The particular life facets employed (i.e. social, professional, family) almost acted as a digital demarcation of different parts of life and were inspired by the distinct, bounded contexts often maintained offline. While making life facets explicit might not be necessary in offline interactions, a clear, visual demarcation is more necessary in digital environments, where, in the presence vast audiences, the management of different contexts can be a lot more challenging. The inclusion of life facets does not suggest that software can fully replicate offline behaviour, but rather the purpose is to bring software design more closely in line with how people naturally behave in offline social interactions.

This study has revealed several advantages of targeted sharing. One participant observed that they were able to "change the options" to "suit the status updates" that were being sent out, thereby being able to target the message to the audience "that would be best suited to it". On the other hand, when using the Locshare app, participants expressed anxieties about sharing content that "wasn't appropriate"; complained of the restriction of having to "think carefully" before sending out a message and not feeling "comfortable" sharing in particular contexts. For one participant, this was because "you had professional contacts, people from my childhood, and my family all mixed into one". Another participant expressed that if content is deemed unsuitable for even a minority of a mixed audience, not sharing at all is safer to avoid any unintended consequences.

By designing technology that facilitated the management of multi-faceted identities, the purpose was also to increase the alignment between the nature of the content and the intended audience. This has two primary advantages. Firstly, it can help in making the content more appropriate to the audience because it gives users more clarity when sharing — sharing is performed in particular contexts and then targeted to specific audiences. This is in contrast to the broadcast sharing model which might often fail to recognise diverse contexts and therefore misalign the content and the audience, as indicated by Wang et al, (2011) and Sleeper et al, (2013). Secondly, it

helps make the content more relevant to the audience; therefore reducing the risk of sharing extraneous information to people that do not desire it. This was indicated by comments such as “I was able to put people in different groups and they were separated correctly.” and “you had the option to send what you wanted to whom you wanted.”

In conclusion, results from this study do not suggest that the broadcast sharing model is perilous and one that should be avoided at all costs. The purpose behind targeted sharing based on life facets is not to replace conventional methods but merely to augment them. As a number of participants observed, broadcast sharing can be advantageous, especially in situations where speed and efficiency are a priority. Indeed, if the need exists, broadcast sharing can help users reach out to a vast audience very rapidly. However, the ‘share all or nothing’ limitation of broadcast sharing can restrict users because not every content is appropriate or applicable to every situation. This study has demonstrated that there is a third option: targeted sharing, particularly based life-facets, that perhaps occupies the middle ground between over sharing and not sharing at all.

Future platforms would do well to leverage the strengths of targeted sharing, especially based on facets of identity, whilst maintaining the speed and convenience of broadcast sharing.

Although this study demonstrated mechanisms for targeted sharing, it did so using the categorisation discovered by Ozenc & Farnham, (2011). In their study, these life modes emerged from a general life mapping activity. But a question arises at this point. Are the life modes of ‘social’, ‘professional’, and ‘family’ representative of how users inherently interpret location sharing situations? In other words, how are location sharing scenarios actually perceived by users? By eliciting this information, not only can the life facets used in this study be validated, but by exploring users’ inner interpretations of location sharing situations, there is also potential to understand how location sharing behaviour changes as users move from one scenario to another. Thus, this insight not only aids in further understanding how social identity influences location sharing, but can also help uncover specific behavioural changes as different facets of identity are enacted. This topic is the focus of the next chapter.

6.6.1 Key outcomes emerging from study 2

- An investigation into how targeted sharing, based on facets of identity, impacts actual location sharing behaviour.
- Discovery of key problems associated with the broadcast sharing model of conventional location sharing systems. Namely, generic friends list collapse multiple audiences, overlooking the notion of multi-faceted identities and the complexities of social relationships. Compulsion to broadcast information can increase anxieties about unintended, inappropriate sharing. This results in an inhibition of self-expression (i.e. through status updates) and can lead to reduced location sharing overall.
- Discovery of the key advantages of the faceted identity model. Provides greater, more targeted control over sharing. This results in users feeling more comfortable in location sharing environments. This leads to more openness in self-expression, which ultimately results in increased sharing overall.
- Recommendations on how technology designers can harness the strength of both models to build stronger location sharing environments, resulting in a more accurate reflection of offline social behaviour.

CHAPTER 7
EXPLORING USER PERCEPTIONS BEHIND LOCATION SHARING SCENARIOS

7.1 INTRODUCTION

The first study in this research explored the exhibition of social identity through location sharing. It investigated self-reported user behaviour in 'location aware' social media by looking at the relationship between identity and location and how users engaged in identity management and impression management. Through technology design, the second study explored the impact of sharing location based on facets of identity, seeking to address some of the tensions surrounding identity management uncovered in the first study. The final study takes a more theoretical approach by exploring user perceptions of digital location sharing. Specifically, the aim is to understand how different locations are perceived and interpreted on a cognitive level. As with any phenomena, the act of sharing location involves cognitive resources such as memory, perception and meaning. The objective is to develop a deeper understanding of how users interpret and make 'sense' of different locations, and the factors that distinguish one location from another. This is achieved using the repertory grid technique, a method that has its roots in clinical psychology (Björklund, 2008), that helps bring unconscious knowledge to the surface so that it is explicitly and verbally articulated (see chapter 4).

This process is not purely theoretical but rather serves several practical purposes. Firstly, by working with a number of participants, inner perceptions of location sharing situations can be analysed according to a range of personal interpretations. Secondly, by doing so, it helps understand how different types of locations are mentally categorised. This has merit not only on its own, but also helps to validate whether the life facets used in study 2 (social, professional, family) are representative of how locations are inherently understood. Thirdly, unlike the second study which primarily focused on the comparing the faceted identity model to the broadcast sharing one, this study enables different facets of identity to be teased apart in order to understand how personal perceptions of location sharing change as people enact different parts of their life. Fourthly, by making this unconscious knowledge explicit, the particular types of behaviour attached to different facets of identity can be explored. In this case, the specific audiences associated with different types of

location sharing scenarios are investigated. By establishing the audience, the particular ways in which location sharing decisions change as people enact different parts of their life are also uncovered.

Thus, the third study addresses the final research aim of the thesis:

RQ3. How are different types of location sharing scenarios cognitively perceived and interpreted and what are the specific audiences associated with them?

This question is distilled into four main research questions:

1) How are different types of location sharing scenarios cognitively perceived and interpreted?

Using the repertory grid technique, the objective of the first research question is to explore how users cognitively perceive and interpret different location sharing scenarios. In other words, what do they mean to users, how do users make sense of them, and how do they mentally distinguish one scenario from another?
As mentioned previously, the repertory grid is a powerful method for eliciting the personal meanings behind phenomena. While standard interviews might probe the conscious mind of the interviewee (Björklund, 2008), repertory grid allows probing to take place on a deeper level, enabling people's inner interpretations to be brought to the surface (Honey, 1979). Since the aim of this question is to explore users' inner perceptions of location sharing situations, and not merely their opinions of them, repertory grid is highly suited for this purpose.

2) What are the specific audiences associated with different types of location sharing scenarios?

Once users' personal meanings have been ascertained, the second research question explores the specific audiences associated with different types of location sharing scenarios, thereby probing how location sharing behaviour changes in different situations.

3) What are the reasons/motivations for sharing different types of location sharing scenarios?

Using data from question 2 as a basis, the third research question probes into the reasons and motivations for sharing to particular audiences in different scenarios. This helps derive insight into how location sharing decisions change as people enact different parts of their life.

4) What are the reasons for not sharing in different types of location sharing scenarios?

As found in the second study, the reasons for not sharing location can be many, including a lack of relevancy, lack of appropriateness and the desire to maintain self-image. The objective for this question is to understand the key reasons why users do not share posts with particular people. The last research question also serves to add further context to question 3.

This study has implications for the design of future location sharing systems. Firstly, it offers a theoretical insight into how location sharing situations are cognitively perceived. Secondly, it reveals the particular audiences likely (and unlikely) to be shared with in different location sharing scenarios. Thirdly, it also helps uncover some of the factors that influence location sharing decisions and how the motivations and reasons for sharing location change as people take part in the various parts of their lives. Thus, the study offers further insight into how social identity influences location sharing behaviour, particularly in how this behaviour changes as different facets of identity are enacted.

7.2 METHOD

7.2.1 Participants

The study was advertised at the University of Nottingham through email, tweets and paper adverts. In total, 32 participants were recruited: all were familiar with sharing location in social media through platforms such as Foursquare, Facebook and Twitter. The sample was a mixture of undergraduate and postgraduate students, as well as members of staff including researchers and technicians. When conducting the study itself, each participant was assigned a unique ID; no personal information

such as name or age was recorded. All participants were compensated with a £10 Amazon shopping voucher.

7.2.2 Procedure

The study was conducted in a lab setting. Each session was voice recorded and lasted 1 hour on average. Upon arrival, each participant was given a brief introduction; this included an explanation of the purpose of the study and the various tasks involved at each stage. Written consent was obtained before starting the session.

Phase 1: Elicitation of constructs

In order to investigate how different location sharing situations were perceived by participants, the session began with what it known as, in repertory grid terms, the elicitation of *constructs*. Constructs are an individual's personal interpretations of given phenomena. To elicit constructs, instruments, known as *elements*, are used. In our case, ten cards with different location sharing scenarios were presented (Fig 7.1). The scenarios were based on the most common types of locations shared in the second study. Given that these scenarios, in their original format, were specific to each participant and thus quite idiosyncratic, further context was added where appropriate to make the scenario more familiar and easy to understand. Following a number of pilot studies, it was felt that certain scenarios were repeating the same information already captured by other similar scenarios. The large number of elements also made individual sessions unnecessarily longer than required. Therefore, scenarios 5 and 10 were removed bringing the final number of elements to 10 in total (see appendix D for original scenarios).

Constructs were elicited using the triad approach. Three scenarios were presented at a time. The participant was then asked which two scenarios were similar and how the third one was different. The similarity was recorded as the *construct (left-hand pole)* and the difference as the *contrast (right-hand pole).* The contrast is not necessarily the polar opposite of the construct but rather a description of the difference as perceived by the participant. One construct, then, consists of a construct-contrast pair that together, represents a single, bi-polar dimension of meaning that is attached to given phenomena.

In cases where constructs were slightly ambiguous, further clarification was sought using the *laddering* technique as described by Fransella & Bannister, (1977) and Young et al, (2005). Constructs were only recorded when agreed upon by both the researcher and the participant. Each construct took approximately 2-3 minutes on average to elicit; some participants, however, were very quick in identifying similarities and differences; others thought very carefully before providing a suitable construct-contrast pair. The triad process was repeated until 8-10 constructs were elicited per participant.

The next stage involved instructing the participant to rate each element (scenario) on each construct elicited using a 5-point likert scale, as described by Kington et al, (2008). The rating options were as follows:

1 = the scenario is closely linked to the construct (left-hand pole)

2 = the scenario is somewhat linked to the construct (left-hand pole)

3 = neutral

4 = the scenario is somewhat linked to the contrast (right-hand pole)

5 = the scenario is closely linked to the contrast (right-hand pole)

Ratings are particularly important because while constructs give insight into *how* a person thinks, the ratings of elements give insight into *what* a person thinks, (Jankowicz, 2004). At the end of the construct elicitation phase, two types of data were obtained. Firstly, the actual constructs themselves provided useful qualitative data (i.e. the participant's own meaning and understanding of the scenarios). Secondly, the actual ratings of each element on each construct provided rich quantitative data that could be used for statistical analysis.

1.
It's a Friday night. You're at a party with close friends. It's a real blast and you're having lots of fun!

2.
It's the end of the work day. You and a few colleagues go to a social event organised by the company.

3.
It's the weekend and the weather is hot. You decide you could do with some new clothes. You're out shopping on the high street with friends.

4.
It's mid-afternoon. You're at work busy working at your desk. You get a 10 min break.

6.
After a great night out, it's the morning. You've overslept and you're still in bed when you should be at work.

7.
You've come back from work. It's late in the evening. You're having a drink with friends.

8.
It's the morning and you're at the bus station waiting for the bus. The bus is running late.

9.
It's a weekday evening. You decide to treat your partner to a meal outside. You're at a fancy restaurant enjoying a delicious meal with your partner.

11.
It's a weekday. You're watching evening telly with your family.

12.
You've fallen ill with the flu. You decide to book an appointment to see your local doctor. You're in the doctor's surgery waiting to be seen.

Fig 7.1: Location sharing scenarios used to elicit constructs

Phase 2: Specific audiences associated with each scenario

To answer the second research question, namely the specific audiences attached to each scenario, the *likelihood* of sharing to certain audiences was measured. All ten scenarios were placed on the table. The participant then selected 15-20 contacts from their phonebook, picking one contact at a time in an ad-hoc fashion. For each contact selected, the participant indicated their specific relationship to them. The options were: friend, family, colleague, acquaintance or other. The participant was then asked to indicate which scenario they would *most likely* and *least likely* share with that person. All responses were recorded on an Excel spreadsheet. Each contact selected was assigned a unique ID by the researcher. It was only the unique ID of the contact that was recorded. No personal information such as name or phone number was recorded by the researcher at any point during the study.

Phase 3: Specific reasons for sharing and not sharing with particular audiences

The final phase helped to answer research questions 3 and 4, namely the reasons for sharing and not sharing location to particular people in each scenario. This was done through a structured interview. Using data obtained from the previous phase, for each scenario, participants were asked to give specific reasons as to why they chose to share their location with certain people (most likely contacts) and why they did not wish to share with certain others (least likely contacts). Interviews lasted approximately 30 minutes and all were voice recorded.

7.2.3 Analysis of Repertory Grid data

To understand how the scenarios were interpreted across all participants, the repertory grid data was subjected to quantitative analysis. This section describes the analysis procedure. The actual results are presented in the next section.

Data from all 32 participants was inputted into the *Rep Grid 5* software as 32 individual grids. Using *RepSocio* (component of Rep Grid 5), the grids were combined into one very large composite grid. This composite grid then became the subject of two kinds of analyses: cluster analysis and principal components analysis.

Cluster analysis was performed to find clusters of similarity between both elements (scenarios) and constructs (meanings). Because of a shared rating system, cluster analysis can uncover rating patterns between groups of constructs. Constructs that share a similar rating pattern suggest that although qualitatively described in different ways, they mathematically have similar meaning. Such a group of constructs can, therefore, be seen as a specific dimension of meaning in relation to the elements of the study (Hogan & Hornecker, 2013). In addition, elements that have been rated similarly on constructs can form clusters of their own.

Data reduction

The composite grid consisted of 253 constructs in total. Running cluster analysis on this large dataset resulted in over 80 clusters being discovered. Many clusters were very similar in meaning and others did not carry any semantic meaning at all. Naturally, the first task was to reduce the data set as much as possible. A procedure similar to Fallman & Waterworth, (2010) was used.

Clusters were retained according to two primary conditions. Firstly, a threshold level was specified at 90% — meaning that constructs needed to share at least 90% consistency in rating in order to be considered a cluster. Secondly, each cluster would need to contain 4 or more constructs. An overly high threshold (e.g. 95%) can result in losing a substantial amount of data which can be considered the bulk of the semantic information — described by Fallman & Waterworth, (2010) as the “semantic flesh”. A threshold that is too low can have the opposite affect — where almost all constructs are included, creating much ambiguity. After experimenting with several values, a 90% consistency was deemed to be the middle course, giving clusters that were clear in semantic meaning, without missing out on valuable semantic information. Fig 7.2 shows the original dendogram, also known as a FOCUS graph. Because the diagram was very large, only part of it is shown as a demonstration.

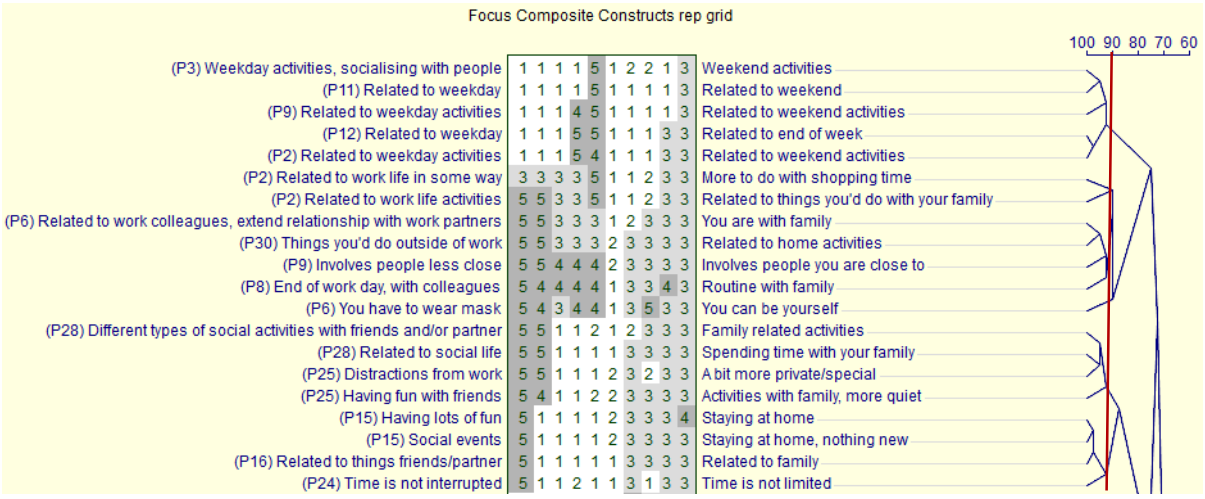

Fig 7.2: FOCUS graph showing clusters of 4 or more constructs at 90% consistency. Consistency level shown by red line

Naming of Clusters

Applying this criteria resulted in the dataset being reduced to 16 clusters consisting of 83 constructs. Although theoretically, the constructs in each cluster carry a similar underlying meaning, it is the researcher's task to identify what that meaning is, Fallman & Waterworth, (2010).

Each cluster was carefully reviewed to identify the underlying meaning that grouped constructs together. To avoid bias, rather than specifying a custom name, a label that characterised each cluster was chosen from the existing constructs contained inside.

For example:

Related to weekday – Related to weekend
Related to weekday activities – Related to weekend activities
Related to weekday – Related to end of week

In this case, '*Related to weekday – Related to weekend'* was chosen as the group label to describe the constructs relating to the weekday-weekend cluster.

Calculating Median rating

After selecting appropriate labels, the median value was then calculated for each cluster (group) on each element. The median was used instead of the mean because previous research suggests that the median de-emphasises single, extreme values, Fallman & Waterworth, (2010), Hogan & Hornecker, (2013). A limitation in the research version of the Rep Grid 5 software meant that median values with decimals could not be inputted. A workaround was found by multiplying all ratings by 10. These new multiplied ratings were tested in a carbon copy of the repertory grid and the results were identical.

Taking the median values and the corresponding label together, it is possible to form a new construct that represents the central tendency within each cluster. Therefore, from 16 clusters, 16 individual constructs were inputted into a separate repertory grid that represented each underlying dimension of meaning. In the new grid, there were a few constructs that carried similar meaning. However, rather than dropping them, cluster analysis was performed again on this new repertory grid to see if any more clusters were formed. Because of the vastly reduced dataset, this time a criteria of 85% consistency and 2 or more constructs per cluster was used. This resulted in three more clusters formed as shown in Fig 7.3

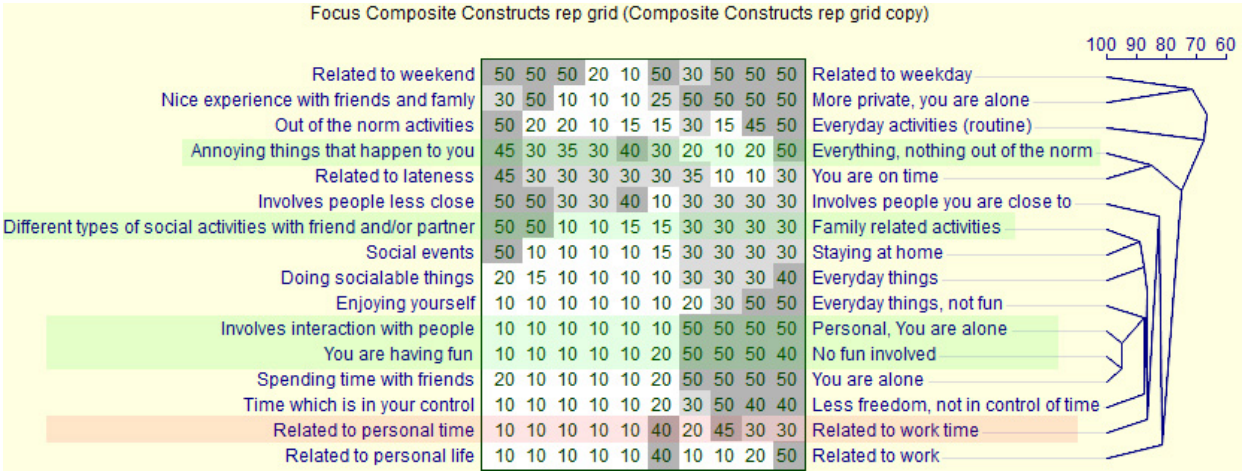

Fig 7.3: FOCUS graph of median ratings

As can be seen, 3 clusters emerged of 2, 3 and 4 constructs respectively at 85% consistency (or above). The constructs retained in these clusters have been

highlighted in green. Note that in the 4 construct cluster, a decision was made to retain 2 constructs. There seems to be two sufficiently different dimensions:

Fun/Enjoyment
Enjoying yourself – Everyday things, not fun
You are having fun – No fun involved

Social vs Solitary
Involves interaction with people – personal, you are alone
Spending time with friends – You are alone

More than one construct can be retained if necessary as demonstrated in Fallman & Waterworth, (2010).

Further, there were two constructs that did not form a cluster, but were nonetheless semantically very similar:

Related to personal time – Related to work time
Related to personal life – Related to work

Since semantically, these constructs had a similar meaning, one construct was dropped. This is highlighted in red in Fig 7.3.

This procedure left us with 10 unique dimensions that represented how participants perceived and interpreted the location sharing scenarios (elements) in the study. The final results are presented in the next section.

7.3 RESULTS

7.3.1 Repertory Grid

The final FOCUS grid is shown in Fig 7.4. The constructs illustrate how the scenarios were perceived by participants; the clusters of elements (scenarios) indicate how they might be mentally categorised. Looking at the clusters of elements, it is evident that scenarios 1 (partying scenario), 3 (shopping with friends) and 7 (evening drink after work) form a strong cluster at just under 90% consistency. These are the overtly social scenarios that relate to partying, shopping and drinking.

Scenario 2 (social event organised by work) is related but at a lesser consistency. Scenarios 9 (meal with partner) and 11 (watching TV with family) form a cluster of their own, indicating the more personal, family-oriented experiences. Scenarios 6 (oversleeping), 8 (bus running late), and 12 (being ill at doctor's surgery) also form a cluster whereas Scenarios 4 (at work) does not.

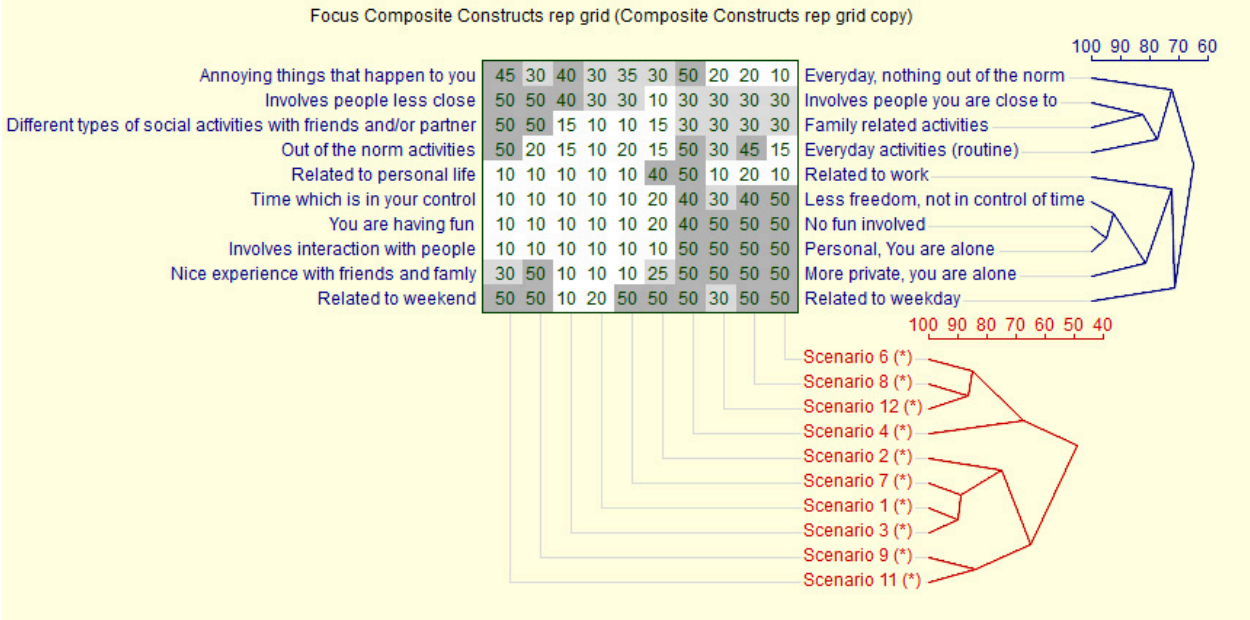

Fig 7.4: Final FOCUS graph showing final 10 dimensions

For further clarity, the ratings of elements on each construct are also presented as bar charts in Fig 7.5.

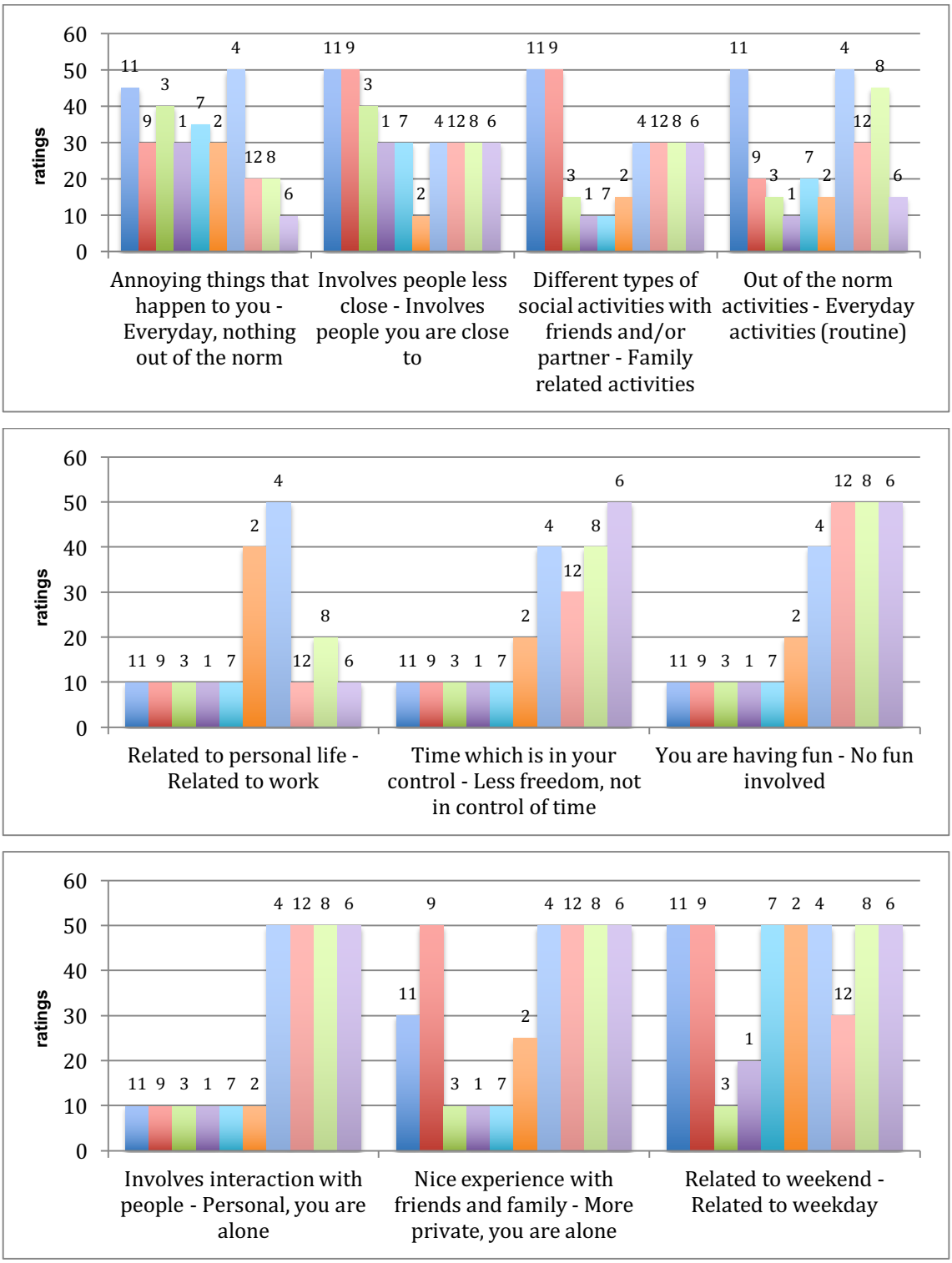

Fig 7.5: Bar charts of element ratings on each construct. X axis represents constructs; Y axis represents ratings; data labels above bars represent scenario numbers

In addition to the FOCUS graph and bar charts, a principal components graph was plotted to observe the interaction between elements and constructs.

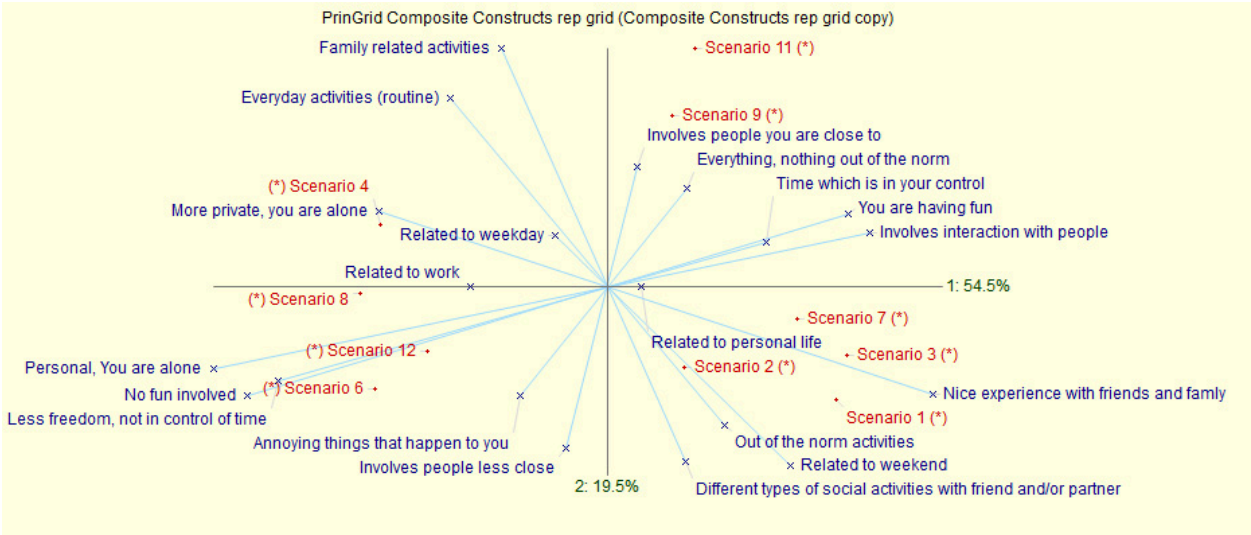

Fig 7.6: Principal components graph showing correlation between elements and constructs. X and Y axis represent the two largest amounts of variance in ratings of elements on constructs. Lines represent constructs; dots represent elements (scenarios)

In the principal components graph (Fig 7.6), scenario 4 (at work) is visually quite close to 8 (bus running late) and reasonably close to 6 (oversleeping) and 12 (being ill at doctor's surgery). Further analysis of the FOCUS graph reveals that it was rated as a solitary activity and one where 'no fun is involved' — similar to scenarios 6, 8, and 12. This can also be observed in the bar charts of ratings (Fig 7.5). However, scenarios 6,8,12 were rated as 'annoying things' that happen in one's 'personal life'. These ratings therefore, make them quite distinct from scenario 4. Scenario 2 (social event organised by work) was the more ambiguous scenario due to it being a social activity experienced with work colleagues. In this sense, it almost crosses between two boundaries: social and professional. For individual participants, it was considered more as a social scenario than a professional one, by virtue of it being rated highly on the 'Different types of social activities with friend and/or partner' and 'You are having fun' poles. Scenarios 9 (meal with partner) and 11 (watching TV with family) are rated similarly, particularly as activities that involve 'people you are close to' and the fact that they are 'family-related activities'. The family oriented context perhaps makes them more personal and intimate — as can be seen in both the FOCUS and principal components graphs.

The clusters of elements suggest that the scenarios fall into four categories, giving insight into how they were mentally categorised by participants.

Social: 1, 2, 3, 7

1.
It's a Friday night. You're at a party with close friends. It's a real blast and you're having lots of fun!

2.
It's the end of the work day. You and a few colleagues go to a social event organised by the company.

3.
It's the weekend and the weather is hot. You decide you could do with some new clothes. You're out shopping on the high street with friends.

7.
You've come back from work. It's late in the evening. You're having a drink with friends.

Personal/Family: 9,11

9.
It's a weekday evening. You decide to treat your partner to a meal outside. You're at a fancy restaurant enjoying a delicious meal with your partner.

11.
It's a weekday. You're watching evening telly with your family.

Work: 4

4.
It's mid-afternoon. You're at work busy working at your desk. You get a 10 min break.

Unusual events: 6,8,12

6.
After a great night out, it's the morning. You've overslept and you're still in bed when you should be at work.

8.
It's the morning and you're at the bus station waiting for the bus. The bus is running late.

12.
You've fallen ill with the flu. You decide to book an appointment to see your local doctor. You're in the doctor's surgery waiting to be seen.

Looking at the actual constructs, scenarios 4,6,8,12 (work and unusual events) are quite distinct from scenarios 1,2,3,7,9,11 (social and family) given their opposing

positions in the principal components graph. This is particularly the case with three constructs. Firstly, the former are deemed as solitary activities as indicated by the pole “Personal, you are alone”. The latter are more social as indicated by the right pole “Involves interaction with people”. The former are ones that do not involve fun whereas the latter are more fun activities. Building on the social theme, in the former you have “less, freedom, not in control of time” whereas in the latter, “time is in your control”. The more social scenarios 1,2,3 and 7 are deemed as ‘out of the norm’ as opposed to everyday, and associated with a ‘nice experience with friends and family’.

Scenarios 9 and 11 were deemed as more private, intimate activities involving “people you are close to” and were also rated highly in the “family-related activities” pole.

7.3.2 Likelihood of sharing to certain audiences

In order to uncover the specific audiences associated with different location sharing situations, the *likelihood* of sharing the 10 scenarios to certain audiences was measured. This was done by asking participants to specify the contacts they would be *most likely* and *least likely* to share the scenarios with. First, we present the results of the audience *most likely* to be shared to.

Most likely audience

Chi-Square analysis was performed (with standardised residual scores) on the frequencies of each group most likely to be shared to. There were 5 groups in total: friend, family, colleague, acquaintance and other. Table 7.1 shows the output from SPSS.

		Scenario										Total
		1	2	3	4	6	7	8	9	11	12	
Friend	Count	55.00	9.00	19.00	4.00	8.00	40.00	5.00	8.00	5.00	6.00	159
	Expected Count	32.07	22.91	16.95	10.08	5.96	27.03	8.25	10.08	15.58	10.08	159
Family	Count	5.00	3.00	10.00	1.00	3.00	3.00	1.00	13.00	24.00	12.00	75
	Expected Count	15.13	10.81	8.00	4.76	2.81	12.75	3.89	4.76	7.35	4.76	75
Colleague	Count	1.00	30.00	2.00	16.00	1.00	5.00	5.00	0.00	0.00	3.00	63
	Expected Count	12.71	9.08	6.72	3.99	2.36	10.71	3.27	3.99	6.17	3.99	63
Acquaintance	Count	9.00	8.00	6.00	1.00	1.00	11.00	7.00	1.00	5.00	1.00	50
	Expected Count	10.09	7.20	5.33	3.17	1.87	8.50	2.59	3.17	4.90	3.17	50
Total	Count	70	50	37	22	13	59	18	22	34	22	347
	Expected Count	70.0	50.0	37.0	22.0	13.0	59.0	18.0	22.0	34.0	22.0	347

16 cells (40%) have expected count less than 5. The minimum expected count is 1.87

Table 7.1: SPSS Output table from Chi-square test

As can be seen, the expected count is less than 5 in 40% of cases. This is troublesome according to Field, (2013) who states that it should be no more than 5 in 20% of cases. To resolve this issue, the 'other' group was removed as it was only used in 2 instances. The colleague and acquaintance groups were also merged into one. The results are shown in Table 7.2

		Scenario										Total
		1	2	3	4	6	7	8	9	11	12	
Friend	Count	55.00	9.00	19.00	4.00	8.00	40.00	5.00	8.00	5.00	6.00	159
	Expected Count	32.07	22.91	16.95	10.08	5.96	27.03	8.25	10.08	15.58	10.08	159
	Std. Residual	**4.05**	**-2.91**	.50	-1.92	.84	**2.49**	-1.13	-.66	**-2.68**	-1.29	
	Adjusted Residual	6.16	-4.27	.71	-2.69	1.16	3.72	-1.58	-.92	-3.83	-1.80	
Family	Count	5.00	3.00	10.00	1.00	3.00	3.00	1.00	13.00	24.00	12.00	75
	Expected Count	15.13	10.81	8.00	4.76	2.81	12.75	3.89	4.76	7.35	4.76	75
	Std. Residual	**-2.60**	**-2.37**	.71	-1.72	.11	**-2.73**	-1.47	**3.78**	**6.14**	**3.32**	
	Adjusted Residual	-3.29	-2.90	.85	-2.01	.13	-3.39	-1.70	4.41	7.30	3.88	
Acquaintance	Count	10.00	38.00	8.00	17.00	2.00	16.00	12.00	1.00	5.00	4.00	113
	Expected Count	22.80	16.28	12.05	7.16	4.23	19.21	5.86	7.16	11.07	7.16	113
	Std. Residual	**-2.68**	**5.38**	-1.17	**3.67**	-1.09	-.73	**2.54**	**-2.30**	-1.82	-1.18	
	Adjusted Residual	-3.65	7.08	-1.50	4.62	-1.35	-.98	3.17	-2.90	-2.34	-1.49	
Total	Count	70.00	50.00	37.00	22.00	13.00	59.00	18.00	22.00	34.00	22.00	347
	Expected Count	70.00	50.00	37.00	22.00	13.00	59.00	18.00	22.00	34.00	22.00	347

6 cells (20.0%) have expected count less than 5. The minimum expected count is 2.81.

Table 7.2: Output table with 'colleague' and 'acquaintance' groups merged. Significant residual scores (above +-1.96) are in bold

As can be seen, this process reduced the expected count from 40% to 20% — just within the acceptable limit. These are the results that will be discussed henceforth. Significant residual scores above +-1.96 are in bold. The scenarios have been grouped according to the clusters discussed earlier.

Social scenarios:

Fig 7.7: 'Most likely' audience chosen for social scenarios

With the social group, scenarios 1 (partying scenario) and 7 (evening drink after work) were shared largely to friends. The standardised residual scores are above +-1.96, making them significant according to Field, (2013). No significance was found for scenario 3 (shopping with friends). Interestingly, although scenario 2 (social event organised by work) was rated as social by participants in the repertory grid, it was largely shared to acquaintances (i.e. a more professional audience). Observing the original table (Table 7.1), we can see that this was mainly to work colleagues. What this suggests is that scenarios relating to a particular part of life may not always be shared with the corresponding audience. Although the scenario is largely social, because it is experienced with work colleagues, it is perhaps more suitable for a professional audience.

Work scenario:

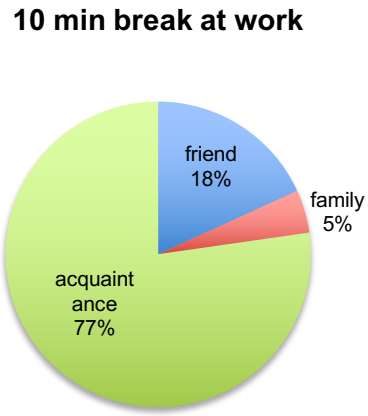

Fig 7.8: 'Most likely' audience chosen for work scenarios

Scenario 4 (10 min break at work) was shared mostly to acquaintances. This result was significant. Again, looking at the original table, we can see that it was most likely to be shared with work colleagues.

Family scenarios:

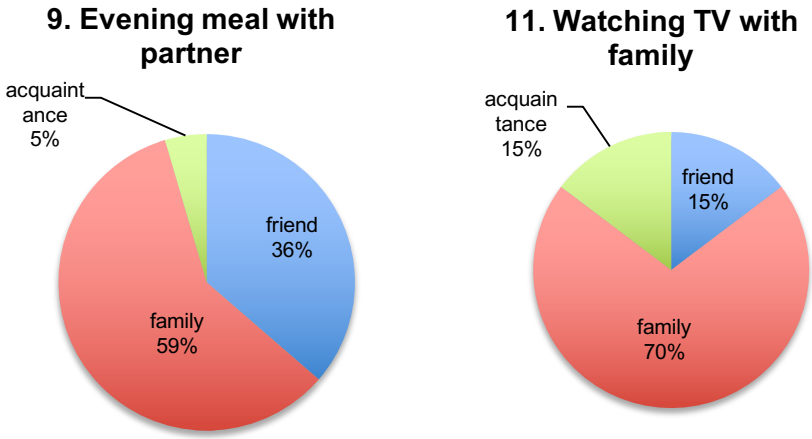

Fig 7.9: 'Most likely' audience chosen for family scenarios

The family related scenarios 9 (meal with partner) and 11 (watching TV with family) were shared mainly to family with these results again being significant.

Unusual event scenarios

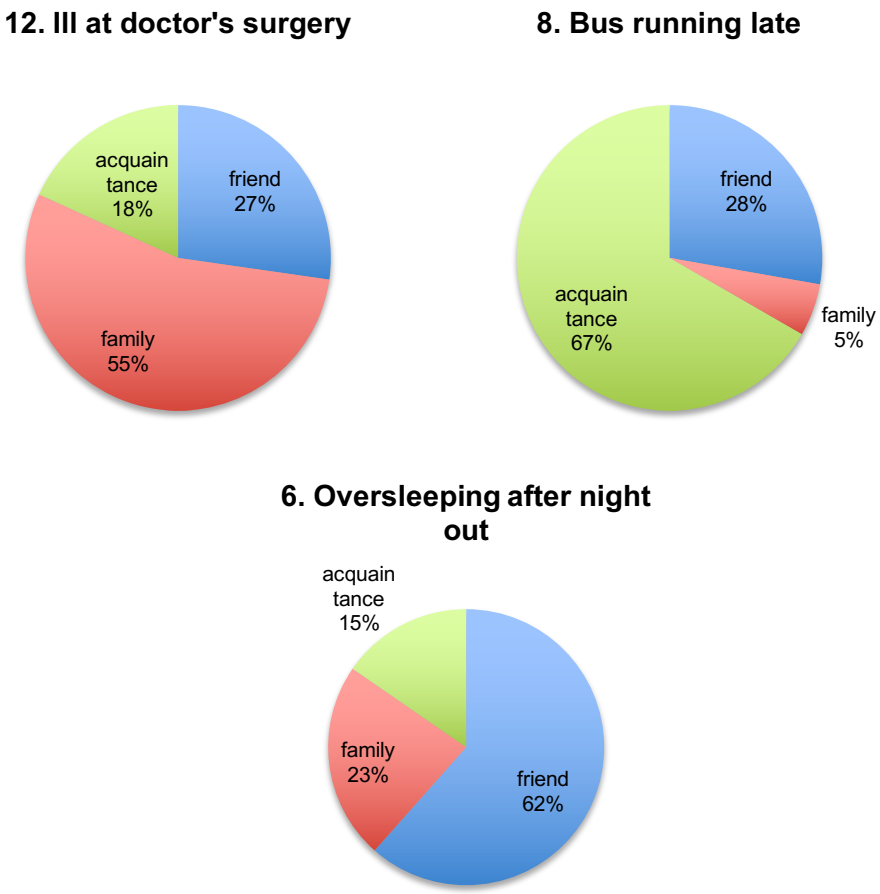

Fig 7.10: 'Most likely' audience chosen for 'unusual events' scenarios

In the unusual events group, scenario 8 (bus running late), was shared mainly to acquaintances whereas scenario 12 (being ill at doctor's surgery) mainly to family. These results were significant. The actual reasons behind this will be explored in the qualitative section. No significance was found for scenario 6 (oversleeping).

Least likely audience

The audience that is *least likely* to be shared to was also measured. The output table from SPSS is shown below with the significant residual scores again highlighted in bold.

		Scenario										Total
		1	2	3	4	6	7	8	9	11	12	
Friend	Count	5.00	21.00	9.00	29.00	4.00	0.00	17.00	9.00	26.00	32.00	152
	Expected Count	12.47	16.17	10.63	20.79	13.40	6.01	12.01	13.40	19.40	27.72	152
	Std. Residual	**-2.12**	1.20	-.50	1.80	**-2.57**	**-2.45**	1.44	-1.20	1.50	.81	
	Adjusted Residual	-3.01	1.73	-.71	2.64	-3.67	-3.41	2.04	-1.72	2.19	1.23	
Family	Count	6.00	8.00	4.00	11.00	11.00	3.00	4.00	7.00	4.00	11.00	69
	Expected Count	5.66	7.34	4.82	9.44	6.08	2.73	5.45	6.08	8.81	12.58	69
	Std. Residual	.14	.24	-.38	.51	**1.99**	.17	-.62	.37	-1.62	-.45	
	Adjusted Residual	.17	.29	-.44	.62	2.35	.19	-.73	.44	-1.95	-.56	
Acquaintance	Count	16.00	6.00	10.00	5.00	14.00	10.00	5.00	13.00	12.00	17.00	108
	Expected Count	8.86	11.49	7.55	14.77	9.52	4.27	8.53	9.52	13.79	19.70	108
	Std. Residual	**2.40**	-1.62	.89	**-2.54**	1.45	**2.77**	-1.21	1.13	-.48	-.61	
	Adjusted Residual	3.05	-2.09	1.13	-3.34	1.86	3.45	-1.54	1.44	-.63	-.82	
Total	Count	27.00	35.00	23.00	45.00	29.00	13.00	26.00	29.00	42.00	60.00	329
	Expected Count	27.00	35.00	23.00	45.00	29.00	13.00	26.00	29.00	42.00	60.00	329

Table 7.3: SPSS output table for 'least likely' audience

The least likely audience had fewer significant residual scores. Thus, for the sake of brevity, rather than present the entire data set, only the scenarios with significant scores will be discussed.

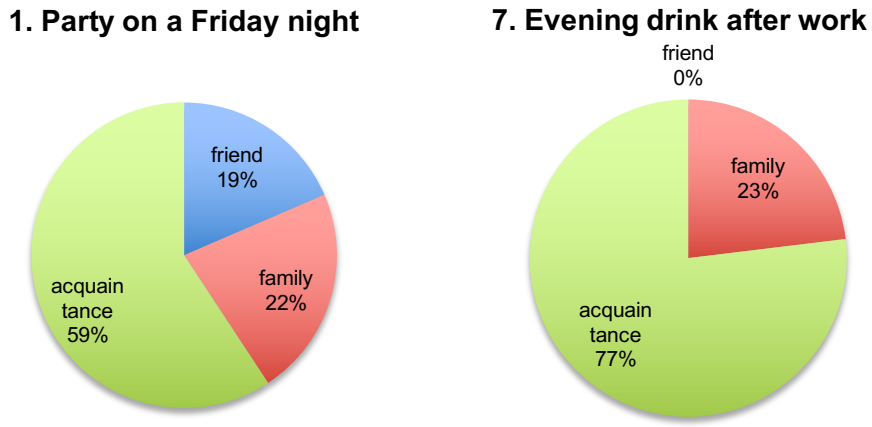

Fig 7.11: 'Least likely' audience chosen for social scenarios

Scenario 1 (partying scenario) was least likely to be shared with acquaintances and friends. This may seem like a contradiction given that 'friends' was also the most likely audience to be shared with. However, it is important to consider the notion of shared interest. These 'friends' were not selected because of their lack of interest in this particular activity, as will be discussed in the qualitative analysis section.

Scenario 7 (evening drink after work) was least likely to be shared with acquaintances, with this result again being significant.

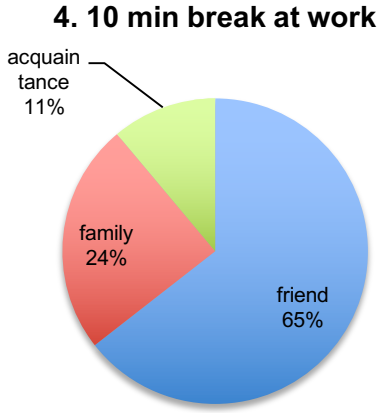

Fig 7.12: 'Least likely' audience chosen for work scenario

In scenario 4, a significance was found for the 'acquaintance' category. Although the standardized residual score for the 'friend' category was not significant, the result is significant if the adjusted residual score is used.

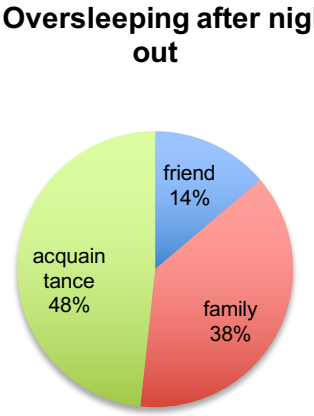

Fig 7.13: 'Least likely' audience chosen for 'unusual event' scenarios

In scenario 6, significance was found for the 'friend' and 'family' categories.

7.3.3 Qualitative analysis

At the end of the session, a structured interview was conducted to understand the *reasons and motivations* for sharing and not sharing (the scenarios) to certain audiences. Although such reasons have been touched upon in previous studies, the goal was to specifically understand how location sharing decisions change as people move from one sharing situation to another.

Interviews from all participants were transcribed and analysed using thematic analysis. The procedure was the same as outlined in section 5.3.6. In some cases, answers were quite brief and not sufficient for thematic analysis. In this instance, simple content analysis was deemed appropriate.

Similar to the quantitative section, the themes will be presented by groups of scenarios. The groups are: social, work, family and unusual events. A summary of content and concluding thoughts will be given at the end of each group.

7.3.3.1 Most likely audience shared with in scenarios

Social scenarios

Scenario	Theme	Quotes
Scenario 1 (party on a Friday night)	Because of a shared interest in activity. (Contact(s) selected would need to enjoy or have an interest in the activity).	*"They're really good friends – we have a lot of fun when we go out. They're my clubbing group of friends. I wouldn't say I'm that close with them, but we do have a lot of fun when we're together. We share the same interests."* *"They're the people I'd most likely see at parties. It's more of a shared activity, not about closeness."*
	To build relationships/bonds with others	*"Because these are the people I party with. If there's a good party, I'd invite them. Some of them are really close friends. Others I'd invite to get re-acquainted. A party is a good place to do that."*
	To share happy moments with others	*"If you're having a good time, you'd likely share it with people who might want to know you're happy. It's perhaps people that care about me and would like to know that I'm having a good time."*

Scenario 2 (social event organised by company)	To share with relevant work related contacts	*"It's a social event organised by the company so I'd share it with colleagues. It'd be most relevant to them. If I shared it with friends, they wouldn't know what it's about and they couldn't take part."* *"This is my manager at work. Given that it's organised by the company, I'd take the opportunity to socialise more with my manager. To build a better relationship with her, outside of work. It's a good way of knowing more (socially) about the people you work with."*
Scenario 3 (shopping on the high street)	Because of a shared interest in activity (Contact(s) selected would need to enjoy or have an interest in the activity.)	*"I've do this type of activity together. We've had fun in the past so it's good to share (this). We have common interests, in terms of shops we go to and they live quite close by also."*
	To share happy moments with others	*"Perhaps this scenario is out of the norm, from the days when I was younger. These are friends from my childhood so it's a way of reminiscing I guess. Just letting them know that I'm out doing that and we'd have a laugh about it."*
Scenario 7 (evening drink after work)	Company that could be relaxed with	*"These are people you could relax with. They're also people you'd like to know better. It's about interacting with them in a more relaxed environment."* *"People I'd regularly see between work and what I'd call 'pyjama time (too late to socialise)'. So we work during the same periods and socialise after work. They're people I'd choose to see outside of work and wouldn't mind seeing after a tired day. They're all close friends."*
	To build relationships/bonds	*"They're people that if I was out, I'd invite them for a drink. It's a good way of catching up, get the conversation flowing, to be more friendly with them."* *"It's more conversational. Having a drink opens up the opportunity to go deeper. I'd share a drink with those I can connect with."*
	To share happy moments with others	*"These people enquire about where I am and what I'm doing. So I might say "that I'm at such and such, at this great place". It'd be a particular circle of friends because they're related to a particular hobby."*

Table 7.4: 'Most likely' audience shared with in social scenarios

Summary

Sharing with those that have a common interest in the scenario was the primary reason for sharing. However, the particular motivation at the time of sharing is perhaps the most salient factor influencing location sharing decisions. Quantitative

results revealed that scenario 1 (partying scenario) was most likely to be shared to friends. However, interview responses suggest that the type of friends selected can vary considerably depending on the motivation. In scenario 1, the primary motivation seems to be fun and enjoyment. Participants therefore, selected people that were most appropriate for achieving this goal, describing them as “people I’d socialise with” and “my clubbing group of friends”. The contacts selected were a mixture of close and distant friends, suggesting that tie-strength was almost an after thought.

On the other hand, when the motivation shifted from fun and enjoyment to relaxation — as was the case with scenario 7 (evening drink after work) — participants were a lot more selective in their decisions. Because the motivation was now to relax and unwind, tie-strength suddenly became active as an influencing factor. Participants were keen to share this experience with those that were “close friends”, “people you’d like to know better” and “people you wouldn’t mind seeing after a tired day”.

Tie-strength can be seen along a continuum, from those very close to those more distant. The type of friends selected in each location sharing scenario seems to be dependant on the motivation at the time of sharing. Close friends and acquaintances might be most appropriate in intimate, relaxed environments, whilst the net can be cast wider in other social events such as parties where the motive for relaxation is superseded by fun and enjoyment.

In addition, nature of the scenario does not necessarily mean that the corresponding audience will always be chosen. Scenario 2 (social event at work), although rated as a social scenario in the repertory grid, was largely shared to a professional audience. Participants expressed that because the social scenario was experienced with colleagues, it would therefore only appeal to a professional audience. Similarly, the activities engaged in are motivated by a desire to build professional relationships with colleagues. The context in which the scenario is shared and the people it is experienced with are more significant than the nature of the environment itself.

The social scenarios were also good ways of building relationships and forging new ones. But again, this was done for different reasons. Scenario 1 (partying scenario) was a means of building relationships in a more public setting. Scenario 7 (evening drink after work) was for having closer interactions with people and getting to know them on a more personal level. Scenario 2 (social event organised by work) was used to forge professional relationships.

Lastly, because social scenarios were all deemed as positive experiences, some participants were keen to share them as a way of conveying happy, enjoyable moments with close contacts.

WORK

Scenario	Theme	Quotes
Scenario 4 (10 min break at work)	Arrange meetups with colleagues	*"Both colleagues and close friends. So if I had a 10 min break, we could arrange a meet up. I think it'd be about convenience. If I've only got 10 mins then I'd be very selective about who I chose to get in contact with."* *"They're colleagues so we're not that close. So maybe they could relate to the event. So if they want to go out to get a coffee, we could do that together. I wouldn't share any personal things with them."*
	To create the right impression	*"I'm working hard and I'd want to show that to these people, who are also hard working."* *"The scenario about work I'd share with my tutor because I know that she cares about my work and my future."*

Table 7.5: 'Most likely' audience shared with in work scenario

Summary

The work scenario is likely to be shared with work colleagues for practical reasons. This is mainly to arrange meet ups with colleagues during breaks. For some participants, this scenario was also means of increasing professional standing by creating the right impression, particularly to other more diligent individuals.

Family scenarios

Scenarios 9 (meal with partner) and 11 (watching TV with family) are socially oriented. However, because the scenarios take place in a family context, they were rated as more intimate encounters in the repertory grid, making them distinct from other social scenarios.

Scenario	Theme	Quotes
Scenario 9 (evening meal with partner)	To share intimate moments (with close contacts)	*"It's a special occasion and it's with my partner. The people I'd share this with would be more personal or family related. Even it was professional they'd have to be very close almost crossing the boundary to personal (life)."* *"Because it's family. I would like to share that with my sister. It's a nice restaurant, maybe she'd like to come, it'd be an option for her if she wanted to go out, have a gathering. I might share it with friends but they'd have to be really close."*
	For recommendation purposes	*"I'd emphasise the restaurant and not the fact that I'm with my partner. The restaurant might be interesting to them."* *"Might share it with colleagues, telling them about the restaurant as a recommendation."*
Scenario 11 (watching TV with family)	To share family-related moments (with family or close contacts)	*"Watching TV with your family is something you'd do with family! I might invite friends if they're really close, especially if they know my family."* *"My brother. We both film buffs. We love sitting down and watching films together. We're into sci-fi, directors cut. We'd just have an evening and just 'geek out' kinda thing."*

Table 7.6: 'Most likely' audience shared with in family scenarios

Summary

Because of the characters involved, these scenarios were shared only to close contacts. This was particularly the case with scenario 9, which was deemed quite intimate and private. As such, participants were very selective about whom to share with and thus chose only a few contacts. In some cases, scenario 9 could be shared to a wider audience but only to provide useful information about the location (e.g. to recommend a restaurant). As one participant remarked, in that case, only the restaurant would be mentioned and not the person you were with (i.e. your partner).

Scenario 11 is more mundane and experienced with family. Therefore, it was deemed only relevant to other family members. It was also a good way of arranging family get-togethers.

Unusual event scenarios

Scenario	Theme	Quotes
Scenario 6 (oversleeping after night out)	Share with trustworthy, close contacts to express humour	*"This is someone who would be with me on the night out. So I would share that like "I've overslept after last night" kinda thing. Just because that person is probably in the same situation, to have a laugh about it because I trust them. It's someone that I know won't judge me."* *"They would find it amusing. They wouldn't judge me, as it might related to them as well. It's not something I'd share with everyone, it's not something you're proud of. They would have to be reasonably close."*
Scenario 8 (bus running late)	Share for practical reasons	*"I might be late for work and they could possibly pass on the message. It's somebody I trust. It's a close colleague/friend. I think trust is factor. It's also 'dead time' so you're like "who can I share that the bus is running late?*
Scenario 12 (at doctor's surgery feeling ill)	To seek help	*"My mum because she'd probably know what to do. Would only share it with close family – people you'd consider taking care of you. You'd ask from people you know that can help you. It would be a specific share. There's also a sense of trust."* *"Relative who's a doctor. If it was more important (disease), she may have her own ideas about that. That's her speciality, she's used to dealing with medical situations so she can provide some advice."*
	To express feelings/receive comfort	*"They're my sisters. If I'm ill and I'm worried, they're the people I could moan to and they'd be the most concerned. They would want to know the outcome (of seeing doctor). I'd only share that with family because it's quite personal."* *"You're feeling uncomfortable and I'd share that to receive comfort (from others). I would also share that family and close friends. I wouldn't share that with everyone because for some people you want to show that you are strong. You wouldn't want to express your weak aspects."*
	For practical reasons	*"This is a supply agency. It'd be for practical reasons to inform them that I wouldn't be available for work."* *"It is someone I had tutored, so I'd share that to inform them that I'm ill (and can't tutor)."*

Table 7.7: 'Most likely' audience shared with in unusual event scenarios

Summary

These scenarios were shared for very different reasons. However, because of their unusual, sometimes sensitive nature, trust is an important factor. They were only shared with people who were very close. Scenario 6 (oversleeping) was deemed quite an embarrassing situation and was shared to those that would not perceive it negatively. However, once the appropriate audience is selected, scenario 6 (oversleeping) and 8 (bus running late) can be a means for expressing humour and become part of the repartee among friends.

Scenario 12 (ill at doctor's surgery) is related to health and was deemed quite private. The audience chosen were those that could provide help in that situation (e.g. family or medical professionals). In other cases, it was to express feelings and seek comfort from loved ones.

These results in particular further highlight the socially oriented aspect of location sharing. Although one's physical location is being shared, it is done primarily as a means of connecting with others. In scenarios 6 (oversleeping) and 8 (bus running late), location was shared in order to express feelings and convey anecdotes — sometimes positive such as humour and witty jokes, and sometimes negative such as venting frustration at a situation. In scenario 12 (ill at the doctor's surgery), participants wished to use the scenario to seek help from others and to receive comfort from them. Such results indicate that location sharing is not necessarily a state, but more an action performed to achieve socially motivated goals, as posited by Cramer et al, (2011).

7.3.3.2 Least likely audience shared with in scenarios

The reasons for not sharing location to certain audiences were also captured. The relevant themes are presented below.

<u>Social scenarios</u>

Scenario	Theme	Quotes
Scenario 1 (party on a Friday night)	Content inappropriate for certain audiences	*"They're very professional; you don't see social interactions outside of that. In this case, it's one of my old bosses who I wouldn't, because of age difference perhaps, have that interaction with. In this case, you might feel judged. You might have work the next day,*

		so you wouldn't want to share that you're out. It would be inappropriate and detrimental, it's something they don't need to know, and perhaps for the sake of both of you, for them not to know." *"Both of them are my colleagues. I wouldn't go to a party with colleagues. They're quite close colleagues, we talk a lot. But it's a Friday night and the environment is totally different. I wouldn't associate with them outside of work. I've built a professional image at work, so I wouldn't want them to judge me when I'm socialising."*
	Not relevant/interesting	*"They're not really friends. They don't really do the late night drinking. This is probably the least likely places they'd be in. They're more the older generation so it's just not their thing."* *"It's least likely that this person would participate in this scenario with me. It's not really relevant to them."*
Scenario 2 (social event organised by company)	Not relevant (to those outside work context)	*"It's organised by company so it's work life. Family and close friends. They're not part of my work life, more my personal/social life. It's not really relevant to them."* *"Because their related to my personal life and wouldn't fit really into my professional circle. So you wouldn't be talking about work (to them)."*
	To maintain professional image	*"Wouldn't bring any of these (people) to a work social. Two of these friends are crazy so I wouldn't want to bring them – it'd be embarrassing! A bit inappropriate, just not fitting."* *"I don't think they'd have an interest. I wouldn't find it appropriate to take them to this interaction. Based on a professional standpoint, you may not want that person to be there, because it's detrimental to you."*
Scenario 3 (shopping on the high street)	Not relevant/interesting	*"Because these people don't like shopping at all. It wouldn't be interesting to them at all. It's unnecessary information for them to know. It wouldn't add anything to their relationship or life."*
Scenario 7 (evening drink after work)	Content inappropriate	*"He's my classmate. He's very hard working. If I share this, it might create the wrong impression. He doesn't like to drink. I don't like to share things that he hates. I don't want to take this risk. In the long term, we might become close friends so I wouldn't want anything to jeopardise that relationship."*
	Contacts not close enough	*"It's kind of a personal experience for me. These people are not that close so I wouldn't want to share with them."* *"They're colleagues. The place and time is late in the evening. I don't associate with them outside of work. This time is only for close friends."*

Table 7.8: 'Least likely' audience shared with in social scenarios

Summary

A recurring theme was a lack of relevancy to the audience being shared to. In the most likely section, one of the major themes was a common interest in the current activity. Conversely, those that did not have an interest in the scenario were simply not shared to. Clearly, participants were careful to ensure that whatever was shared is something that their audience could relate to in some way.

Another reason for not sharing was a fear of giving the wrong impression. This was particularly the case with scenarios that involved drinking. Participants were reluctant to share to work colleagues and acquaintances in order to maintain a professional image

Work scenario

Scenario	Theme	Quotes
Scenario 4 (10 min break at work)	Not relevant, impractical, pointless	*"I would never work with those people. They work in different fields, some are from different countries. They're not doing the same job as me, so I don't see the point."* *"It's physically not possible to share a 10 min break with your family. It would just be impractical."*

Table 7.9: 'Least likely' audience shared with in work scenario

Summary

Similar to social scenarios, primary reason was a lack of relevancy. Scenario 4 is a very specific situation that takes place at work. Many participants did not want to share with anyone outside the work context.

Family scenarios

Scenario	Theme	Quotes
Scenario 9 (evening meal with partner)	Inappropriate to share private life with those not close	*"It's quite a personal thing. I wouldn't like to share with everyone that I'm out with my partner. Again, they might not want to know, might not need to know. It's a personal, closed experience and you'd want to keep it that way. I might share it with very close friends or maybe if it's a special occasion you'd share it with very specific people."* *"They're not that close to me. I wouldn't share something that personal with them. I don't have a need to share such personal things with everyone."*
Scenario 11 (watching TV with family)	Not relevant (to others outside family context)	*"One of these is one of my best friends. Others are friends and acquaintances. Not part of my family, they wouldn't be there. They wouldn't really find it interesting. I think trying to mix family with friends can be a bit awkward – a lot of leg work!"* *"Doesn't add anything to their life. If you're going to share location, you'd want it to be relevant to them so they feel involved and engaged in the experience. Sharing this isn't adding to that interaction and experience."*

Table 7.10: 'Least likely' audience shared with in family scenarios

Summary

Scenario 9 is quite an intimate scenario involving time with a partner. As such, participants were reluctant to share with a wide social network — be that friends or professional colleagues. Here, the core concern seems to be tie-strength, with some people simply not being close enough to share more private, intimate moments with.

Scenario 11 was not deemed relevant to anyone outside the family context. Participant argued that because the activity was mundane and more family-related, it simply would not interest anyone outside this context.

Unusual event scenarios

Scenario	Theme	Quotes
Scenario 6 (oversleeping after night out)	Avoid giving the wrong impression	*"These people are work related. So there's no way I'd share that scenario with them! I don't think they'd judge me in the best way."* *"My mum, manager, and dad because it's not something that I should be doing. I think my parents would find it embarrassing because they've got a very strong work ethic. I wouldn't want to give the wrong impression."* *"These are family members. So if you've overslept, it's quite shameful, you wouldn't want your family to be ashamed of you. I guess it's a case of not wanting to disappoint the ones you love. There's some people who might find it funny without judging, but family will always judge you."*
Scenario 8 (bus running late)	Irrelevant/trivial	*"Quite a boring situation. Because I work in an academic environment it's not really time critical. I wouldn't need to tell anyone about it. Unless there was someone waiting for me e.g. work colleagues, partner. Other than that, it's just non-information."*
Scenario 12 (at doctor's surgery feeling ill)	Too private to share with distant contacts	*"We're friends but they're not the kinds of people I'd go to for help. I'd go straight to my GP and wouldn't share it to them. If I had a friend who was related to the field i.e. medicine then I guess I might go to them. Other than that, I'd rather go to a professional. It would have to be someone who can offer support or expertise in that scenario."* *"I wouldn't share this with friends. No one likes to hear about other people being ill! I might share it with family, so they might be more interested in your health. I might share it with colleagues if it would affect them."*
	Not to worry loved ones	*"Relatives that I'd rather not worry. My mother lives far away because I know she worries about me."* *"My friends. I wouldn't want them to know that I'm ill. I wouldn't want them to worry. I would probably share it with my partner. I would need to tell someone I guess, to tell them that I need attention."*

Table 7.11: 'Least likely' audience shared with in unusual event scenarios

Summary

The reasons for not sharing varied because these scenarios, although out of the norm, are contextually quite different.

Scenario 6 was a more embarrassing situation. The main reason for not sharing was to avoid giving the wrong impression. This was particularly the case with professional and family audiences. With the former, participants felt that this would demonstrate a lack of work ethic and laziness — attributes clearly not appropriate for a professional audience. For family, participants did not want to disappoint loved ones or to feel judged.

Scenario 8 was deemed quite trivial to certain contacts and lacked any relevancy. Scenario 12, being health related, was not shared to contacts deemed less close. Again, tie-strength and trust are important factors. People did not want to share to those they did not trust with their health and also those that could not help in that situation. Another reason was to not alarm loved ones with health matters.

7.4 DISCUSSION

The mental constructs elicited from the repertory grid give some insight into how the location sharing scenarios were interpreted. The work and unusual event scenarios (4,6,8,12) were deemed as solitary activities, differing from the social and family scenarios (1,2,3,7,9,11), which involved “interaction with people”. The ‘fun factor’ was another distinction, with the social and family scenarios being those in which “you are having fun” as opposed to the other scenarios in which you are not. Control of time was an interesting construct, with work and unusual event scenarios interpreted as having ‘less freedom’ as opposed to the social and family scenarios that involve ‘time which is in your control’. The social scenarios were interpreted as ‘out of the norm’ and also ones where you have a ‘nice experience’, as opposed to work, which is more mundane and solitary.

The family scenarios (9,11) were interpreted as not only those that involved interaction with others but also ones that involved ‘people you are close to’. They were also rated highly on the family-related construct. This made them quite distinct from the social scenarios. Although they may also be enjoyable, the people you experience them with are family, making them more private, intimate activities.

Study 2 was a comparative study assessing the impact of sharing location based on three different life-modes: social, professional and family. These life-modes were extracted from Ozenc & Farnham, (2011) who found them to be the most common

ways in which people 'mapped out' their lives. Therefore, they were not specific to location sharing, or indeed any form of social media. Quantitative results revealed four clusters of scenarios: social, work, family and unusual events. It should be noted however, that the work and unusual event scenarios were related, because they were rated as largely solitary activities and ones where 'no fun is involved'. These results suggest that the 'life-modes' of social, professional and family are in line with how location sharing scenarios are mentally perceived. However, the life modes are not all encompassing. While they may provide a basic framework in which to organise content on social media, there will inevitably be situations that are beyond their scope and applicability. This was evident with the 'unusual events' cluster, which was quite distinct from the social and family scenarios. These findings also corroborate those of study 2, where participants acknowledged that life-modes are good as a basis for organising audiences but the freedom to customise groups was required.

To uncover the specific audiences associated with different location sharing situations, the *likelihood* of sharing scenarios to certain audiences was also measured. With the exception of scenario 2 (social event organised by work), the social scenarios were largely shared to friends. The residual scores of scenarios 1 (partying scenario) and 7 (evening drink after work) were significant (above +-1.96). However, this generic 'friends' group only tells half the story. In social relationships, friends can differ significantly in terms of tie-strength — with some people closer than others. Qualitative results revealed that the type of friends selected depended on the motivation and goal in each scenario. In scenario 1 (partying scenario), the primary motivation was fun and enjoyment. As such, the friends selected were those that were conducive to that goal. This comprised of a wide circle of friends or those that were regularly socialised with. On the other hand, in scenario 7 (evening drink after work), the primary motivation was relaxation. In this case, participants were more selective with their choice of contacts. People that one could 'relax' and 'unwind with' were chosen over those that were simply socialised with on a more general level. Although both scenarios were rated as social, a shift in motivation at the time of sharing meant that a completely different audience was selected. This observation also illustrates that just because a location is shared to a particular group (e.g. friends), does not mean that everyone in that group is the same. The people in that group can vary considerably in terms of tie-strength and their suitability for a location update. The activities engaged with certain friends might also vary depending on their character, personality and personal interests. This diversity is difficult to fully

appreciate and ascertain from a generic group label (e.g. friends, colleagues, acquaintances) but can be the difference between sharing and not sharing at all.

Scenario 2 (social event organised by work) was a little unusual because it almost crossed the boundaries between social and professional. Although participants rated it as a social scenario, it was shared largely to a professional audience. What this demonstrates is that scenarios relating to a particular facet of life, in this case social, may not always be shared to the corresponding audience. Rather, as aforementioned, the audience selected is dependent on the motivations and objectives at the time of sharing location. Unlike the other social scenarios, this scenario took place in a professional capacity. This meant that people's motivations shifted from overt socialising for fun and enjoyment to socialising in order to achieve career-oriented goals. One participant observed that the environment was a good way of building closer relationships with colleagues and as such, would likely send a location invite to co-workers. Another participant similarly remarked that it was a good opportunity to build closer ties with their boss. Due to the business-related context of the scenario, another participant wished to share their location with other professionals who might find it useful. Each of these examples illustrate quite a radical change in motivation, which clearly has an impact on location sharing decisions.

The family scenarios were shared mainly to family contacts. Qualitative analysis revealed that this was because they were experienced with family (e.g. with a partner, wider family etc.) and were therefore only appropriate and relevant to very close contacts. In scenario 9 (meal with partner), participants were particularly keen to keep their family life separate from other areas. In scenario 11 (watching TV with family), the family context meant that it was only suitable to either other family members or contacts that enjoyed a very close relationship. Further, although quite social themselves, the family scenarios were rated as distinct from the other social scenarios in the repertory grid. Interview responses add further context to this distinction; family scenarios involved a greater level of closeness and intimacy, which made them relevant and appropriate only for a family-related audience.

In the unusual events group, scenario 8 (bus running late) was shared mainly to acquaintances. Scenario 12 (ill at the doctor's surgery) was shared largely to family. Interview responses suggest that trust is an important factor with these scenarios in particular. These events were deemed as unusual, annoying, and even

embarrassing. Therefore, they were more likely to be shared with close, trustworthy contacts. Scenario 8 (bus running late) was shared for more practical reasons (e.g. to notify others of lateness). But even in this case, the people shared to would usually be those that can reliably pass the information on to the relevant party (e.g. boss, supervisor etc.). Scenario 12 (ill at the doctor's surgery) was largely shared to seek help, either from very close contacts or medical professionals. Another reason was to receive comfort and attention from very close contacts, usually family.

The audience 'least likely' to be shared with was also measured. In this instance, fewer significant residual scores were found. Scenarios 1 (partying scenario) and 7 (evening drink with friends) were least likely to be shared with friends and acquaintances. This may seem like a contradiction given that friends were the most likely audience for scenario 1 (partying scenario). However, given that the primary reason for sharing this scenario was a shared interest (in the activity), those that did not fit this criteria were not selected. Similarly, we have seen that for scenario 1 (partying scenario), participants are motivated by the fun factor which means that only those suitable for this purpose are selected. Furthermore, since both these scenarios involve drinking, participants were keen not to give the wrong impression. This was particularly the case with acquaintances. Avoiding the consequences of inappropriate sharing usually overrides the need to share as study 2 uncovered.

An oft-recurring theme for not sharing location was a lack of relevancy. Participants were keen to ensure that whatever was shared would be relevant to their audience in some way. This is quite different from conscious, deliberate attempts to project one's activity on to others — behaviour most commonly associated with impression management. The first study revealed evidence that users sometimes share their location in order to enhance their self-presentation. While apparent in the first study, the results of this study suggest that it was not a primary motivation. It is clear that participants made careful decisions when sharing and were concerned about the relevancy of their content to their audience.

7.5 LIMITATIONS OF STUDY

- The results are particular to the elements (scenarios) used in the study. The study would have to be replicated with other elements to have wider scope.
- The sample was restricted to university staff and students and therefore may lack broad generalizability.

- The study took place in a lab setting. Therefore, results do not reflect actual user behaviour through software.
- Each participant had a one-to-one interaction with the researcher. This may have had an impact on the responses given in the session.

7.6 CONCLUSION

Through the repertory grid technique, this study has elicited 10 major bi-polar constructs that give insight into how location sharing scenarios are perceived and interpreted. Social and family scenarios were associated with positive moods and experiences, those that involved fun while interacting with others. By contrast, the other scenarios were associated with negative moods and experiences and largely considered solitary activities. These results provide insight into how people's perceptions, in relation to location sharing, change when enacting different facets of identity. Social scenarios are largely considered 'fun' activities and social experiences that are enjoyed with others. Family scenarios, although somewhat social in their own right, are separate from the overtly social situations because of their family related context; as such, people associate them with intimacy and privacy. Work situations are perceived as mundane — places that signify the restriction of the freedom afforded in other situations, and those that carry a requirement to fulfil obligations. Although these interpretations are tied to location sharing scenarios, they are perhaps not too far apart from how different facets of life might be perceived in offline interactions. Such results also underline how location sharing systems almost blend the physical and virtual worlds. The makeup of the physical world, its environment, appearance and characters, all ultimately contribute to providing meaning and context to the digital location being shared.

Although the elicited constructs provide useful insight on their own, we also probed deeper into how these perceptions might impact location sharing behaviour. Quantitative analysis revealed that social scenarios are more likely to be shared with friends; work scenarios with acquaintances, mainly colleagues; and family with other family related contacts. These results might suggest that the likely audience selected, corresponds with the particular life facet to which a scenario is associated (i.e. social to friends, work to acquaintances, family to family etc.) However, discussed previously, this is not always the case. One interesting finding emerged with scenario 2 (social event organised by company); although it was rated as a social scenario, it was in fact most likely to be shared with acquaintances or

professional contacts. While the scenario might be experienced in a social environment, the context in which it takes place (i.e. professional) is a salient factor when selecting a suitable audience. This result clearly has implications for future design in terms of how context can sometimes radically influence location sharing decisions. Given this factor, it also serves to further emphasise the perils of broadcast sharing, a model that fails to recognise the very notion of a multi-faceted identity, let alone appreciate the intricacies of context as those facets are enacted.

Consistent across a number of scenarios was a desire to share enjoyable moments with others in a social network. Similar to the results of study 1, these results indicate that physical location is a way of communicating the self, projecting one's personality, and sharing positive experiences with others. Through this process, social connection is achieved. Participants were careful in choosing the right audience — selecting those that were either very close, such as family members, or those that were related to the scenario is some way. With the right audience established, location can be a means for maintaining or indeed strengthening existing relationships. This does not suggest, however, that sharing positive moments are deliberate attempts to project one's activity on to others — traits associated with impression management. While sharing such moments might, for some, have been part of wider self-presentation strategy; even in this case, participants did not overlook relevancy and applicability (to the audience) when sharing.

Consistent with the findings of both studies 1 and 2, participants were also keen to preserve their self-image by not giving the wrong impression to certain members of their audience. This was particularly the case with scenarios that could be misinterpreted such as those that involved drinking or those that conveyed a negative image such as oversleeping. Such results illustrate that location sharing decisions are made with care and attention. Participants were clearly concerned about the impact of their location on their image and social relationships. However, while in a laboratory environment, participants could be selective about whom to share with and whom to omit, it is not so simple in real-world location sharing systems. Certain undesirables, at least for specific situations, might be embedded in a large, homogenous friends list. This means that either users have to screen their content to make it appropriate for everyone, as study 1 revealed, modify their tone accordingly, or simply choose not to share the location at all, as study 2 revealed. In

any case, a generic friends list can lead to inhibitions about sharing location as a whole.

In conclusion, this study has revealed how different location sharing scenarios are cognitively perceived, and in doing so, uncovered some of the factors that distinguish one location sharing situation from another. The particular audiences likely and unlikely to be shared with in different scenarios were also analysed. While in many cases, the likely audience might correspond with the life-facet to which it is commonly associated (e.g. social to friends, family to family), the context in which the scenario takes place can dramatically influence what audience is selected. Moreover, the motivation and goal of the user, at the time of sharing, is one of the key factors influencing location sharing decisions — it can also shift and change depending on the situation. Finally, it is troublesome to assume that contacts, by virtue of being part of the same social circle, can therefore be taken as one homogenous whole. On the contrary, social relationships are far too intricate for one to hold such a rudimentary view. Rather, a user's particular motivations and goals, the strength of ties to their social network, and the level of trust with those people, all ultimately contribute in deciding what to share and to whom.

7.6.1 Key outcomes emerging from study 3

- An analysis of the deeper, personal meanings behind different location sharing scenarios.
- An initial understanding of the audiences likely (and not likely) to be shared to in different location sharing situations.
- An initial understanding of the reasons for sharing location in different situations. Relating to this, an insight into the factors influencing location sharing decisions in various scenarios.
- An analysis of how goals and motivations change from scenario to scenario and how this impacts location sharing decisions, particularly in selecting the type of audience.
- A preliminary understanding of how location sharing behaviour changes as different facets of identity are enacted.

The next chapter presents the final conclusions of the thesis.

CHAPTER 8
CONCLUSION

The last chapter presents the final conclusions on the research conducted in this thesis. First, each research question is reintroduced and relevant conclusions pertaining to each study are discussed in turn. Overall conclusions are then made in light of the primary aim of the thesis, namely, how social identity influences the digital sharing of location. A separate discussion on the specific implications of the research on future technology design is also presented.

This chapter also provides a discourse on the main contributions of the thesis, discusses the limitations of the research, and presents possible avenues for future work.

8.1 PRIMARY AIM OF RESEARCH AND RESEARCH QUESTIONS

The overall aim of this thesis was:

> *To investigate the influence of social identity when digitally sharing location*

This aim was distilled into three primary research questions:

Q1. How is individual-level social identity exhibited in current 'location aware' social media?

Q2. What is the impact of targeted sharing, based on facets of identity, on location sharing behaviour?

Q3. How are different location sharing scenarios perceived and interpreted and what are the specific audiences associated with them?

8.2 RESEARCH APPROACH

This thesis adopted a mixed-methods approach that leveraged the strengths of both quantitative and qualitative research to address the core research aims. Thus, it employed a range of techniques including surveys, experiments in the wild, laboratory studies and interviews in answering each research question. The

particular methods considered most suitable to answering those questions were selected at each stage of the research.

The results, therefore, are a mixture of statistical analyses coupled with rich, qualitative interpretations. In each research study, qualitative techniques served to provide further detail, context and meaning to quantitative data. This enabled the overall research aim to be explored from multiple viewpoints, and ultimately, to be addressed more insightfully and comprehensively.

8.3 CONTRIBUTIONS

This research investigated how social identity influences digital location sharing. First, by drawing upon literature from social and behavioural sciences, the social identity theory was explored from both a sociological and psychological perspective. After grounding the research in the understanding of how social interactions take place offline, each research study then investigated how individual-level social identity is manifested in digital location sharing environments. This approach meant that the sociality of location sharing, in terms of the social factors that influence location sharing behaviour, could be explored holistically and comprehensively. Thus, the primary aim of this thesis was to develop a deeper understanding of how facets of offline social behaviour are transferred and enacted in location sharing platforms, and what can be learned from that knowledge to inform the design of future location sharing systems. This thesis, therefore, not only contributes to the body of research on digital location sharing, but by exploring user behaviour in social networking platforms, also contributes to social media research in general. Further, by investigating how human interactions take place through digital spaces and mediums, it also makes contributions to the Human Factors and HCI disciplines.

Through this research, a scale measuring location sharing attitudes as they relate to social identity was developed. Thus, some of the key factors influencing those attitudes when enacting social identity were uncovered. Further, the relationship between identity and place was also explored. Specifically, this research offers insights into how identity is reflected through digital locations, how it might influence the types of places visited and shared, and the specific methods by which the public self is communicated to others in digital location sharing systems.

This thesis also demonstrates, through both a self-reporting study and a field study exploring actual usage, the dichotomy between offline and online social behaviour,

particularly in relation to digital identity management. It uncovers how the notion of a multi-faceted identity is often overlooked in location sharing systems, how this manifests as anxieties among location sharing users and the specific strategies employed by users to manage those concerns. Through technology design, it also demonstrates how such anxieties can be mitigated by organising the online audience according to facets of identity. The findings illustrate some of the benefits, particularly in terms of user experience, of modelling software design more closely on offline social behaviour.

Using methods from psychology, this research also provides an initial understanding of how location sharing situations are cognitively perceived by users and the personal meanings attached to them. Through this process, it offers insights into the factors that distinguish one location from another and how these locations, in turn, might be mentally categorised by users. By making this knowledge explicit, it also provides insight into the specific audiences attached to different types of location, and the particular reasons for sharing location in varying situations. This is beneficial in not only understanding the factors that influence audience selection, but also in understanding how location sharing decisions change as different facets of identity are enacted.

8.4 HOW IS INDIVIDUAL-LEVEL SOCIAL IDENTITY EXHIBITED IN 'LOCATION AWARE' SOCIAL MEDIA?

The first research aim comprised of four main research questions:

Q1. How is identity reflected in the digital locations that are shared on social media?

Q2. How do people project their identity through their digital location?

Q3. How do people digitally manage their social identity across different groups within their social network?

Q4. How do users engage in impression management when sharing digital location?

Fig 8.1 provides a summary of results and how each result links to the original aims. More detailed conclusions then immediately follow.

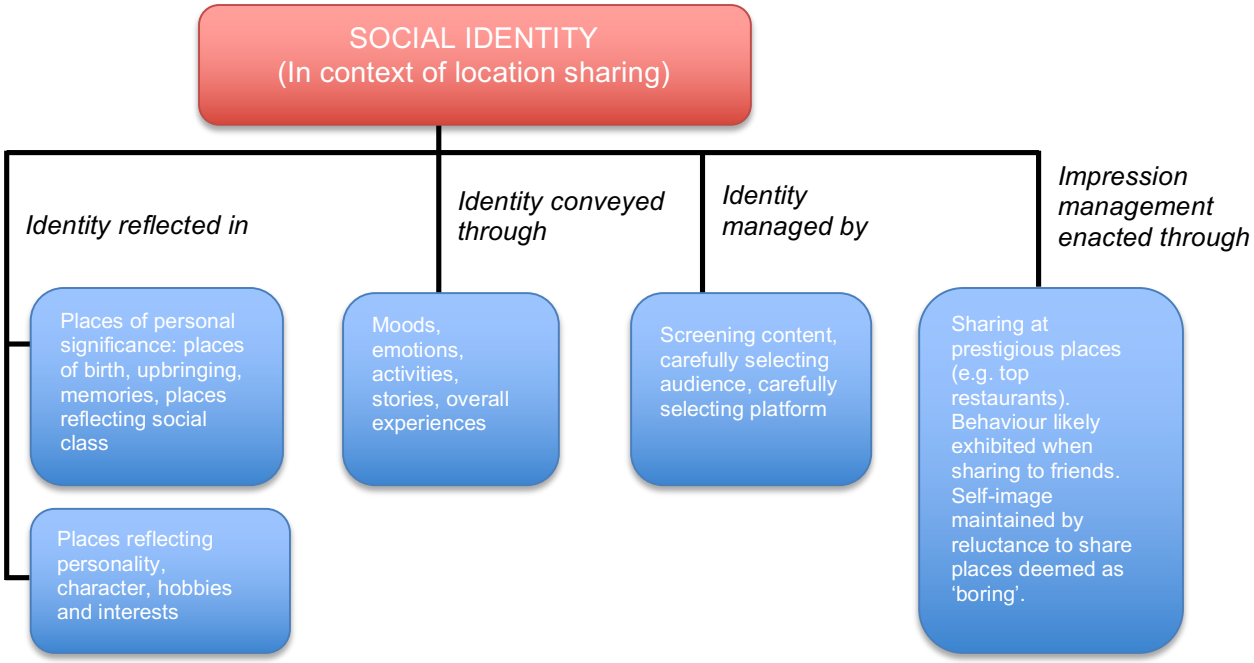

Fig 8.1: Summary of results showing links to research questions

8.4.1 Conclusions from study 1

Results from the first study reveal a strong relationship between identity and place. Identity, being the individual identification of a person, can influence the types of places they are likely to visit. By doing so, the type of place can, in turn, give a glimpse of who that individual is as a person. For example, physical presence in an academic institution, a gym, or coffee shop can project a person's professional role, lifestyle, and particular interests. This lends support to the symbolic interactionism observations of Morie et al, (2008) that suggest that the self is constructed through "a process of social interactions with various communities, physical structures, environments, as well as with other humans and objects". Thus, this interaction can essentially shape an individual's self-perception. Sharing location digitally, along with its many contextual components, then, is a way of conveying identity to a potentially vast audience.

Further, as well as being a transient reflection of an individual, one's identity can also be strongly attached to certain places. As depicted in
Fig 8.1, places of birth, upbringing, childhood memories, honeymoons and first dates can all hold particular significance for people. Participants remarked that these places are more likely to be shared than others. Thus, location can be a

representation of the many facets of an individual's identity. This perhaps also explains the observations of Kinsella et al, (2011) that location sharing can act as a "window" into people's lives, revealing much about their daily movements, interests and habits.

Moreover, in addition to indicating lifestyle and hobbies, location can also represent one's social class. Some participants observed that presence in prestigious locations is indicative of one's wealth and social status largely because of the perceptions people hold of such places, areas and neighbourhoods. This corroborates the findings of Filho et al, (2014) who found that patterns of check-ins in wealthy neighbourhoods is a good indicator of one's background and therefore can be used to infer social class.

For individual participants in the first study, identity is comprised of personality, character, hobbies and interests and relationships with others. Although the study did not define identity in any specific sense in the survey, this definition is in line with that of Thoits & Virshup, (1997) who postulate that identity is not just a composition of socio-demographic attributes but also comprised of physical appearance, leisure activities and personality. Some participants also acknowledged that identity is faceted and that different facets are activated depending on the place (e.g. home, work, university etc.). This is not surprising considering social psychology theories, such as those of Stryker, (2000), that posit identity as being multi-faceted and role based, comprising of a set of discrete identities that can each trigger different behaviours in an individual.

Results indicate that identity is primarily projected through current activities, moods and emotions, stories, and overall experiences. This demonstrates that location is a means through which personality, character and personal experiences are conveyed. As Cramer et al, (2011) observe, location sharing is more of an action than a state; an activity that is performed to achieve socially oriented goals. Digital location is imbued with context and meaning by physical place and its components, and given significance and purpose when shared with others in a social network.

Negotiating different facets of identity in social media can be challenging and problematic (Farnham & Churchill, 2011). Tensions in identity management were uncovered in the first study. Users actively screened content before sharing, accepted invites with caution, and used different platforms to segment their identities accordingly (Fig 8.1)

Although social media uses appropriate metaphors (e.g. share, friend, tag, poke) to enhance the familiarity of digital space, the nature of digital environments is, of course, considerably different to that of the physical world. While in the offline world, individuals read and interpret cues from their surroundings and the body language of others, online spaces are void of any of these attributes. Similarly, in the physical world, people's lives are often segmented through borders or boundaries that demarcate different contexts (e.g. home, work, church etc.) as postulated by Clark, (2000). These boundaries are characterised by Clark, (2000) as being either physical, temporal or psychological. Using this conceptualisation, online spaces have no physical demarcations; temporal borders can be blurred due to the persistence of online data; and psychological borders are difficult to construct because of the absence of the clear, physical cues found in the offline world.

The lack of contextual cues can, therefore, make managing facets of identity particularly troublesome. In study 1, one participant remarked that location sharing software 'generalised' diverse audiences, bringing "everyone all together in one app". This notion is consistent with the context-collapse argued by Marwick & Boyd, (2010) where multiple audiences are collapsed into one. Another participant observed that they had different "roles" for friends and family groups, indicating a conflict in identity management and the presence of 'incompatible' roles as also found in Farnham & Churchill, (2011).

The degree to which individuals segment their lives can vary along a continuum — from highly integrated to highly segmented (Nippert-Eng, 1996). Thus, the issue of identity management might affect some people more so than others. Some participants used different platforms depending on the facet of identity; Facebook was primarily a place for socialising with friends while LinkedIn was used for professional networking. This explicit segmentation perhaps indicates a higher level of facet incompatibility. These results are similar to Stutzman et al, (2012) who uncovered frequent use of multiple profiles in social media.

Further, the absence of environmental cues means that users must conceptualise an "imagined audience" (Marwick & Boyd, 2010). Much like a writer must anticipate the reactions of his audience, so too must users anticipate what is appropriate and inappropriate for their social network. In the first study, this tension was exhibited by some users who screened their content to ensure that it was suitable for the intended audience. Other research has demonstrated that users sometimes get the balance

right; at other times wholly wrong, resulting in regrets (Patil et al, 2012b) and unintended consequences (Wang et al, 2011).

Location sharing, by virtue of being an action that is undertaken with particular intent, is also a means of enacting performance and enhancing self-presentation. The perceptions attached to certain locations seemed to influence, in some cases, the particular locations shared; some participants exploited these perceptions to good effect. Participants reported attempts to elevate their self-image by sharing location in prestigious places (e.g. top restaurants). Quite often, this was to seek attention from others by appearing gregarious, outgoing and interesting to others. They also expressed a desire to preserve their self-image by avoiding 'boring' places that might be detrimental to their online identity. These results largely corroborate those of Tang et al, (2010), Lindqvist et al, (2011) and Guha & Birnholtz, (2013). Correlational analysis uncovered that extraverted individuals and those with a higher degree of agreeableness are more likely exhibit this behaviour.

Although location sharing is an individual action, the presence of an online audience can impact the motivations of users, potentially turning them from passive consumers to active performers. Much like a stage performer engages in behaviour aimed at impressing his audience, so too is user behaviour influenced by the perception of who might be 'watching' online. Factor analysis, in addition to indicating the maintenance and enhancement of self-presentation, also uncovered potential acts of deception manifested as deliberate attempts to craft particular images in the minds of others. Unlike sharing location when one happens to be present at a particular location, these are deliberate attempts at enhancing self-presentation by specifically visiting a particular place, with the sole intent to share that location. This includes check-ins at places where one is not actually present. Observing the means of this factor suggests that this action was not commonly reported by the sample used in the study. However, there is potential for this type of behaviour in location sharing platforms. Foursquare and Facebook, for example, only require check-ins to be in the nearby vicinity of a place which can increase the temptation for distortions of truth. Such attempts can be part of efforts to construct specific self-images, possibly idealised, which are difficult for an online audience to verify and confirm. The use of deception is not uncommon in social media, particularly in online dating, where users commonly embellish information about height, weight and physical appearance in order to appear more desirable, as revealed by Hancock et al, (2007). Online

impression management can, whether through location sharing or otherwise, blur the distinction between the real and ideal self (Manago et al, 2008).

Having said that, these results do not suggest that location sharing is driven by a self-centred, narcissistic desire to construct far-fetched idealised images. Indeed, most identities projected through digital location may very well be genuine, authentic portrayals of personality and character. Further, impression management is not exclusive to online spaces, but rather a pervasive part of offline social interaction, as posited by Goffman, (1959). Although perhaps in more subtle form, offline interactions can include those that are performed to create favourable impressions with others. Digital environments, including location sharing systems, are simply platforms to exhibit this behaviour online to a potentially broader audience — if the desire and intent exist. Just as offline behaviour can be influenced by a perception of who might be physically spectating (Dalsgaard & Hansen, 2008), the virtual audience and the potential for online spectators can impact what is shared and how.

8.5 WHAT IS THE IMPACT OF TARGETED SHARING, BASED ON FACETS OF IDENTITY, ON LOCATION SHARING BEHAVIOUR?

This research aim was distilled into four, study specific research questions:

Q1: What is the impact of targeted sharing, based on facets of identity, on the number of locations users share?

Q2. What is the impact of targeted sharing, based facets of identity, on the types of places people share?

Q3. How effective are targeted sharing and broadcast sharing in enabling self-expression?

Q4. By introducing targeted sharing, can we reduce anxieties about location being misinterpreted?

Fig 8.2 depicts a summary of the main findings of the study, highlighting the advantages and disadvantages of sharing location according to the two different models.

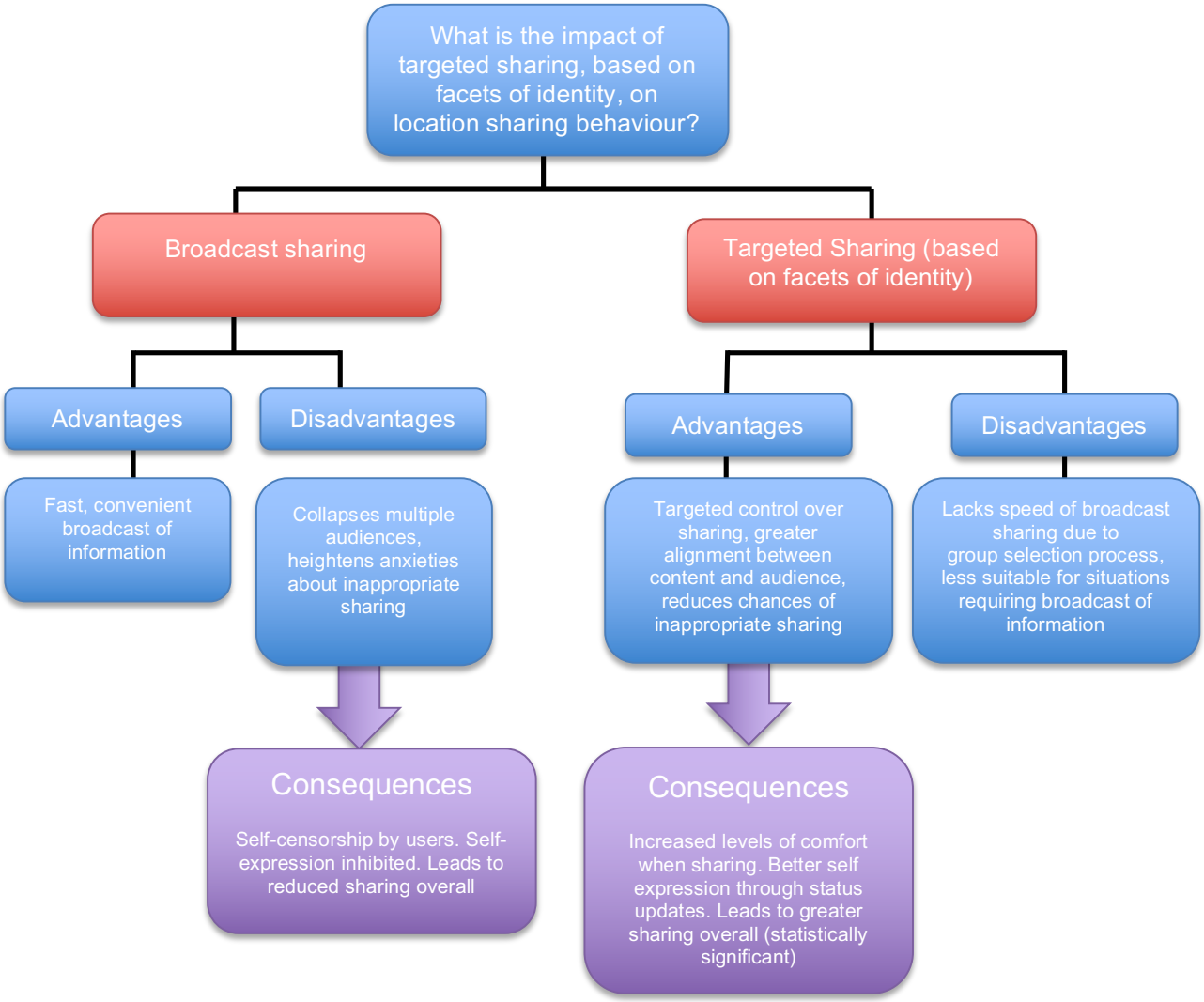

Fig 8.2: Summary of results from study 2 highlighting the advantages and disadvantages of broadcast and targeted sharing models

8.5.1 Conclusions from study 2

The second study sought to address the tensions in identity management discovered in study 1. It did so by experimenting with an alternative form of sharing location that recognised the notion of a faceted identity. Research in sociology indicates that individual-level social identity is role-based, with each role carrying different modes of behaviour. The intent behind the software was to try to model technology design

around the role-based boundaries exhibited offline. It took a very egocentric approach by organising the audience based on the typical life facets (Ozenc & Farnham, 2011) of the individual user. By doing so, the objective was also to align the audience more closely with the nature of the content being shared, thereby mitigating anxieties around unintended sharing.

In social networks, digital location is typically shared using the broadcast sharing model. As the name suggests, users essentially 'broadcast' their location to a potentially vast and diverse audience. This model is problematic because rather than appreciating the concept of multi-faceted identities, it assumes that users have a singular, unified identity that fits all situations (Farnham & Churchill, 2011). It also leaves users with two disparate choices: either to share to everyone or sharing nothing at all.

This 'all or nothing' approach can heighten concerns about sharing as a whole. In the second study, when using the Locshare app and broadcasting their location, participants consistently reported tensions about sharing to a diverse audience that had a mixture of different people, with each having a different relationship with the user (Fig 8.2). They felt restricted and experienced challenges in sharing content that was both relevant and suitable to one homogenous group of people. Participants also felt inhibited in terms of self-expression, having to 'tone' down their language to make it appropriate to their audience. This resulted in users sharing less in order to avoid unintended repercussions. As one participant remarked, if content is deemed inappropriate for only a minority of contacts, it is a compelling reason to simply not share at all.

This tension and hesitancy is not surprising considering how differently communication takes place offline. As Boyd, (2002) posits, offline social interactions involve situational and interpersonal contexts. To present an appropriate face, people take situational cues from the environment to ascertain what is considered appropriate behaviour in that setting (e.g. a party vs. office). Simultaneously, they also read interpersonal cues, evaluating the behaviour and self-presentation of others in order to determine their own behaviour in a given context. Based on this information, they engage in varying levels of communication. Some conversations are reserved for private spaces (e.g. at home, in the presence of close friends), others are tied to particular contexts (e.g. candid talk in social settings, professional behaviour at work) and some are suitable for public announcements (e.g.

announcing an engagement). The broadcast sharing model, rather than appreciating the dynamics of contextual behaviour, almost forces all information to be broadcasted as a public announcement. This situation can significantly increase the risks of unintended sharing. If this model was replicated in offline interactions, it is safe to assume that it would be somewhat chaotic. Yet in social media, it seems to be the norm. In constructing platforms that facilitate information sharing, technology designers might have overlooked the more intricate components of social communication. This has resulted in online communication being wholly different, and potentially more perilous, than offline interactions. In online spaces, people might communicate this way not because it is the right way to do so, but because, for a long time, it has been the only way to do so.

Further, the sheer size of the online audience is something very difficult to truly appreciate and comprehend. It is not necessarily restricted to the people seen in a friends list. Information shared online is potentially viewable by many layers of different audiences (e.g. friends of friends in Facebook) and because it is on the web, can potentially be accessed by unwanted parties (e.g. advertising agencies) and those with more sinister motives. Faced with this situation, users have to imagine their audience (Marwick & Boyd, 2010), and play a precarious guessing game in determining what content is appropriate and what is not. This perhaps explains why, when using the Locshare app, users felt inhibited and apprehensive because of a need to “please” everyone, as one participant remarked. Compelling users to broadcast their content every time they wish to communicate online is troublesome, awkward, and quite frankly, unnatural. This problem is exacerbated in location sharing systems, particularly in cases of plausible deniability because present location is shared alongside status updates. This makes users more accountable in situations where the information might reach the wrong audience.

By introducing an alternative method of sharing location that recognised multi-faceted identity, the objective was to mitigate some of the problematic issues of unrestricted broadcast sharing. Quantitative results revealed that users shared more locations overall with the FacetID app. No significant results were found between the types of locations shared (i.e. social v professional v family). In qualitative interviews, users welcomed the transparency and flexibility of being able to target their content to particular groups. They felt that the app offered greater clarity because their phone contacts, by virtue of being segmented according to facets of identity, made them more aware of the audience being shared to. This environment ultimately made

users feel more comfortable when sharing their location. Participants expressed advantages in being able to target messages “to the audience best suited to it” and having the option to “send what you wanted to who you wanted” which made the sharing process “much easier”. This level of comfort also enhanced self-expression in comparison to broadcast sharing, resulting in users being more “open” and “free” when sharing. Users could also communicate in a way that was most suitable to the context. They expressed the advantage of being able to “adjust” their tone depending on the audience; not having to “overthink” messages; being able to use “loose type” language; being as “casual” as required and therefore conveying more of their “truer self”.

By designing software that reflects the personal boundaries maintained offline, users’ privacy concerns may also be mitigated. As Page, (2012) found, many privacy concerns are connected with users’ desire for offline boundary preservation. They argue that human relationships are subject to change; for example, acquaintances can become friends while close contacts can become distant. People’s sharing habits, therefore, reflect this change; what was once appropriate for someone might suddenly become unsuitable. The life facet approach enables users to segment their audience according to the boundaries maintained offline. This gives users more control over their sharing; sharing can be targeted to particular groups of people, according to the life facet currently active, rather than broadcasting information to multiple audiences that might disrupt offline relationships.

Having said that, the particular life facets used in the second study (i.e. social, professional, family) are certainly not all encompassing. While they provide a basic structure in which to organise online audiences, the idiosyncrasies of users mean that there will inevitably be situations that fall outside their scope. As participants pointed out, the life facets do not consider tie-strength. Human relationships, like friendships for example, can vary along a continuum — with some people closer than others. This variation may impact what is shared. Mechanisms that help users define tie-strength is a possible avenue for future work. Similarly, participants also suggested adding functionality to create sub-groups, particularly based on hobbies and interests. Any further groups might be more idiosyncratic but a greater level of customisation might aid in reflecting a user’s life more closely.

Although broadcast and targeted sharing are different models for communicating location, they are not mutually exclusive. There might be many occasions when

broadcasting one's location is suitable; indeed, the popularity of platforms like Twitter is a case in point. However, there are many situations, as both study 1 and 2 have demonstrated, when it is not sufficient and even perilous. The faceted identity model perhaps occupies the middle ground between oversharing and not sharing at all. Future platforms should leverage the strengths of both approaches, enabling users to broadcast their location for when the need arises, while offering options for selective, targeted sharing — particularly based on facets of identity — for when the situation is more appropriate.

8.6 HOW ARE DIFFERENT LOCATION SHARING SCENARIOS COGNITIVELY PERCEIVED AND INTERPRETED AND WHAT ARE THE SPECIFIC AUDIENCES ASSOCIATED WITH THEM?

The final research aim was comprised of four research questions:

Q1. How are different types of location sharing scenarios cognitively perceived and interpreted?

Q2. What are the specific audiences associated with different types of location sharing scenarios?

Q3. What are the reasons/motivations for sharing different types of location sharing scenarios?

Q4. What are the reasons for not sharing in different types of location sharing scenarios?

8.6.1 Conclusions from study 3

The final study investigated how certain location sharing situations are perceived, how users make sense of them, and how they distinguish one scenario from another. As seen in Fig 8.3, some scenarios, such as social situations, were perceived as involving interaction with others whilst others, such as work situations, were considered more solitary. Related to interaction was the sense of fun and enjoyment, with social scenarios again being perceived as fun in comparison to others. The concept of time was an interesting distinction; work scenarios signified the restriction of freedom and a commitment to fulfil work obligations, as opposed to scenarios outside of work in which time is under one's control, or in other words, part of one's

'free time'. Family related scenarios were deemed to be distinct from others because of their family-oriented context and signified privacy and intimacy.

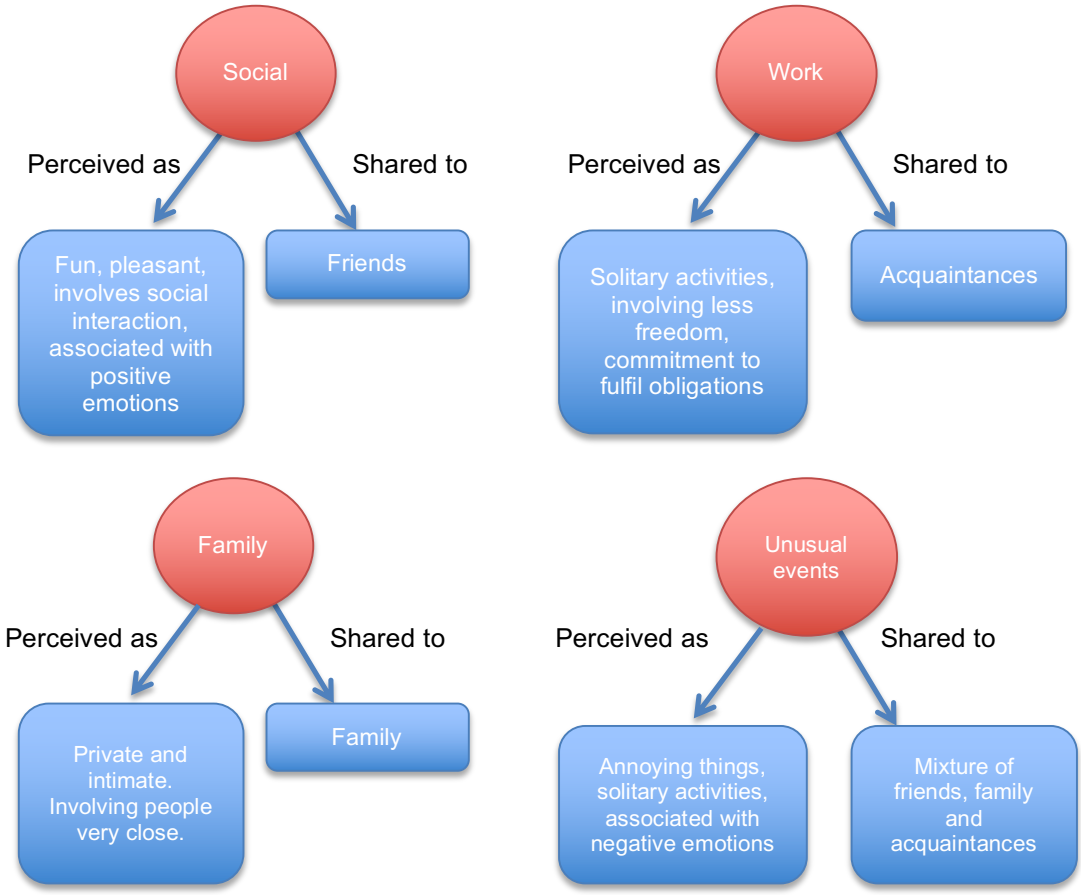

Fig 8.3: Illustration of how scenarios were perceived and the audience 'most likely' to be shared to

These perceptions are perhaps not dissimilar from how social interactions might be perceived offline. Although the scenarios represented location sharing situations, they took place in a real world context. Therefore, conceptually, the digital component of location sharing cannot be separated from the physical context in which it is shared. Location sharing, as an action, emanates and emerges from physical space that has its own environment, places and characters. Thus, it is just as much part of the location sharing process as is the digital form in which it is conveyed; indeed, without it, that digital form is void of any meaning.

The study also revealed the particular audiences to which different scenarios are likely to be shared (Fig 8.3). For some scenarios, the audience selection was quite predictable; social scenarios were mainly shared to friends; work scenarios to acquaintances; and family scenarios to family members. However, one scenario,

which represented a social event organised at work, deviated from this pattern. Although it was largely rated as a social scenario, it was shared to a professional audience. While this might be obvious considering the context in which it takes place, it does suggest that audience selection is not primarily dependent on the environment nor the particular life facet to which the situation might be associated. Rather, users carefully consider the context and the relevancy of their content (to their audience) before deciding on whom to share with.

Indeed, interview responses revealed 'relevancy of content' as a consistent reason for deciding whether or not to share location. Unlike deliberate attempts to project one's identity on to others, participants ensured that their content was related to their audience in some way. This suggests that participants were careful to avoid sharing content that might be perceived as extraneous, unwanted information. Similarly, in situations potentially detrimental to self-image, participants were concerned about not creating the wrong impression in the minds of certain others. This was particularly the case with scenarios that involved drinking, with inadvertent sharing to acquaintances and family causing the most concern. This demonstrates, similar to the findings of studies 1 and 2, that participants are perturbed about the consequences of unintended sharing. If content is deemed irrelevant or potentially threatening to self-image, it is simply not shared at all. Having said that, despite the precautions, there are some situations that can unintentionally 'slip through the net', causing much anguish, as Wang et al, (2011) and Patil et al, (2012b) discovered.

Although the relevancy of content is an important consideration when selecting audience, the particular goals and motivations of the user at the time of sharing is perhaps most salient. As depicted in Fig 8.4, these motivations shift and change, thereby impacting what content is shared and to whom. In some social situations, such as partying or clubbing, the primary goal is to seek fun and enjoyment. This overarching objective supersedes other factors such as tie-strength, with those most conducive to achieving this goal selected over others. In other social scenarios, such as an evening drink after work, the goal shifts to a desire for relaxation. Tie-strength is now considered in the audience selection process, with very specific people chosen that one can relax and unwind with. Further still, in social situations that take place in a work context (i.e. experienced with work colleagues), the goal is now very much career-oriented which is why, despite presence in a social environment, the scenario is likely shared to acquaintances or work related contacts. In family scenarios, the desire for privacy and intimacy means that users are very selective

about their audience. Finally, in situations that are potentially embarrassing or involve the exchange of sensitive information (e.g. health-related), the level of trust (with the recipient) is also considered alongside tie-strength.

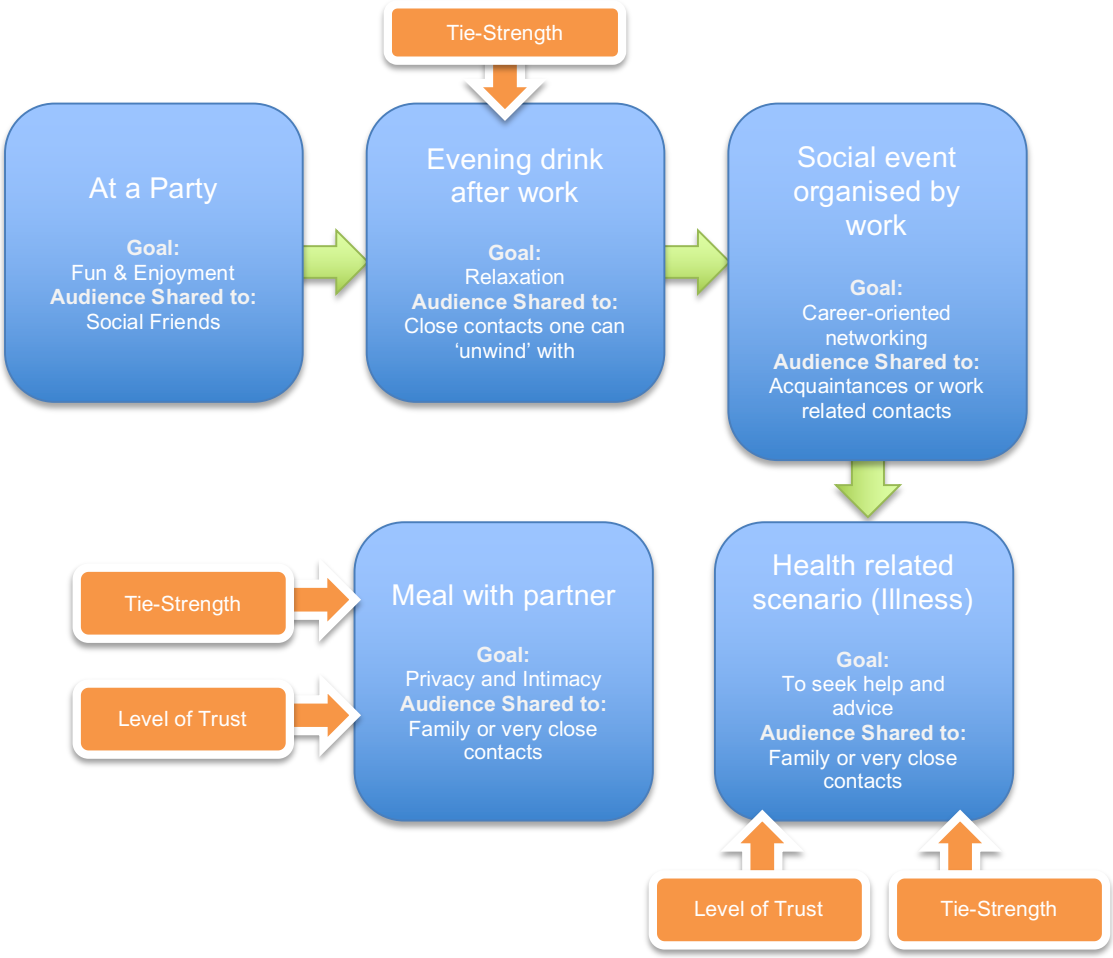

Fig 8.4: How goals and motivations change from scenario to scenario and how this impacts location sharing decisions

In relation to tie-strength, Wiese et al, (2011) found that self-reported closeness is the strongest indicator of willingness to share location — even greater than life facets. They observe that the ability to define tie-strength is a possible method for aiding privacy controls. For example, they suggest incorporating tiered rules by restricting location information depending on closeness; only enabling access to either close friends (high strength), medium-close (medium strength) or weak ties (low strength). This approach seems a plausible method for managing privacy in systems that involve constant location broadcast. However, in self-reporting systems, where sharing is explicitly initiated by the user, it does not factor in the motivations of

the user, the relevancy of content, and the context of the situation. As has been explained, these are salient factors influencing location sharing decisions. Sharing location in order to invite others to a night club, for example, might be prompted by a desire to have fun. In this situation, sharing to only weak ties might cast the net as wide as possible, but the information might still reach an audience that is not appropriate or suitable for that particular goal. The lack of relevancy might also lead to unintended consequences if it is deemed inappropriate to parts of the audience. Tie-strength alone, therefore, may not always be an adequate mechanism for controlling the sharing of location. That said, the explicit definition of tie-strength could be used to augment life facet circles, by either defining closeness at group level or within nested groups inside top-level group definitions. This could add an extra layer of detail to life facet circles, and be a further representation of offline social behaviour.

The results of the final study illustrate that the act of sharing location involves the interplay of many different factors that all impact location sharing decisions. Users carefully consider the relevancy of their content and how it might be perceived by their audience. They share content that might help maintain or enhance particular relationships and avoid sharing information that might be detrimental to self-image. Tie-strength is also a factor, but is very much dependent on the particular goals and motivations of the user.

Further, a user's social network consists of many intricate relationships. Content shared to one group might be entirely unsuitable to another. Even within a particular circle, such as a friends group, the type of people selected can vary considerably and is again tied to what the user wishes to achieve by their location sharing activity. It would therefore be unwise to assume that contacts in a specific social circle are part of one homogenous group in which every individual is treated the same.

8.7 OVERALL CONCLUSIONS

The overall aim of this thesis was to investigate the influence of social identity when digitally sharing location. The thesis began by first exploring how the self is constructed in the offline world, unpacking how people present themselves in everyday social interactions. Through three research studies, it investigated how facets of offline social behaviour, in our case those pertaining to individual-level

social identity, are manifested in the digital sharing of location. Through this process, the aim of research was to inform the design of future location sharing systems.

Past research such as Tang et al, (2010) argue that location sharing has transformed from being purpose-driven, that which is done in response to specific location requests, to social-driven, that which is done to achieve socially-oriented goals and objectives. Systems like Foursquare, and more recently Facebook and Twitter allow users to self-report their whereabouts, changing location sharing from a largely passive activity, to a goal-seeking, objective-led active one. Location sharing systems, by virtue of being integrated into social networks, have also given users access to a potentially boundless audience. This has radically changed the dynamics of location sharing behaviour. Just as people in the offline world engage in self-presentation techniques, selectively revealing parts of themselves in order to present their best 'face' in any situation, people use social networking to put their 'best foot forward'. However, the absence of the physical body, coupled with features that enable information to be globally disseminated almost effortlessly, means that this behaviour is significantly amplified online.

Using Goffman's dramaturgical metaphor, location sharing, in addition to being a means of conveying one's authentic self, can also be used to craft particular impressions in the minds of others, whether real or idealised. Places, as well as people and objects carry certain perceptions — some might be perceived as prestigious and desirable, others more mundane and everyday. This research has revealed that users can exploit the particular perceptions of place to sometimes enhance self-presentation and at other times, preserve and maintain established self-images.

Moreover, this research has consistently found that location sharing is a means of conveying and projecting the self. Similar to the findings of Barkhuus et al, (2008), location sharing is a way of communicating lifestyle, activities, personality and character. As Dourish et al, (2007) posit, places and environments are given life and meaning by the people that inhabit them. Users actively share different locations to their audience in order to project the various facets of their identity, thereby imbuing those places with life, meaning and character. Identity has a strong relationship with place; it can influence the types of locations shared and those locations, in turn, can reflect a person's individuality, revealing much about their likes, interests and movements.

Having said that, this thesis has also found that sharing physical place is a means to a goal, and not the goal itself. Although physical place can provide the context for social disclosure, what is actually conveyed is everything related to the self. What users seek in most location sharing situations are opportunities for projecting the self via a location-based digital medium, and through that process, connect with others in a social network. As one participant, when referring to the purpose behind location sharing, articulated quite eloquently, "*The human need to belong to a group, and feel there are others we are connected to regardless of the medium.*" What is desired at a fundamental level, then, is human communication and connection, the very bedrock of social interaction. In fact, evidence for this phenomenon was found consistently throughout the research. Location was communicated primarily through moods, emotions, activities, stories and experiences. In study 2, location names and status updates were used to convey humour, quirkiness, witty remarks and personality. Physical locations merely provided the backdrop for this process to take place. The act of sharing location was prompted and motivated by socially-oriented goals and was comprised of all the socially-centric components necessary to achieve that goal.

On this note, the advent of check-in systems has contributed to the widespread adoption of location-based social networking, particularly in the smartphone market. The ability for users to self-report their location status to an online audience has opened up a world of opportunities for new interactions and experiences. Yet, the findings of this research suggest that, when social networking, the objective is not place discovery per se, but rather in how location can be exploited to socially connect with others. This suggests that the immediate future of location-based social networking may lie not in place discovery, but in people discovery. The widespread success of dating apps such as Tinder have demonstrated the lucrative potential of this emerging market. Such apps focus on using location based services to discover not places, but people. Indeed, it is in the discovery of people where perhaps the potential for social benefit and reward might be at its highest. As Roback & Wakefield, (2013) postulate, it is the pursuit of social reward that drives the continued use of social networking technologies. Shifting focus from places to people might maximise the chances of attaining that reward, further enhancing location-based social interaction and potentially increasing the adoption of location based services even further.

In researching social identity and offline social behaviour, it was discovered that facets of this behaviour have not been replicated well in the online world. Location

sharing software predominantly requires users to broadcast their location to an online audience. It is a model that overlooks some of the key components of offline social interaction including multi-faceted identities, context-specific behaviour and the heterogeneity of human relationships. This results in tensions when trying to manage facets of identity and heightens anxieties about inappropriate sharing. While in the physicality of the offline world, people subconsciously maintain contextual boundaries, the lack of feedback derived from physical interactions means that, in the online world, users must anticipate and imagine the reactions of their audience. In this situation, they can either get the balance and tone right — resulting in social benefit — or get it wrong, potentially resulting in serious consequences. Study 2, in particular, illustrated the benefits of modelling software design on how people typically behave offline. Thus, technology designers should focus not just on creating opportunities for new interactions and experiences, but also in understanding how offline social behaviour can be best accommodated in social networking environments.

8.8 IMPLICATIONS FOR DESIGN

This research has found that social identity is strongly exhibited through digital location sharing. It suggests that location-based social networking is an activity that is less about place discovery, and more about using physical space to convey identity and socially communicate with others. Although physical location can provide the backdrop and context to digital social interactions, it is ultimately the opportunity to communicate and converse with others, through projection of the self, that users are primarily concerned with. The check-in model, while clearly demonstrating the benefits of self-reported location disclosure, is primarily built on the discovery of place and not social networking. Physically checking in to a location comes *first,* and is only *then* followed by social networking features, which offer possible ways of sharing that place with others. Mayorships, badges and monetary rewards are offered only for physical presence in a location and not social networking, again indicating the primary goals of location sharing apps. In other words, social sharing is there to mainly augment and increase the appeal of place discovery. However, designers should perhaps look at re-ordering this process so that social networking is made central. Efforts could then be focused on how the sharing of place can be used to enhance digital social interactions and not vice versa.

To this end, social interaction, particularly through mobile devices, tends to be short and episodic. Novel ways of capturing transient, fleeting moments of significance and easily sharing that to a social network is a step in that direction. Similarly, software designs that facilitate the projection of the self, such as new ways of communicating moods, activities, events, and stories to others beyond text and images, might be welcomed by location sharing users.

Further, since the results of this thesis suggest that users are primarily motivated by a need for social connection, design efforts could be shifted from place discovery to people discovery. This opens opportunities for direct person-to-person communication rather then that done through the medium of physical location. This could increase the likelihood of users deriving fun and enjoyment through software use, which as Roback & Wakefield, (2013) discovered, drives the continued use of social networking technology. The widespread success of Tinder has clearly demonstrated what is possible in this arena. However, this potential is not limited to online dating apps. Rather, users could be matched based on many different criteria such as background, events of childhood (e.g. having attended similar schools, colleges etc.) and hobbies and interests — from the most common to the most eccentric.

Although impression management, in the sense of enhancing self-presentation, is not the primary motivation behind location sharing, this thesis has uncovered enough evidence to suggest that it is a very real phenomenon in location sharing systems. Therefore, there are perhaps opportunities to design software that specifically accommodates this behaviour by enabling the potential enhancement of self-presentation through location-based mechanisms. While the likely controversy of such designs might inhibit mainstream adoption, there may still be scope to occupy a niche market.

With the potential pitfalls of broadcast sharing, design efforts should also be directed toward mechanisms for identity management. As the second study discovered, software design that recognises multi-faceted identities can reduce the risk of unintended sharing, enhance user experience, and create an environment in which users feel more comfortable sharing their location. This environment can lead to more openness in self-expression and result in an increase in sharing overall. In contrast, the ‘share all or nothing’ approach of broadcast sharing leaves users compelled to make one of two very disparate choices. A third option that enables

users to target their sharing to specific audiences, particularly based on facets of identity, is a possible method of accommodating personal boundaries as well as mitigating the risks of inappropriate sharing. To reduce such risks even further, automatic conflict detection mechanisms could be designed that alert the user when a potential mismatch between the nature of the content and the audience is detected. This can help avoid unintentional sharing particularly in states of heightened emotion. Currently, the gap between online communication and how offline interactions take place seems to be a large one. What is intended by this particular discourse is that, in the zeal of creating new experiences that are driven by a desire for novelty and ingenuity, software designs should not overlook the more fundamental components of offline social behaviour. Forgoing this endeavour might lead to an impediment of user experience rather than its enhancement.

The motivations behind location sharing are dynamic — shifting and changing depending on the situation. As these goals change, so too do users selection of audience. As this thesis has uncovered, a top-level friends list, for example, does not reflect the diversity between different types of friends. Some friends are those that are specifically socialised with, some are appropriate for other activities. This dichotomy could be represented by enabling users to customise their social circles according to the nature and purpose of the relationship. As previously mentioned, this feature might work well within the definition of facets of identity, in order to provide top-level organisation to potentially idiosyncratic circles, and to ensure sharing is done from an egocentric perspective based on the life of the individual user.

Similarly, location sharing software could be designed that is more aware of user motivations and particular contexts. Through algorithms, software could learn from typical user behaviour and make recommendations based on the context of the location. For example, when at a party, recommendations could be made about potential invites, not just based on proximity, but also on past goals and behaviour. This might aid in making location sharing software more contextually aware of users' actions.

Finally, the ability to define tie-strength is another feature that might aid in managing social circles. Friendships, professional contacts, and even family relationships are not homogenous. Thus, being able to organise contacts based on the strength of one's relationships is another way of representing offline interactions more closely.

Such features could, again, be used to augment and add a further layer of definition to life facet circles. This design feature could particularly aid in situations that involve the sharing of sensitive information (e.g. embarrassing content, health-related information) by, in that case, restricting sharing to only the extreme end of the tie-strength spectrum; in other words, to only those considered very close and trustworthy.

8.9 LIMITATIONS

The research undertaken in this thesis has several limitations that should be considered. Firstly, studies 1 and 3 are self-reporting which means that they only probed users' perceived behaviour and are therefore not representative of actual behaviour in a real world setting. The first study, for example, only explored attitudes toward location sharing. The third study, in ascertaining the audiences associated with different scenarios, only investigated the *likely* contacts in a given scenario. This meant that participants, under reasonably strict experimental conditions, had to imagine themselves in each scenario and articulate the likelihood of selecting certain people. This procedure, in and of itself, may not necessarily represent actual user behaviour when placed in a real-world situation. As Barkhuus, (2004) discovered, there can sometimes be a dichotomy between users' perceived attitudes and their behaviour when using technology in the real-world. Thus, variations in results may be observed if the studies are repeated 'in the wild'.

The samples recruited in studies 2 and 3 were primarily from a university population. This was because the research took place in an academic setting which enabled quick and convenient access to an academic population. The studies may need to be repeated with a wider user base for them to be applicable and generalizable to a broader population.

Further, user interviews were all conducted by the researcher, largely in a face-to-face format. While every attempt was made to maintain impartiality, the very presence of the researcher may have impacted any responses given. Moreover, all interviews, including open-ended responses in study 1, were analysed using qualitative analysis techniques. Although such techniques provide a strong framework for deriving meaning from qualitative data, the results are nonetheless subjective and do not have the statistical rigour of quantitative analyses.

The second study, being an experiment ‘in the wild’, was conducted under specific experimental conditions. Participants were required to share location a minimum of 2-3 times a day and were sent reminders to do so. The minimum requirement was stipulated to ensure regular use and mitigate the risks of non-participation. It is also, arguably, a number that would constitute regular usage in actual location sharing platforms. That said, the absence of this stipulation might have an impact on results.

In addition, the apps shared location via SMS, which one could argue, is unconventional. However, this was done to increase generalizability. Sending location via a Facebook post or Tweet, for example, would have restricted the sample to only users of that particular platform. SMS texts, by virtue of being accessible from almost any mobile phone, ensured neutrality from this standpoint. Nonetheless, the method was used only for the purposes of the study and is not representative of how location is shared in conventional location sharing systems.

Users were also aware that all locations shared, including status updates, were being recorded and monitored. This knowledge might have impacted their behaviour and thus, may not be a reflection of user behaviour outside of such conditions. Usage was also observed for only 14 days which is a small snapshot of their location sharing activity. More longitudinal studies might be necessary to attain more reliable results.

Finally, the repertory grid exercise used scenarios based on the typical locations shared in study 2. Further context was added as necessary to aid familiarity. The final scenarios were therefore very specific representations of location sharing situations. Thus, while the results probe how such situations might be perceived, they are nonetheless specific to those scenarios. The study may have to be repeated with different scenarios in order to increase scope and reliability.

8.10 FUTURE WORK

There is scope for future work. Although the faceted identity model has benefits for identity management, it is only a basic framework in which to organise audiences. Further enhancements could be made through the representation of sub-facets and definitions of tie-strength within particular life-facets. Moreover, rather than using SMS location updates, the model could be built into existing platforms such as Twitter and Facebook. It could then be deployed more longitudinally to assess the impact on results.

Similarly, sharing location based on facets of identity has yet to be tested alongside other methods such as Google circles. Both offer ways to target sharing. Similar to the second study, it would be interesting to compare both these methods and analyse their impact on location sharing behaviour.

The third study revealed how certain scenarios were associated with positive moods and experiences whilst others were perceived as negative and even annoying. An interesting direction for further study is to understand the particular emotions that prompt the sharing of location. That is, what specific emotions (positive and negative) are more likely to prompt people to share? Further, how does the content shared differ depending on the emotion that triggered it (i.e. positive v negative)? Such research might aid in the development of location sharing systems that are more contextually aware.

8.11 CLOSING REMARKS

When hearing the term ‘location sharing’, what often comes to mind is the communication of physical place. This thesis, however, has revealed that it is much more than finding our way through physical spaces. It is an effective means of social networking and interacting with others. Through their location, people actively project many facets of the self — personality, character, humour, and lifestyle. In this sense, social identity not only influences digital location sharing, but in the world of social media, is the very driving force behind the phenomenon. Human beings, as social creatures, have an inherent, immutable desire to communicate and connect with each other. Social technologies merely provide the framework and tools for that to take place on a grander stage. By sharing one’s location, the goal, then, lies not in the place itself, but in how it can be used in the unquestionably human endeavour to know one another.

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APPENDIX A
Study 1 User Survey

In the following section, please indicate the extent to which you agree (or disagree) with the statements. For statements with which you neither agree nor disagree please select neutral. There are 5 possible answers, starting with **strongly agree** and ending with **strongly disagree**. Please choose one that applies most to each statement.

I feel that my location is a representation of my identity (who I am)

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a place that reflects my personality/identity, I share it with others

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I check in to or share different locations to project different aspects of my identity

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I push my 'special check-ins' or locations to Twitter, Facebook or another Social-Networking site

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I have a number of different 'personas'

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I sometimes use location-software to project different personas

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I check-in/share my location at different places to project my different personas

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I check-in to or share locations that make me appear more professional

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I check-in to or share locations that make me appear more sociable.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When sharing location, I find it difficult to manage different parts of my identity across different groups within my social-network i.e. friends, family, colleagues, acquaintances.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I feel that location sharing apps allow me to properly control my sharing across different parts of mylife e.g. family life, work life, social life etc.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a prestigious place i.e. top restaurant, bar, I want others to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I am reluctant to check-in to or share places that would make me look 'boring' to others

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I feel that location-sharing adequately helps me segment different parts of my life e.g. family life, work life, social life etc.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I do not check-in to or share locations to make me appear more professional

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If I'm at a prestigious place e.g. top restaurant, I want my **family** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If I'm at a prestigious place e.g. top restaurant, I want my **friends** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If I'm at a prestigious place e.g. top restaurant, I want my **colleagues** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If I'm at a prestigious place e.g. top restaurant, I want my **acquaintances** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If I'm at a prestigious place e.g. top restaurant, I want **everyone** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a place that I consider 'boring', I **would not** want my **family** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a place that I consider 'boring', I **would not** want my **friends** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a place that I consider 'boring', I **would not** want my **colleagues** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a place that I consider 'boring', I **would not** want my **acquaintances** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When I'm at a place that I consider 'boring', I **would not** want **anyone** to know about it

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I sometimes use my location to actively project my identity (who I am)

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When sharing location, I actively project my identity through my current activity i.e. what I am doing at the time

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When sharing my location I sometimes convey my current mood i.e. how I am feeling at the time

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When sharing my location, I sometimes express it as a story

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

When sharing location, I actively project my identity through my overall experience at the location i.e. what I'm feeling and doing at the time of sharing location

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I sometimes use my location to draw attention to myself

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

My current location e.g. check-in is an accurate reflection of exactly where I am at the time

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

If I'm near a prestigious place, I check-in or share my location even though I'm not physically there

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I'd go to a prestigious place just to check-in or share that location

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strong Disagree

I am conscious about how my location is read and interpreted by others

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

I am conscious about my location being misinterpreted by members of my social network

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I sometimes use my location to increase 'my standing' in my social network

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

My location sharing decisions are influenced by who I think might be viewing my location data

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I sometimes check-in/share my location at places to suit a particular audience e.g. specific friends, colleagues etc.

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I try to obtain game-based rewards e.g. badges, mayorships to enhance my standing in my social network

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I sometimes check-in or share my location at places that would enhance my image among my social network

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

When I earn a game-based reward (e.g. badge, mayorship), I want others to know about it

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I would not check-in or share my location if I had no friends in my friends list

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I would not check-in or share my location if no one could view my check-ins

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I do not check-in to share the location of places that I consider 'boring'

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I sometimes check-in or share my location to enhance my self-presentation

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I sometimes look at friends' profiles to find out where they are or where they've been

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I do not check-in to or share locations that make me appear more sociable

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I sometimes look at the profiles of the friends of my friends (to know more about them)

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I do not mind checking-in or sharing my location in **front of other people** (physically)

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I find it awkward to check-in or share my location in front of other people (physically)

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I do not check-in or share my location at home

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I prefer to keep different parts of my life separate

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I have parts of my life that are very different from each other

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

In different situations with different people, I often act like very different persons

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I sometimes find myself in places that I only want **certain** people to know about

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

I am interested to know where others in my social-network are

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

When I earn a mayorship (e.g. in foursquare), I want others to know about it

○ Strongly Agree ○ Agree ○ Neutral
○ Disagree ○ Strongly Disagree

When at a prestigious location, I often try to be very specific about where I am

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I tailor my location to suit a particular audience within my social-network e.g. friends, colleagues etc.

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I'd go to a prestigious place just to check-in or share that location

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

I am conscious about how my check-ins (location-history) are perceived by others

◯ Strongly Agree	◯ Agree	◯ Neutral
◯ Disagree	◯ Strongly Disagree	

The following questions are optional and are not a requirement for completing the survey. Please answer them as freely and openly as you can.

Note that once you have clicked on the CONTINUE button at the bottom of each page you can not return to review or amend that page

Do you feel that your location is a part of your identity (who you are)? If so, how do you think your location is linked to your identity?

If you post your check-ins on Twitter, Facebook or another Social Networking Site, how do you convey your location to others e.g. what you're doing presently, how you feel at the time, a story or something else?

What prompts you to share your location?

Considering that location-sharing is (largely) a public platform, what strategies do you use to manage your identity across different groups within your social network i.e. friends, family, colleagues, acquaintances etc?

Do you feel that location sharing apps adequately help you segment different areas of your life e.g. family, work, social life etc? Do you find any conflicts when sharing your location in these different 'roles'?

When socialising, with whom would you not want to share your location and why?

If you were at a place that you considered prestigious, who from your social network i.e. friends, family, colleagues etc. would you want to share your location with and why?

If you were at a place that you considered 'boring', who from your social network i.e. friends, family, colleagues would you not want to share your location with and why?

Are you conscious about who views your check-ins/location-history? If so why?

Does this affect where you check-in or share your location? If so, in what way?

Which places don't you share your location and why?

Do you feel that you should have more control over who sees your location data i.e. your friends, colleagues, general public? If so in what way?

If you do not want others to view your check-ins/location-history, what do you do?

APPENDIX B
Remainder of open-ended questions from study 1 survey

What prompts users to share location?

The survey probed deeper into the reasons behind location sharing in the first place. Namely, what prompts people the share their location?

Emotions and Feelings

This was an oft-occurring theme. A number of participants expressed that certain emotions such as excitement, happiness and boredom were integral factors when deciding to share location.

For example, when asked what prompted one to share location, some participants said, "*The joy of being in a place I love", "If I'm getting good emotions e.g. enjoyment or amazement", "Because I am excited or interested by it, and want to show that off to others", "It is always with a message about my mood/how I feel".*

Other participants also remarked that they would share even in a 'boring' or mundane place if there was a particular mood or feeling they wanted to express. For example, when they felt frustration at being in a (long) queue or boredom when at a library, *"if I was bored in a long queue, for example, I suppose I could vent my frustration through a check-in", "or to make a statement about how my day is going in general i.e. if I've been sat in the library all day!".*

These findings are consistent with those of Hardy (2011) who also found that synchronizing activities and expressing moods are a popular way of conveying location.

Interesting or unusual location

For some participants, the nature of the location was significant. Interesting or unusual locations were more likely to prompt someone to share. One participant remarked "*The nature of the place, I would only share somewhere unusual, exciting or special. I would not share somewhere where I am everyday."* Another participant

noted, *"If I am somewhere special or unusual that I think somebody else might be interested to know that I'd been."*

Convey activity

For many participants, their current activity can be an appropriate prompt especially if it is something interesting or enjoyable. One respondent said *"(I would share) If I'm doing something interesting or out of the ordinary."*

Prompts can be triggered by both positive and negative experiences as one respondent observed, "*Usually if I'm somewhere exciting (i.e. travelling, eating-out, going to the movies etc.), or to make a statement about how my day is going in general i.e. if I've been sat in the library all day!"*

To convey identity, personality to others

The sharing of identity and personality with others was another prompt. One participant wrote, *"The idea of sharing your life and identity with close friends who can relate to what I'm talking about"*. Another respondent similarly remarked, *"(I would share) so people can see what I like to do."*

Location sharing can also be triggered if a location is strongly linked to personal identity or a particular habit. One participant wrote "*I would say it's when I feel I correlate strongly with the location. For example, being known as a coffee-addict, I'll always check in and share at coffee places."*

General points

The rest of the reasons did not fit into any distinct themes. Nonetheless, there were some interesting topics touched upon.

A number of participants mentioned that location sharing was simply a way of seeking attention, particularly from friends. One respondent claimed, *"I would share if I'm excited about it or want attention".* Another stated, *"Wanting to boast about it or let others know, a sense of pride."* One participant went further by mentioning the specific reason for doing so, *"I would like to be perceived as extraverted and more exciting to friends on Facebook"*

This was an interesting topic suggesting that the behaviour of others can influence personal location sharing decisions. One respondent claimed, *"(I would share) if I am with a group and someone else does it."* Another participant agreed, *"The fact that others do it too."*

Some participants used location to document travels and archive memories. One participant remarked, *"To help me document my travels on photo albums on Facebook - so that family/friends get a little bit more insight in to the trips I have been on or to remember an exact location e.g. small town I stopped in during a road trip."* Another participant stated, *"Predominantly as a location archive for my personal use. The sharing and game mechanics are a bonus."*

Sometimes location sharing can be done just to inform someone of their whereabouts. One respondent said, *"When travelling I update at times so my sister can track where I am, because she asks me to."* Another participant stated, *"The need to let a person or group of people know where I am currently."*

For some participants, there was a deeper need to somehow belong to a group and share aspects of oneself with those who care about you. One participant said, "*Just when I'm happy somewhere, I feel like sharing it with people that care about me."* One participant quite eloquently stated, *"The human need to belong to a group, and feel there are others we are connected to regardless of the medium."*

Are users conscious over who views their check-ins or location history?

Participants were also asked about whether they were conscious about who viewed their check-ins or location history. This was to understand whether this was a factor when choosing to share location.

Conscious

Screen before posting

One participant said, "*I am conscious in the way that I think about it thoroughly before I post something, asking myself 'Will it be interesting to people?'"* Another participant mentioned that they were not concerned since they screened before

posting, "*I am careful what i share so I am not concerned who views history - so I screen it before sharing."*

One participant was particularly concerned because of not knowing who is looking, "*Yes, you don't always know who is looking, so you need to be careful about how you portray yourself online."*

For privacy reasons

There were a number of privacy concerns such as personal safety and security issues.

Personal safety

One participant was concerned about unwittingly revealing when their home was empty, "*Yes. I don't want strangers or people I don't trust knowing where I am and that I am not at home."* Another participant remarked similarly, *"Yes. I wouldn't want it public as then people would know when my house was empty etc and that could be a security risk!"*

One participant was concerned about stalking, *"Yes. (About) stalkers and people I don't want in my life anymore."*

(General) privacy concerns

A number of participants were quite concerned about what could be done with personal information. One participant expressed such concerns, *"Yes. I am guarded with my personal information. I disagree with giving full addresses of homes (which I know to have happened on many occasions with friends at house parties etc.). I suppose public places aren't so bad, but I don't feel the need to keep people informed - I suppose I'm not that interesting! I don't think people care about where I am most of the time - it's quite an arrogant thing to share constantly with Facebook friends where you are, flooding news feeds with pointless details."* Another participant similarly stated, "*Yes. But I'm also interested about what can be done with that history. I am concerned that others may have more location-history that I do myself."*

Not conscious

A number of participants were not conscious of who viewed their history, mostly because they had no way of knowing who viewed it in the first place.

Share only with friends

Some respondents mentioned that their sharing is mainly with friends. One participant said that they would not be on their friends list if this was an issue, *"I would not have them on Facebook if I did not want them to know/conscious about what they would think."*

Only share interesting places

For some participants, the content of their posts was important. These users shared content that was deemed 'interesting' and hence were not concerned about negative implications. One participant said, "*No, I only ever share my check-in status if I am somewhere interesting and want people to know about it."*

Some participants were simply not concerned with location history because they felt it was not an accurate judge of character or personality. One participant said, *"No because I do not feel I am hiding anything from anyone and it is not an accurate judge of character anyway."*

What places do people not share their location and why?

As part of the research, we also asked participants about particular places that they would not share their location.

Private, personal locations

As with previous research, Lindqvist et al, (2011), private places were less likely to be shared. One participant mentioned, "*Anything that I consider to reveal personal information – that's private."* Another participant said, *"I tend to hold back with the Workplace, only because I've already done it a couple of times. I certainly stop short of checking in at Home. That's never a good idea."*

Additionally, health related places were also private with many choosing not to alarm others. One participant remarked, *"Hospital/Doctors – this is very personal and you wouldn't want to raise unnecessary concerns around friends."*

Boring, mundane places

Boring, mundane places were less likely to be shared for impression management and simply because they are of no interest. One participant mentioned, *"Boring places e.g. my/room/random restaurant/fast food shop/less branded clothes stores."* Another participant said, *"Home, work, gym, dentist, supermarket etc.. it's boring, everybody visits those places every day.. nobody cares!"*

Embarrassing places

Certain embarrassing place were also not shared. One participant said, *"If I was at some dodgy venue, then I wouldn't share that either, as I mentioned above, I probably wouldn't even tell friends about that in person."* Another participant said, *"Any time I visit an adult-entertainment venue I wouldn't share because this is frowned upon."*

Segmentation of life

A number of participants said that they specifically do not share at certain places to segment different areas of their life. One participant stated, *"When I am with my boyfriend. I do not share this because it is best to keep intimate parts of your life private."* Another participant said*, "(Would not share) social events to family for separation of private and family life."*

APPENDIX C
Remainder of interview questions from study 2

User feedback on how apps can be improved

Locshare

Lacking groupings

One participant said that Locshare is missing what FacetID has,

"I think that what your first app (Locshare) is missing is what your second app has (FacetID)!"

"Not being able to target your group is a disadvantage of Locshare. That's the reason why I didn't use it very often."

"I mean on Facebook you can actually make groups but it's just a lot of work and effort and you just can't be bothered to do it to be honest."

FacetID

Add sub groups

Quite a few participants said that although they appreciated targeted sharing, the ability to add sub-groups was missing.

"You could have give the option of detecting your GPS location (like Facebook) or you could type it. Also the groups could be split up into sub-groups as I've said before"

"I think adding your own labels to a group of people would add a sense of personalisation. This could encourage the user to interact with the app a lot more, in a comfortable manner."

"More categories within groups. The top-level groups work pretty well. I guess you could have a misc. category that doesn't fit anything else...for example "ex-

girlfriends" but I guess that could also go into social. For professional you could have university or other job. You could also have temporary category I guess for something that was only applicable for a certain time."

APPENDIX D
Original scenarios from study 3

1.
It's a Friday night. You're at a party with close friends. It's a real blast and you're having lots of fun!

2.
It's the end of the work day. You and a few colleagues go to a social event organised by the company.

3.
It's the weekend and the weather is hot. You decide you could do with some new clothes. You're out shopping on the high street with friends.

4.
It's mid-afternoon. You're at work busy working at your desk. You get a 10 min break.

5.
It's lunchtime. You and your colleagues head over to the café for lunch.

6.
After a great night out, it's the morning. You've overslept and you're still in bed when you should be at work.

7.
You've come back from work. It's late in the evening. You're having a drink with friends.

8.
It's the morning and you're at the bus station waiting for the bus. The bus is running late.

9.
It's a weekday evening. You decide to treat your partner to a meal outside. You're at a fancy restaurant enjoying a delicious meal with your partner.

10.
It's a manic Monday. The groceries are running low and you're out shopping for weekly groceries in your local supermarket.

11.
It's a weekday. You're watching evening telly with your family.

12.
You've fallen ill with the flu. You decide to book an appointment to see your local doctor. You're in the doctor's surgery waiting to be seen.