Managing Mobility in Practice: Empirical Studies of the Everyday Practices and Technology Use of Film and Television Freelancers

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Certificate of Authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

I dedicate this thesis to the two boys I hold very dear to my heart, my husband Rob and my son Griffin.

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> Let us therefore say rather, borrowing a term from other works, that the life of consciousness – cognitive life, the life of desire or perceptual life – is subtended by an 'intentional arc' which projects round about us our past, our future, our human setting, our physical, ideological and moral situation, or rather which results in our being situated in all these respects. It is this intentional arc which brings about the unity of the senses, of intelligence, of sensibility and mobility. (Merleau-Ponty 1962, p.157)

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Glossary of Terms:

ACM	Association for computing machinery
AI	Artificial intelligence
Caller ID	Caller identification
CSCW	Computer Supported Cooperative Work
DOP	Director of photography
HCI	Human-Computer Interaction
ICTs	Information-communication technologies
ID	Interaction Design
IDHuP	Interaction Design and Human Practice Laboratory, UTS
IJHCS	*International Journal of Human Computer Studies*
IM	Instant messaging
NVivo	NUD*IST Vivo
OH&S	Occupational health and safety
PD	Participatory Design
SMS	Short message service
UTS	University of Technology, Sydney

Abstract

Researchers in the fields of human computer interaction (HCI) and computer supported cooperative work (CSCW) have increasingly sought to understand the role that mobility takes in shaping people's actions and interactions via technologies. This thesis contributes to this endeavour by exploring the mobile practices and technology use of a type of mobile worker little considered within the literature: film and television freelancers. The thesis expands current understandings of mobile people and their practices by examining the freelancers':

- mobile practices in terms of physical, social and temporal dimensions;
- technology use, both mobile and fixed; and
- cross-contextual work and social practices.

The thesis's findings can assist technology designers in developing devices and applications that support the practices of mobile people.

Findings are provided from three studies of practice: a set of interviews; observation of the making of a television advertisement; and self-reporting kits with post-interviews. The analysis reveals insights into practical strategies used by freelancers to manage unpredictability in their lives. The research demonstrates the ways in which freelancers rely on stable social bases, rather than remote offices, to manage patterns of short- and long-term movements over time. The thesis argues that understanding the interplay of stability and change that shapes the technology use of mobile people is central to developing technologies to support their practices. This contrasts with a predominant focus, particularly within the mobile HCI literature, on mobility in terms of short-term travel and micro-interaction.

The research makes three key contributions to existing knowledge and understandings of mobile practices and technology use to inform design. Firstly, the thesis documents the practices and technology use of film and television freelancers. Secondly, it presents a set of conceptual tools to assist designers and researchers in 'thinking through' the ways in which people experience and manage their mobility in practice. The conceptual tools encapsulate the temporary durations of the freelancers'

involvements in and across social situations and the key uses of their technologies to manage these involvements. Thirdly, the thesis provides practical design insights in the form of design implications, personas and research design details of the self-reporting kit study. Together these contributions provide grounded insights into ways of designing technologies to enhance people's management of their mobility in practice.

Chapter 1

Introduction

In this chapter the core concerns of the thesis are introduced. The chapter begins with a background for the research. The areas within the literature that are being addressed by the research are then summarised, the research questions are presented, an overview of the research approach is provided, and the key contributions of the research are detailed. Finally, the chapter structure of the thesis is outlined to guide the reader through the detailed body of the thesis content.

This research contributes to current understandings of mobile practices and technology use within the fields of human computer interaction (HCI), mobile HCI and computer supported cooperative work (CSCW). This thesis addresses two areas. Firstly, it explores mobile practices and technology use of a type of mobile worker little considered to date within the literature: film and television freelancers. The thesis examines the ways in which the freelancers in the research achieve their mobility in practice through their actions and interactions with others. The work and social dimensions of the freelancers' experiences are studied across the cycle of the seven-day week. Rather than focusing on mobile phones alone, the thesis explores the use of technologies, both mobile and fixed, to support people in managing unpredictability in their work and social lives.

Secondly, the thesis aims to generate insights to inform the design of technologies to support mobile practices. Personas are provided to represent the different patterns of change experienced by the freelancers in the research. Empirically grounded conceptual tools are presented that encapsulate the diversity of the freelancers' management of mobility in practice. Specific implications for the design of technologies are developed from the empirical data gathered in the thesis. A description of the research design process for the self-reporting kits is included to assist other researchers in their exploration of social, personal and mobile practices. Although no actual design is attempted in this thesis, all research is oriented towards grounding and informing the design process. The central purpose of the thesis is to assist technology designers in developing devices and applications that support the practices of mobile people.

The remainder of this chapter outlines the contributions of the thesis to the fields of HCI, mobile HCI and CSCW, including a background to the research and an overview of the research questions and processes that form the content of the thesis.

1.1 Research Questions

An essential characteristic of modern living is the increasing mobilisation of human interaction (Kakihara & Sorensen 2002) and the emergence of new forms of mobility, both physical and social. People are able to travel quickly across large distances, and at the same time technologies such as mobile phones and the internet are enabling interactions from afar that were previously carried out through face-to-face contact (Pooley, Turnbull & Adams 2006). With the increasing popularity of a widening range of mobile devices, services and software, it is our ability to communicate wherever we are that has played a significant role in changing patterns of social interactions with others. As a result, understanding the role that mobility takes in shaping people's actions and interactions with others via technologies has been increasingly examined by HCI and CSCW researchers (for example Bellotti & Bly 1996; Brewer & Dourish 2008; Fallman 2005; Kakihara & Sorensen 2002; Luff & Heath 1998; Nilsson & Hertzum 2005; Oulasvirta & Brewster 2008; Perry 2007; Shklovski 2006; Weilenmann 2003a).

Within the literature that explores mobile practices, there has been a growing recognition that existing understandings of mobile practices can be expanded to better inform HCI design. Three significant themes in the extant literature demonstrate this and are presented below (see section 2.6 for further details).

Firstly, a number of researchers have called for expansion in the types of mobile people, practices and contexts studied within the literature (see Axtell, Hislop & Whittaker 2008; Perry & Brodie 2005; Weilenmann 2003a). For example, Perry and Brodie (2005) suggest that studies of particular workers within the CSCW literature have tended to result in the design of mobile technologies that support these workers only. These workers include large-scale knowledge workers and mobile service engineers. Studies of different types of social groups are starting to emerge within the literature (for two important examples

see Le Dantec & Edwards 2008 and Williams, Anderson & Dourish 2008). These studies reveal that people with different mobile practices have very different spatial distributions of activities and reliances on technology. Explorations of the practices of a broader range of mobile people can, as Le Dantec and Edwards (2008) note, provide an array of opportunities for designing technological systems to empower mobile people.

Secondly, in parallel to this, researchers have identified limitations in existing understandings of mobility and its role in shaping technology use and practice. This has occurred as a result of a relatively narrow focus on understanding mobility in the literature in terms of travel between physical locations (Kakihara & Sorensen 2002) and temporary absence from a remote established office base (Nilsson & Hertzum 2005; Weilenmann 2003a). Furthermore, much of the mobility literature that deals with mobile systems is too abstract to be useful in the actual design and evaluation of mobile devices (Kjeldskov & Stage 2004). As Brewer and Dourish note:

> Mobility is not simply movement from A to B (Cresswell 2006). Trans-national migrations, economic globalization and religious pilgrimages are obviously forms of mobility that need to be understood socially, but so too is the daily commute, the venture downtown for an evening's entertainment, or the vacation. (Brewer and Dourish 2008, p.963)

In response, there have been an increasing number of calls by researchers to examine the social, cultural and temporal aspects of people's mobility and mobilities (Dourish, Andersen & Nafus 2007; Fallman 2005; Nilsson & Hertzum 2005). Designers may be able to achieve a better relationship between people and technology by starting with understanding mobility rather than by starting with technology design (Dourish, Andersen & Nafus 2007).

Thirdly, as research in HCI and CSCW turns to explore life rather than work purposes alone (Bödker 2006), a growing number of studies are starting to

examine not only work practices in work settings, or social practices in social settings, but a combination of both – for example, family ties and home life across the week (Palen & Hughes 2007) or students' connections with family while living away from home (Chen & Katz 2008). Although these types of cross-contextual studies are now starting to emerge within the literature, they tend to focus on the ways in which family lives both shape and are shaped by technology use. There are currently few studies that explore contextual blurring from a work perspective by examining the ways in which working lives are shaped by and are shaping technology use across contextual boundaries.

The research in this thesis contributes to the growing body of HCI research that aims to expand our current understandings of mobile practices, people and contexts. To do this, three research questions were developed. The first two questions examine the mobile practices and technology use of film and television freelancers:

> **Question One: How can the mobile practices of film and television freelancers, a very specific mobile group little examined within the literature, be described?**

> **Question Two: How do film and television freelancers use existing technologies to support or inhibit their mobile practices in both work and social settings?**

The third research question translates the findings of studies of freelancing practice into practical design considerations that may assist designers of technologies to support mobile practices:

> **Question Three: What practical design insights can be drawn from studies of freelancing practice to assist designers and researchers in delivering technological support to a broader range of mobile people?**

The substantive domain of film and television freelancers was selected to address the research questions. Freelancers are workers who are employed by a single employer for only short periods, such as weeks to a few months. The rationale for this selection is outlined in the section below.

1.2 Research Domain

Film and television freelancers were selected for the research for two reasons. Firstly, freelancers demonstrate high levels of unpredictability in their lives as a result of their frequent transitions between work projects. Unlike other types of mobile workers studied within the literature, such as intermittent business travellers and teleworkers (Axtell, Hislop & Whittaker 2008; Kakihara 2004; Perry et al. 2001), freelancers form temporary teams to collectively complete projects. The project itself is temporary. It exists only for the finite period of time required to complete the work. The project dissolves once it is completed as the workers move on to find their next job. Jones (1996) describes this type of project work as the 'boundaryless career', defined by people's movement across the boundaries of separate companies. The project, rather than a stable organisation, is the organising structure for the freelancers' careers. The freelancers' patterns of ongoing movement between projects represent an added dimension of mobility that offers rich experiential insights beyond the everyday alone.

Secondly, film and television freelancers are not document workers (for studies of document workers see O'Hara et al. 2001 and Oulasvirta & Sumari 2007). Film and television freelancers work with highly specialised equipment and specialised skill sets at a variety of locations to create film content. They operate technical equipment and software, (e.g. editing on computers and using video cameras) or manage visual aspects of the film content (e.g. make-up, directing, clothing and the artistic direction of props). As a result, their requirements for

remote access to information via technologies are not the same as those found in many existing studies within the HCI literature.

1.3 Research Approach

The research approach was shaped by two specific challenges of studying mobile practices and technology use. Firstly, to explore the life practices and technology use of freelancers, rather than work practices alone, participants needed to be located who were willing to provide access to their work and private lives. Secondly, access needed to be negotiated to diverse work locations, employers and social situations over time as a result of the freelancers' frequent project changes. To meet these challenges an iterative approach was taken to the research, based on a phenomenological perspective.

Three complementary field studies were conducted over a two-year period. The research began with a series of interviews with eight freelancers from a broad range of media industries. For the second study, I observed a team of 27 film and television freelancers working together to develop a television advertisement for an advertising agency. In the third study, eight self-reporting kits were distributed to film and television freelancers, followed by post-interviews. Across all three studies I aimed, where possible, to use methods that provided direct access to the experiences of participants in both work and social contexts.

The studies focused on both the issues discussed by the participants and patterns of behaviours regarding their use of technologies as they managed unpredictable work schedules. The research examined the role that technologies played in facilitating mobile practices rather than how people interacted with their technologies. The analysis resulted in a set of conceptual tools, design implications and representations that encapsulate the different rhythms of freelancing practice and the different intensities of technology use exhibited by

the freelancers. Specific details of these research contributions are provided in the following section.

1.4 Research Aims and Contributions

Three specific aims shaped the research process, resulting in three key contributions to existing knowledge. These are:

1. *To provide empirical findings of a type of mobile worker and types of mobile practices, across social and work contexts, that have to date been little explored within the literature.*

The review of the HCI and CSCW literature revealed no studies in which freelancers were the central focus of the research. Nardi, Whittaker and Schwarz (2000, 2002) included data about networks of freelancers in conjunction with other types of modern workers, such as permanent employees and contractors, working for organisations. However, Nardi, Whittaker and Schwarz's studies focus on the stable organisational side rather than on the freelancers themselves. In contrast, the research in this thesis focuses on the practices of the freelancers, as well as those who generate project work for others. A contribution of the research is the empirical examination of the everyday practices and mobile technology use of a little-explored group of mobile people within the literature.

2. *To contribute to existing understandings of mobile work, mobility and mobile practices within the HCI and CSCW literature, and to consider ways in which technologies can be designed to support the practices of mobile people.*

This thesis does not attempt to define the concept of mobility. Instead, it contributes to the literature by developing grounded insights into the ways in which mobility is practically achieved in practice by freelancers. A significant contribution of the research is a set of orienting tools to assist designers in

conceptualising a diverse range of mobile practices and related technology use. The conceptual tools are:

- the identification of a central characteristic of the freelancers' mobile practices in terms of *temporariness*, encapsulating the duration of the freelancers' involvements in and across social situations;
- the categorisation of temporariness into two dimensions – *flux and stability*, at *micro and macro* durations – to provide a way to talk about specific instances of the freelancers' mobile practices across a range of durations; and
- three key uses of technology to manage temporariness – *availability, transitioning and sustaining* practices – to reveal the practical ways in technologies were used by the freelancers to manage their mobile practices.

Definitions for each of the conceptual tools above and their usefulness to designers and researchers are detailed in Chapter 4. The conceptual tools assist with thinking through and talking about particular instances of the temporal, physical and social aspects of the freelancers' experience of mobility in practice. They can assist technology designers in becoming sensitised to a range of people's movements at different durations. By developing technologies to support *availability, transitioning* and *sustaining* practices, designers can assist people in managing unpredictability in their lives. This provides designers with practical access to ways of developing technologies to enhance people's management of their mobility in practice.

3. To produce practical tools to assist designers and researchers in the mobile domain.

In addition to the conceptual tools described above, this thesis contributes additional practical insights and representations for technology designers. Specific design implications for both understanding and designing technologies

to support mobile practices are presented in sections 5.3, 6.2 and 7.4. Personas that represent the different rhythms of project transitioning and intensities of technology use are provided in appendix B. These personas can be utilised by other researchers and designers to access different contexts of use in their own design processes. Details of the research design of the self-reporting kits are included in appendix C. This appendix describes iterations in the design of the kits, including trials of activities and the improvements made to access details about social, personal and mobile practices. Together these design representations, implications and methods make visible ways of understanding mobile practices for others to utilise in design processes.

Some of the key findings and contributions of this research have also been peer-reviewed and published. The publications are included in appendix D.

1.5 Limitations

Two specific limitations have been identified that impacted on this research. Firstly, the main emphasis of the research was on mobile practices, not on freelancing culture, to inform design processes. As a result the research is limited to exploration of the freelancers' movements and how their technology use directly relates to these movements. There is no broader discussion of the freelancing culture such as power relationships, status and social hierarchies, or historical perspectives on mobile communication.

Secondly, the research is limited to the mobile people and contexts to which access was granted. Due to difficulties in studying mobile practices, for example attaining access to people's multiple locations, changing work projects, and social lives, the research is limited to short studies of work projects. It was not possible to follow any participant across all three studies or to observe people across multiple work projects. This may have provided more detailed insights,

for example into the ways in which the freelancers adapted to and managed new situations and constantly changing work groups.

1.6 Thesis Structure

This section gives a guide to the structure of the thesis by providing a brief summary of the contents of the thesis chapters.

Chapter 2 – Literature Review

Chapter 2 reviews existing understandings of mobile practices in the HCI and CSCW literature. This is followed by a review of freelancing practices across the business literature. The review reveals three opportunities for further research that are addressed in this thesis. The review demonstrates that by widening our examination of different types of mobile practices it is possible to expand existing understandings and to sensitise designers and researchers to aspects of the 'mobile' that are relevant to design.

Chapter 3 – The Research Process

Chapter 3 describes the research process that was followed to explore the mobile practices of freelancers. This chapter outlines the series of studies that form the body of research in this thesis. The evolution from one study to the next is described, including the constraints that shaped the selection of data collection methods used at each stage. The analysis and synthesis of the data are detailed to demonstrate the relevance and fit of higher-order themes with the field data.

Chapter 4 – Conceptual Tools for Understanding and Managing Mobile Practices

Chapter 4 defines the empirically grounded concepts that were developed from the findings. These core conceptual themes structure the analysis of findings in

chapters 5, 6 and 7. The usefulness of these concepts for designers is introduced and further discussed in the remainder of the thesis.

Chapter 5 – The Freelancers' Experience of Flux

Chapter 5 distinguishes between the freelancers' work itself and their management of the unpredictability of their working lives. The different rhythms of flux the freelancers experienced are discussed in terms of their transitions between projects and the ways in which they adapt to changing projects, new work locations and variable working hours. Specific implications for technology designers are explored, including ready to go mobile toolkits, coordinating mobile groups and crossing work and social boundaries.

Chapter 6 – The Freelancers' Experience of Stability

Chapter 6 presents the range of stable contexts the freelancers' relied on and interacted with in order to provide essential structure to their highly mobile working lives and daily movements. In this chapter a number of these are identified, such as the social networks of freelancers, their home base, the continuity of mobile phone numbers, and booking agencies and production companies. The role of these different stable contexts in shaping the ways that the freelancers responded to and negotiated their movements with others is discussed. Specific implications for technology designers are explored, including creating and archiving temporary groups and supporting the nuances of social networks.

Chapter 7 – Technology Use: Availability, Transitioning and Sustaining Practices

Chapter 7 describes the specific ways in which the freelancers used their technologies to manage temporariness at different durations. Details of the freelancers' use of technologies, both mobile and fixed, are outlined. These include macro-coordinations, improvisations and sustained connections. The

place that social and personal communications informally play in the work culture of film and television freelancing is examined. The chapter concludes by considering the implications for technology design, including managing contingent availability and supporting cross-contextual and cross-platform interactions.

Chapter 8 – Conclusion

Chapter 8 summarises the key findings and contributions of this thesis. These contributions are discussed in relation to the aims of the thesis: exploring the mobile practices of film and television freelancers, the role of their technologies in supporting these practices; and developing practical design insights from the findings of studies of practice. This chapter provides recommendations for possible further research.

Chapter 2

Existing Approaches to Understanding Mobile Practices

This chapter reviews the HCI and CSCW literature relevant to the design of technologies to support mobile people and their practices. Four strands of the literature are examined in relation to the insights they provide for understanding mobile practices, and specifically freelancing practices. These are:

- *existing definitions of mobility and characteristics of mobile practices;*
- *current explorations of the relationship between mobile contexts and mobile practices;*
- *studies of technology use that inform understandings of mobile practices; and*
- *studies of freelancing practice and technology use.*

This chapter also explicates the range of issues involved in exploring mobile practices. It provides a contextual background for the contributions and findings of this thesis.

This chapter begins by briefly outlining the fields of CSCW and HCI, including the sub-domain of mobile HCI, to provide a background for the contributions of this thesis. The second section of the chapter reviews the literature in these fields that aims to understand mobile practices and mobility. Opportunities for further research are identified to situate the research in this thesis in relation to existing studies and approaches. The chapter concludes by reviewing literature both within the HCI and the wider field of business that specifically examines freelancers' technology use and project work.

2.1 Background Context: The Fields of HCI, Mobile HCI and CSCW

The research described in this thesis contributes to the fields of CSCW and HCI, including the sub-domain of mobile HCI. The central concerns and evolutions of each of the three research fields are outlined in turn below. This background provides a context for the contributions of the thesis.

2.1.1 Human Computer Interaction

The Association of Computing Machinery (ACM) defines the field of HCI as "a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (Hewett et al. 1992, p.5). HCI first emerged from the intertwined areas of computer graphics, operating systems, human factors, ergonomics, industrial engineering, cognitive psychology and computer science (Hewett et al. 1992). HCI is a field that broadly examines the relationship between humans and computers but usually refers to an individual human interacting with technology (Moran & Anderson 1990).

Researchers have noted a number of major themes and influences that have shaped the field of HCI (e.g. Bannon 1991; Bödker 2006; Harrison, Tatar &

Sengers 2007). In her 2006 keynote speech at the NordiCHI conference, Bödker (2006) identifies three significant shifts or waves in the foci of HCI research. The first wave consisted of an emphasis on human factors and cognitive aspects related to technology use, such as attention, memory and perception. Human factors research focused on optimising the fit between humans and machines, while cognitive science provided an increased emphasis on what is happening both in the computer and simultaneously in the human mind (Harrison, Tatar & Sengers 2007). A second wave of HCI research prioritised the role of human actors within the human-computer dialogue (see also Bannon 1991). Bödker notes that, in this wave, situated action, distributed cognition and activity theory provided important theoretical insights. Formal guidelines, methods and testing were mostly abandoned in favour of proactive design methods that included users and qualitative approaches to studying use. Finally, Bödker identifies a third evolution in HCI research. This has been the turn away from work to the wide proliferation of contexts of use as a result of mobile, personal and domestic technologies. She notes that the third and current wave includes an emphasis on design for less functional and more hedonistic uses, on life rather than work purposes alone.

A turn away from work to life settings within the literature has been demonstrated through an increasing number of studies of technology use in social contexts (for example Grinter, Palen & Eldridge 2006; Harper 2003; Ito 2004; Katz 2003; Ling 2007; Ling & Haddon 2003; Shklovski 2006). These studies present rich ethnographic detail on the adoption, use and integration of technologies, particularly mobile phones, into everyday life. More recently, studies are emerging that explore technology use across work and social boundaries (for example Chen & Katz 2008; Palen & Hughes 2007). The same portable technologies are being carried and used by people in and across a multitude of contexts. These recent studies of the life practices of families and

students demonstrate that further explorations of the work and social uses of technology can contribute important insights to the HCI field. This thesis contributes to the field by exploring the life practices and technology use, both mobile and fixed, of freelancers.

2.1.2 Mobile Human Computer Interaction

The sub-field of mobile HCI, within HCI, emerged with the first workshop on HCI and mobile devices in 1998 (see Johnson 1998a). The aim of the first workshop, continuing to mobile HCI conferences today, was to provide a forum for researchers and designers to discuss the challenges and potential solutions for effective interaction with mobile devices (Johnson 1998a). Research in mobile HCI has traditionally been technology focused (Kjeldskov & Graham 2003; Oulasvirta & Brewster 2008; York & Pendharkar 2004), with an early emphasis on the physical factors of mobile devices such as input and output interaction styles and accessing information on small screens. More recent research has explored a wider range of applications, including designing systems to encourage exploration of the environment (Robinson, Eslambolchilar & Jones 2009), mobile social networks (Ankolekar et al. 2009) and providing health support to users (de Oliveira & Oliver 2008; Jeong & Arriaga 2009).

In their introduction to a special issue on mobility in the *International Journal of Human Computer Studies* (IJHCS), Oulasvirta and Brewster (2008) note that mobile technologies have tended to be developed in special application areas that do not refer to the core of mobile HCI research. They suggest that this is due to a lack of actionable findings, insights, methods and theories to inform mobile technology design. They argue that recent explorations of mobility, such as those included in the special issue, are however breaking new ground in mobile HCI research. This research is providing important insights for technology designers, as it:

> … brings into focus the expanding spheres of mobile HCI: from the user interfaces designed for the moving user to the immediate situations at hand and all the way to the wider and more latently operating social, organizational and cultural contexts. (Oulasvirta & Brewster 2008, p.833)

The special issue on mobility, in conjunction with the predominant technology focus within mobile HCI to date, demonstrates that further explorations of mobile practices and the social aspects of mobile technology use can form important contributions to this field. This thesis contributes to the mobile HCI field by conducting field studies of the mobile practices of freelancers specifically to inform technology design processes.

2.1.3 Computer Supported Cooperative Work

The fields of HCI and mobile HCI have tended to focus on the individual's use of technology. In contrast, the field of CSCW recognises that people work together in groups, organisations and communities using technologies (Moran & Anderson 1990). CSCW research is concerned with the design of computer systems to support people in the collaborative achievement of their work (Grief 1988). In the way that HCI previously turned to psychology for an understanding of human behaviour, CSCW turns to sociology, particularly ethnography, to provide insight into the sociality of work (Hughes et al. 1994).

Within CSCW, studies of mobile collaborative practices have emerged as an important field in its own right (Perry et al. 2001). An increasing number of studies have explored mobility in relation to artefacts, technologies, individuals and practices (for example Bellotti & Bly 1996; Luff & Heath 1998; Nilsson & Hertzum 2005; Perry 2007; Perry & Brodie 2005; Perry et al. 2001; Pinelle & Gutwin 2003; Schrott & Glückler 2004). However, Perry and Brodie (2005) identify a predominant focus in the CSCW literature on particular types of workers, such as large-scale knowledge work or the work of mobile service engineers. They argue that further detailed studies of the technology use and

mobile practices of a broader cross-section of society are required in order to develop more widely applicable insights for technology designers. Further contributions can be made to the CSCW literature through studying the collaborative work and social practices of different types of mobile workers. This thesis contributes to the CSCW field by examining freelancers and a type of mobile work that does not rely on an established remote work location for ongoing support.

2.2 Understanding Mobile Practices

The concept of mobility and the importance of understanding mobile practices first emerged within the CSCW literature in the mid-1990s as researchers called for studies to examine the role of mobility in shaping collaborative work activities (e.g. Bellotti & Bly 1996; Luff & Heath 1998; Whittaker, Frohlich & Daly-Jones 1994). Up to this time, note Luff and Heath (1998), although workplace studies in the CSCW literature had not been concerned with mobility as such, they demonstrated how people relied upon their own mobility and the mobility of artefacts as a part of the coordination of their activities with others. For example, studies of air traffic control, underground train workers and photocopier repairers (for example Edwards et al. 1995; Heath, Hindmarsh & Luff 1999; Heath & Luff 1992; McCarthy et al. 1997; Orr 1996; Suchman 1997), all in various ways revealed how the mobility of people and artefacts, particularly in relation to centres of coordination, was constituent of collaborative work. However, running counter to the findings of these studies, Luff and Heath also identified a trend in CSCW towards developing increasingly complex systems on conventional workstations to support collaborative practices. Studies of work practice and design had not focused on the role that mobility played in shaping people's requirements for technological support beyond desktop collaboration (Bellotti & Bly 1996).

A focus on understanding mobility emerged as researchers found that people's movements about and away from their usual workplaces influenced the collective achievement of their work. For example, Whittaker et al. (1994) revealed the integral role of physical proximity and informal interactions 'on the move' in facilitating the interaction of team members. In other words, people's roaming in localised work settings was seen as integral to providing opportunities for informal interactions. In their study of a team of product designers at a design firm, Bellotti and Bly (1996) further found that remote workers experienced difficulties as a result of the local roaming of colleagues. Simply put, it was difficult to contact people who were often away from their desks. Bellotti and Bly argued that systems could be designed to better support distant workers by providing them with the benefits of awareness that co-located team members developed while roaming their local offices.

These early calls for understanding the role of mobility in shaping practices have led to a variety of responses and approaches within the HCI and CSCW literature. In the following sections some of the key conceptualisations, understandings and definitions that have influenced design and research in the literature are detailed.

2.2.1 Micro, Local and Remote Mobility

Among the first definitions of mobility in the literature were those developed by Bellotti and Bly (1996) and Luff and Heath (1998). Bellotti and Bly defined the term *local mobility* in their study of a distributed design team. They found that most of the work:

> … involved far more mobility than we had envisaged, most of this was not long distance, involving car or public transportation, but rather local mobility; simply walking between rooms or buildings at a local site. (p.209)

Their study examined the role that local mobility played in supporting communication and awareness between team members.

Luff and Heath categorise the practices of medical practitioners, construction staff and workers on the London Underground around three types of mobility. These are: *micro mobility*, *local mobility* and *remote mobility*. They defined micro-mobility as the movement and manipulation of artefacts in relation to the ongoing demands of particular tasks. As an example they described the manipulation of paper medical records used by doctors during medical consultations. The translation of paper medical records into electronic systems on fixed work stations resulted in the loss of the benefits of micro-mobility. Electronic records were not able to be passed between practitioners, carried around or located in different parts of the office. Local mobility is discussed in terms of Bellotti and Bly's definition as the movement of people around a localised domain. Luff and Heath provide two different examples of remote mobility: firstly, a foreman travelling across a construction site to monitor the work of gangs at different locations; and, secondly, London Underground staff who travelled out of a centralised 'ops room' to work on station platforms. In each of these cases, remote workers experienced difficulties in locating and communicating with distant staff, demonstrating opportunities to enhance remote collaboration via technologies.

The definitions of mobility developed by Luff and Heath and Bellotti and Bly provided access to understanding some of the ways in which workers relied on their own mobility and the mobility of artefacts in accomplishing their work. Their work demonstrated that mobility at different granularities resulted in very distinctive requirements for technological support for collaborative practices. Their definitions have been drawn on and used as a starting point for research and design efforts within the literature. For example, drawing on Luff and Heath's definition, Bardram and Bossen (2003, 2005) investigate local

mobility in a hospital setting, developing a conceptualisation of *mobility work* to inform the design of technologies to support local practices. Also using the concept of local mobility, a range of mobile technology prototypes have been designed to enhance the opportunities for people to informally meet by detecting proximity to others (for example Bergqvist et al. 1999; Lehikoinen & Kaikkonen 2006; Oulasvirta et al. 2007).

Similarly, examples of studies that explicitly examine the remote mobility of workers include studies of office workers travelling on business trips (O'Hara et al. 2001; Perry et al. 2001). These studies focus among other things on the limited access to others, information and resources while working remotely and the consequences of this for work practices (Perry et al. 2001). Based on the concept of remote mobility, mobile technology prototype systems have been designed to facilitate access to information at distant offices (for example Lamming et al. 2000; Trevor & Hilbert 2007). Prototypes address some of the specific issues encountered when accessing documents remotely, such as unanticipated document needs and behaviour, device interoperability, and the movement of information from one technology platform to another to facilitate sharing.

Researchers have argued that definitions of mobility, such as those developed by Luff and Heath and Bellotti and Bly, reflect one particular type of mobile work. They note that this has limited both early understandings of mobile practices and technology design. For example, in 2003 Weilenmann (2003a) suggested that studies of mobile practices and definitions of mobility within the HCI and CSCW literature had predominantly been characterised by remoteness from a distant work base. This is demonstrated for example in Sherry and Salvador's (2001) identification of two types of mobile work that are both defined in relation to remoteness:

> … *remoteness*, which means separation from a resource-rich 'home base' and *truly mobile work*, which involves both remoteness and motion, or at least more fleeting periods of stasis. (p.111, authors' emphasis)

Weilenmann noted that mobile work does not always occur in relation to a distant work base; instead mobile practices can be 'base-less'. Weilenmann identified a lack of field studies of a wider range of mobile practices, particularly those without a distant work base. Her empirical studies of base-less mobile practices reveal that important insights can be gained by exploring the accomplishment of mobility in practice rather than by attempting to define the concept of mobility.

Similarly, in 2005 Nilsson and Herzum (2005) suggested that, with research foundations in fixed computing settings, understandings of mobility up to this time had been dominated by residual traits through conceptual comparison with office-based work. Efforts to expand definitions of mobility and understandings of mobile practices in terms of spatial, temporal, contextual and social dimensions are discussed in sections 2.2.2, 2.2.3 and 2.2.4 below.

2.2.2 Spatial, Temporal and Contextual Mobility

Kakihara and Sorensen (2002) presented an alternative definition for mobility that centred on, as they term it, the mobilisation of human interaction, rather than distance from a work desk or centralised work location. They noted that:

> … 'being mobile' is not just a matter of people travelling but, far more importantly, related to the *interaction* they perform – the way in which they interact with each other in their social lives. (p.2, authors' emphasis).

Kakihara and Sorensen argued that human interaction is becoming increasingly mobilised over time as a result of the widespread adoption of modern technologies. They categorised this increasing mobilisation in terms of three types of mobility: spatial, temporal and contextual.

Kakihara and Sorensen define *spatial mobility as* the geographical travel of people, objects, symbols and space itself. Movement in this sense is then about travel from location to location both physically and virtually through technological mediums. They define *temporal mobility* as the evolution from linear clock time to the overlapping of multiple temporal modes of work, such as the increasing polychronicity of activities. *Contextual mobility* they define as the increasing access of people to others via information-communication technologies (ICTs) across a range of contexts. They note that people are interacting with other people who can have very different cultural backgrounds, geographical locations, and settings (both mobile and fixed). Contextual mobility is then about the mixing of and access to disparate contexts that are facilitated by technology use.

Kakihara and Sorensen's conceptualisation of the increasing mobilisation of human interaction has been used to frame discussions of mobility within the literature (for example Axtell, Hislop & Whittaker 2008; Ciolfi, Bartolucci & Murphy 2005). It has also been used as a conceptual framework to analyse the practices of construction workers to develop insights into technology design (for example Mitchell et al. 2006). However, Kakihara and Sorensen's conceptualisation of spatial, temporal and contextual mobility has also been critiqued as being too broad to be useful in the actual design and evaluation of mobile devices (for example Kjeldskov & Stage 2004). The contribution of Kakihara and Sorensen's conceptualisation has instead been the opening up of understandings of mobile practices beyond physical travel alone. More recent approaches to understanding mobility have turned to address the social and cultural significance of people's physical movements. These approaches are discussed in the next section.

2.2.3 Social and Cultural Mobilities

A shift in the ways in which researchers are talking about and approaching mobility has more recently emerged within the literature (for example Brewer & Dourish 2008; Dourish, Andersen & Nafus 2007; Fallman 2005; Williams, Anderson & Dourish 2008). Use of the term 'mobility' is starting to be replaced by the term 'mobilities', including the social and cultural significance of people's movements. The pluralisation of the term 'mobility' acknowledges, as Urry (2002) notes, the complex mobilities of people, information and images that are occurring as a result of the development of modern communication technologies and transportation. There are many mobilities and many cultural collectives, whose experience of mobility is formed by more than simply movement between locations (Dourish, Andersen & Nafus 2007). Technology is also involved in the production of these cultural patterns, making them important for designers and researchers to understand (Dourish, Andersen & Nafus 2007).

In their discussion of studies of how Aboriginal Australian belief systems shape the ways in which the landscape is encountered, Brewer and Dourish (2008) distinguish between approaching mobility in terms of technical aspects or in terms of social and cultural aspects:

> When we think of mobility in technical terms, we think of topics such as bandwidth, resource management, location and wireless networks. When we think of mobility in social or cultural terms, a different set of topics come into view: pilgrimage and religious practice, globalization and economic disparities, migration and cultural identity, daily commutes and the suburbanization of cities. (p.963)

Similarly, Fallman (2005) distinguishes between people's movements not only between points in space but also between, as he terms it, 'physio-social' situations that span multiple physical and virtual spaces. He argues that it is not

possible to separate the physical and the social, and suggests a view of mobility in terms of people's changing involvement in situations with others.

A turn to explore social and cultural mobilities is exemplified by two empirical studies within the literature that examine longer-term patterns of mobile practices. Firstly, Shklovski and colleagues (Shklovski 2006; Shklovski, Kraut & Cummings 2008; Shklovski & Mainwaring 2005) explore residential moves and the role of technology in facilitating people's interstate relocation. They describe residential mobility as a process of settling in to a new location, with a "balance between the pull of the things left behind and the demands of the new and unknown" (Shklovski & Mainwaring 2005, p. 621). They found that technologies performed essential functions in both sustaining key relationships with distant family members, and dealing with the move itself by gathering information about the new location, finding places and coordinating activities related to the move.

Secondly, Williams, Anderson and Dourish (2008) explore the use of mobile technologies by transnational retirees who share their time between Thailand and the United States. They found that the retirees' frequent travel was anchored in three key ways, through: *spatial anchoring*, in which the retirees travelled repeatedly to regular locations in different countries; *temporal anchoring*, with yearly rhythms to travel between countries punctuated by spontaneous travel in response to life events; and *infrastructural anchoring*, as retirees adjust to different legal, social, political, economic and technological infrastructure in different countries. Instances of mobile phone use were shaped by the three anchorings, particularly as the retirees developed work-around practices to deal with technology infrastructure issues and the juggling of multiple bases in different countries.

The work of Shklovski and colleagues and Williams, Anderson and Dourish described above have particular relevance to the research in this thesis. The

studies examine types of mobility that people experience over longer-term durations rather than in everyday practice. Yet the studies also reveal that technology performs an integral part in managing people's longer-term social mobilities. The studies demonstrate that understanding the ways in which the mobile practices of different types of mobile people are tied to place, rhythms and infrastructures can reveal useful distinctions and opportunities for designing technological support systems. For example by identifying technology breakdowns and some of the different ways in which people use technologies to keep connected to family. The research reported in this thesis contributes to studies of social mobilities by examining the patterns of freelancers' longer-term movements between projects, as well as everyday practice.

2.2.4 Understanding and Characterising Mobile Work

An alternative approach within the literature to defining or talking about mobility has also developed in the form of research efforts to understand the nature of mobile work (see Bertelsen & Bödker 2001; Christensen 2001; Churchill & Munro 2001; Perry et al. 2001; Pinelle & Gutwin 2003; Sherry & Salvador 2001). Rather than defining mobility, studies such as these aimed, as Perry et al. (2001) note, to understand the problems that mobile workers encountered in order to provide a rich resource to designers in scoping design spaces. Examples include the examination of collaborative mobile practices that occurred in massively distributed work spaces at a waste-water treatment plant (Bertelsen & Bödker 2001), the loose coupling of collaborative work by mobile health professionals (Pinelle & Gutwin 2003) and the ties between mobile practices and particular locations, rather than examining mobility in order to interact with others (Christensen 2001). A central theme that has emerged in these studies, as Churchill & Munro (2001) state, is that a fundamental

experience of collaborative mobile work includes the mutual negotiation of rhythms of contact, availability and accessibility with others.

Addressing the problems that mobile workers encounter has resulted in challenges for researchers in understanding and talking about mobile work, due to the diversity of practices that it encompasses. For example, Perry et al. (2001) found that within the subset of mobile office workers there were many different types of mobile work, each with its own set of limitations and relevant requirements for support. These included working at different stationary locations, local movements around a central location, travelling, and working in hotels and on planes. In addition to the diversity of work locations experienced by mobile workers, Pinelle and Gutwin (2003) distinguished differences in the ways that various types of mobile groups organise their mobile activities, are dispersed across physical locations, and work with others.

To approach the problem of understanding mobile work, researchers focused on the key activities that occupied workers to both enable and conduct their mobile work. For example, Sherry and Salvador (2001) identified three key activities that occupied mobile workers:

- firstly, managing the logistics of motion, consisting of the coordination work required to move one's self and resources from one location to another (e.g. rescheduling flights and locating resources while on the move);
- secondly, conducting the mobile work tasks themselves. This is the actual work that the mobile workers are doing while they are away from their work base; and
- thirdly, using technologies to maintain personal relationships and deal with personal affairs.

Similarly, Perry et al. (2001) identified additional aspects of work that arise as a result of being mobile, such as preparation for a trip and planning for the unpredictable, effective use of down time by mobile workers, the use of the mobile phone to access remote information through others, and the use of technologies to generate awareness about the activities of remote colleagues.

Drawing on findings of studies such as those of Perry and colleagues and Sherry and Salvador, two conceptualisations of mobile work have been developed in the literature. These are Bardram and Bossen's notion of *mobility work* (2005) and Perry's definition of *mobilisation work* (2007). Both of these concepts draw on and extend Anselm Strauss's (1985) concept of *articulation work*. Articulation work is the coordination or 'supra-type of work' that ties together actors, tasks and organisational units above and beyond the work activities themselves. The concept of articulation work explicitly defines the boundary between the work activity and the coordination that facilitates the activity, allowing people to manage contingencies that arise as a by-product of their work (Perry 2007). Both conceptualisations distinguish between the work itself and the way that a person mobilises their body, their technologies and their resources to support the work. The conceptualisations provide designers with tools to reflect on and understand the ways in which people are mobile in their work, in order to design technologies to better support mobile work.

Bardram and Bossen (2005) define the concept of *mobility work* as the physical movement counterpart to the actual work tasks themselves; it is a 'supra-type of physical work' that people engage in to gather together the right spatial configuration of people, resources, places and knowledge in order to conduct collaborative work. Their conceptualisation analyses the physical movements that are required above and beyond the work tasks to coordinate and mesh activities together (Perry 2007).

Perry (2007) takes this definition further, distinguishing between mobility work and what he terms *mobilisation work*. He defines mobilisation work as:

> the additional work on top of the (mobile) task required to make that person's (or more than one person's) work possible to do whilst they are mobile. (2007 p.2)

Perry's definition focuses on the activities that surround the mobile work, rather than physical movement alone. He suggests that there is always additional essential work to be done in order to achieve goals while mobile. He argues that one of the core problems in developing an understanding of mobile work is that we have a limited understanding of the way that mobility itself supports the unfolding work. Perry suggests that we need to examine not "what is the work of the nomadic worker, but what is the work that is required to make nomadic work possible" (Perry 2007, p.1).

This thesis draws insight from Perry's concept of mobilisation work. A challenge I encountered throughout my research process was the complexity of the terms 'mobility', 'mobilities' and 'mobile'. Researchers rarely defined their use of the terms in the literature, despite the diversity of aspects and practices the terms encompass. The examples of studies and prototypes throughout the review in the sections above reveals that different definitions of mobility can influence and constrain technology design in essential and sometimes problematic ways. Different definitions of the terms address very specific aspects of what it means to be mobile. The challenge for researchers is then to distinguish which aspects of mobile practices are relevant to, and need to be supported through, technology design. Perry's 'mobilisation work' provides a way to examine not the concept of mobility itself but the practical ways in which people achieve their mobility in practice through their actions and interactions with others.

2.2.5 Opportunities for Further Research

The review in section 2.2 reveals that viewing mobility and mobile practices in terms of geographical movement may be the most obvious way to understand mobility. However, as researchers start to consider the social and cultural aspects of people's movements, the focus turns from designing technologies to assist navigation between locations to supporting people as they, for example, negotiate cultural boundaries, move interstate or deal with temporary homelessness. Recent efforts to understand the social and cultural dimensions of people's movements (for example Dourish, Andersen & Nafus 2007; Shklovski 2006; Shklovski, Kraut & Cummings 2008; Shklovski & Mainwaring 2005; Williams, Anderson & Dourish 2008) are providing rich insights for technology designers to consider new ways of delivering technological support to a broader range of mobile people.

Studies of the social and cultural dimensions of people's movements are exploring longer-term patterns of mobile practices beyond the everyday alone, for example residential moves and transnational migration. The studies reveal that an important part of people's everyday technology use can be the management of longer durations of mobile practices. Consideration of both short and long-term mobile practices can reveal opportunities for designers to develop systems to enhance crucial aspects of people's collaboration and interaction with others. This thesis contributes to recently emerging studies that aim to understand mobile practices by examining freelancers' movements between work projects and their technology use to manage the uncertainty of their upcoming employment.

The literature review also raises the important question of how to develop understandings of mobile practices so that these can be usefully applied to design processes. The review reveals that different definitions of the term mobility can narrow design opportunities by focusing design attention on

specific aspects of practice. Rather than defining the complex concept of mobility, design insights into understanding people's complex mobilities can be developed through studies of everyday practice and technology use. Similarly to Perry and colleagues (Perry 2007; Perry & Brodie 2005; Perry et al. 2001), one of the practical goals of this thesis is to provide grounded analytic concepts and insights to assist in the design of technologies that support people's management of their mobility in practice.

2.3 Understanding Mobile Practices through Contexts of Use

Another area within the literature that is relevant to understanding mobile practices is research that explores mobile contexts. The specific contexts in which people use technologies present their own qualities in relation to the availability of resources and the constraints they place on action, interaction and collaboration (Ciolfi, Bartolucci & Murphy 2005). This section details some of the different views of context held by HCI researchers. Although there is a large body of technology design research that aims to develop mobile systems that enhance and respond to the local contexts of users (for example Dix et al. 2000; Ho & Intille 2009; Kaasinen 2002; Lehikoinen & Kaikkonen 2006; Skov & Høegh 2006), this section does not address the design of context-aware devices. Instead it discusses research that starts with understanding context itself, particularly the stable social contexts that are being created and sustained through mobile technology use.

Six sections are presented below, covering: a background to understanding context; efforts to define and understand mobile contexts; studies of the mobile workplace; the blurring of local and remote contexts as a result of technology use; technosocial situations; and the 'un-tethering' of people from places, resulting in an increasing reliance on social connections.

2.3.1 Understanding Context

Before discussing the literature that examines mobile contexts, it is important to address, as Dourish (2004) notes, what we mean when we talk about context. Context has been talked about by many researchers within HCI (for example Bradley & Dunlop 2002; Chalmers 2004; Dey 2001; Dourish 2004; Lueg 2002; Tamminen et al. 2004), yet most have failed to define it in a way that has been useful for technology design (Bödker 2006). Dourish (2004) suggests that difficulties in defining and understanding context can be explained by considering the two predominant philosophical perspectives that have shaped HCI research on context: positivist perspectives and phenomenological perspectives. These are addressed in turn below.

Firstly, Dourish notes that engineering approaches, including those that tend to dominate discourse in technology design fields, inherit their philosophical foundations from a positivist tradition. Dourish suggests that positivist approaches aim to develop and model independent objective descriptions of social phenomena that are abstracted from the detail of specific settings or occasions. Software systems are representational, so a concern with context logically leads to a concern with the ways in which context can be encoded and represented (Dourish 2004).

The dominance of a positivist tradition within HCI design is demonstrated in the area of context-aware computing. Context-aware computing focuses on the development of mobile systems that enhance and/or respond to the local environment of users, for example location-based services, mobile guides or context-aware devices (Dix et al. 2000; Ho & Intille 2009; Kaasinen 2002; Lehikoinen & Kaikkonen 2006; Skov & Høegh 2006). Kaasinen (2002) argues that a significant challenge for context-aware computing is that context cannot be easily identified or measured. She notes that location, however, is a measurable aspect that can and is being exploited by context-aware computing.

She suggests that technologies that respond to other aspects of context, such as the user's social situation, will follow as these aspects become quantifiable and measurable. Kaasinen and other researchers (for example Bradley & Dunlop 2002; Dey 2001; Esbjörnsson & Weilenmann 2005; Kim et al. 2004) demonstrate the difficulties that technology designers can encounter when attempting to develop systems to detect the social aspects of context.

Secondly, Dourish (2004) notes that phenomenological perspectives provide a contrast to positivist discourse on context. Phenomenologists view social facts as emergent properties of interaction rather than as pre-given absolutes. He notes that phenomenology turns analytic attention away from the idea of a stable external world that is recognisable by all, towards a view of the perceivable world as a consensus of interpretation. From a phenomenological perspective, the focus for the design of context-aware devices is not on pre-defining context but on how to support the process through which context is continually negotiated and shared (Dourish 2004).

Context plays an important role in, and came into focus in the analysis and design of, human computer interaction as a result of the contribution of social analyses from a phenomenological perspective (Bödker 2006; Dourish 2001a). A seminal work within the HCI literature that influenced understandings of human interaction is the book *Plans and Situated Actions* by Suchman (1987). Suchman drew on the ethnomethodological approach of sociologist Garfinkel (1967), who proposed that the rational accountability of actions is an ongoing, practical accomplishment between people. Applying an ethnomethodological approach in the domain of interactive systems design, Suchman challenged dominant artificial intelligence (AI) and planning models that viewed human action as a sequential organisation of predetermined goals (Dourish 2001a). She argued instead that every course of action depends in essential ways upon its material and social circumstances. All human actions, whether predetermined,

spontaneous or anywhere in between, are situated actions (Robertson & Loke 2009). Suchman notes:

> It is frequently only on acting in a present situation that its possibilities become clear and we often do not know ahead of time, or at least not with any specificity, what future state we desire to bring about. (1987, p.52)

Suchman's work and other phenomenological and situated perspectives in HCI research, such as ethnography, participatory design and critical design, reveal the integral connection of people's actions and shared meaning making to the "viewpoints, interactions, histories and local resources available to those making sense of the interface" (Harrison, Tatar & Sengers 2007, p.7). A phenomenological perspective also reveals a temporal context for related actions and interactions, as these gain meaning from the way in which they form part of a larger pattern of activity (Dourish 2001a).

The understanding of context used in this thesis is informed by the phenomenological perspectives on context described above. This research explores the types of social contexts that people construct through ongoing interaction with others and rely on in order to manage their mobility in practice. This research also gathers information about people's interactions over time to place them in their wider temporal context. The phenomenological perspectives that shape the research in this thesis are described in further detail in section 3.1.

2.3.2 Local Settings

The relationship between mobile contexts and technology use has been examined by some researchers, particularly in relation to mobile workers, through studies of the local settings in which mobile activities occur. Studies that examine these local settings reveal that places both shape and are shaped by people's actions and interactions with others (Axtell, Hislop & Whittaker

2008; Brown & O'Hara 2003; Ciolfi, Bartolucci & Murphy 2005; Laurier 2002; Tamminen et al. 2004). For example, in their study of mobile professional workers and hot-deskers, Brown and O'Hara (2003) found that mobile workers have less physical certainty about the locations of their work than conventional workers. Brown and O'Hara found that work locations influenced mobile work due to limitations on access to artefacts and people. At the same time, mobile workers also changed the temporary places in which they worked, both through the activities they carried out there and also by altering the local environment to make mobile work possible. Brown and O'Hara also found that mobile workers developed temporal structures and systems to better coordinate face-to-face meetings with remote colleagues.

Studies that focus on the local settings in which mobile practices occur demonstrate that, as Brown and O'Hara (2003) suggest, making place is an important concern for mobile people. In his study of car-based mobile workers, Laurier (2002) found that the workers engaged in additional tasks to assemble their mobile office at the start of the work day. Additional tasks included switching on and listening to the radio to avoid traffic jams and charging up the mobile phone in a car-mounted charger. Laurier notes that these types of additional tasks were often an unrecognised part of the mobile worker's occupation. This resonates with Perry's (2007) conceptualisation of 'mobilisation work', detailed in section 2.2.4, which describes the additional tasks that people conduct in order to make the mobile work itself possible.

Studies that focus on the relationship between local contexts and mobile practices can make visible the additional work involved in managing changing locations. However, local contexts are not the only contexts that both shape and are shaped by mobile practices. The sections below discuss the literature that focuses instead on the contexts that are created through mobile phone use and the influence of remote contexts on local action.

2.3.3 The Blurring of Local and Remote Contexts

A recurrent theme in the literature on technology use is a tension between people's locally unfolding activities and the remote situations that portable technologies provide access to. Technologies, both mobile and fixed, facilitate the blurring of contexts by allowing people to manage their involvements in both local and remote settings. This is emphasised in research that examines mobile practices and mobile technology use as a result of the variety of contexts in which portable devices are used. As Sherry and Salvador note:

> Technology bursts into the here and now – it introduces entirely new worlds to which the mobile professional must attend, over and above the ones they currently occupy. (2001, p.116)

A number of field studies have examined the ways in which local and remote contexts are being blurred in practice due to mobile phone use (Gant & Kiesler 2001; Harper 2001; Palen & Hughes 2007; Sadler, Robertson & Kan 2006a). For example, in their study of mobile phone adoption and use by university staff, Gant and Kiesler (2001) found that, although people adopted mobile phones initially for reasons such as safety, they increasingly used them to attend to everyday family matters while at work. Gant and Kiesler also identified that the blurring of contexts was more likely to occur in locations that have weakly defined social norms, such as in the car or on the street. Their study and others (see also Campbell 2007; Lasen 2006; Love & Perry 2004; Palen, Salzman & Youngs 2000; Sadler, Robertson & Kan 2006b) demonstrate the ways in which social norms shape people's choices on whether or not to accept remote calls in different locations.

Three different views have emerged within the literature on the relationship between local and remote contexts due to mobile phone use. Firstly, a number of researchers have argued that mobile phone use results in a switching between contexts (Gergen 2002; Messeter et al. 2004). From this perspective,

mobile phone users become both simultaneously absent from their local environment and present in the remote one, termed 'absent-presence' by researchers such as Kleinman (2004) and Rettie (2005). This view focuses on people's dislocation from local contexts as they attend to the demands of their mobile phones; mobile phone use intrudes on local action. This perspective focuses technology design on issues such as the management of interruptions by developing call management protocols or context-aware devices (e.g. Grandhi, Schuler & Jones 2009; Ho & Intille 2009).

Secondly, in direct contrast to a view of absence or switching, other researchers have argued that mobile phones provide opportunities for sharing in both local and remote contexts. For example, Weilenmann and Larsson (2001) describe the way in which teenagers combine local and remote contexts through their group use of individuals' mobile phones in multi-party talk. Palen et al. (2001) describe the simultaneous multiple social spaces that people occupy as a result of their mobile phone use. In this second perspective, new possibilities for action are created as mobile phones expand the social worlds available to people while they are physically elsewhere. This perspective focuses technology design on ways to support local collaborative practices via individual devices. Examples include mobile systems and public displays to facilitate sharing between people both locally and over distance, particularly in locative media and gaming application domains (Brown et al. 2005; Tuulos, Scheible & Nyholm 2007).

Thirdly, in their study of office workers working on trains, Axtell, Hislop and Whittaker (2008) provide another view on understanding the interplay between local and remote contexts. Rather than examining the contexts created through mobile phone use, they instead consider the influence of expectations from remote contexts on local action. Axtell, Hislop and Whittaker found that two contexts shaped the workers' freedom of choice around their immediate

activities: the physical constraints of the local environment, and the expectations of the remote organisation. For example, Axtell, Hislop and Whittaker's study revealed that workers during busy periods of work relied on technologies in different ways and prioritised particular types of activities while travelling in comparison to workers without remote time pressures. Axtell, Hislop and Whittaker's study is novel in that there have been few studies that consider the influence of the expectations of remote contexts on local action. The literature instead has tended to focus on the constraints of the local context on attending to remote concerns (such as the examples of studies on social norms cited above).

2.3.4 Technosocial Situations

The section above demonstrates that distinctions between local and remote contexts are increasingly difficult to make, as a result of the expanded contexts that people have access to via their mobile devices. Ito and colleagues (Ito 2005; Ito & Okabe 2005; Okabe & Ito 2006) present an alternative understanding of the contexts created through mobile phone use. They note that researchers have predominantly focused on mobile phone use in relation to the local setting of use – on single instances of mobile phone use rather than related series of interactions. Ito and colleagues suggest that insights can be gained by examining the 'place' constructed through the related interactions that occur on mobile devices. They label this 'place' a *technosocial situation*.

In their study of mobile phone use by Japanese youth, Ito and Okabe (2005) identify the 'augmented flesh-meet' as an example of a technosocial situation. The 'augmented flesh-meet' consists of all of the mobile phone interactions related to meeting with others face to face. This includes those prior to, during and after the meeting. Instances of interactions that form the 'augmented flesh-meet' could then include the initial coordination of a meeting between friends, the shifting of plans when running late, last-minute changes to the meeting

location, and follow-up text messages to share forgotten bits of information or to say thanks.

Ito and Okabe (2005) suggest that examinations of technosocial situations can bring to the fore a wider range of emergent practices, particularly new forms of stable social patterns:

> To say that mobile phones univocally cross boundaries, heighten accessibility and fragment social life is to see only one side of the dynamic social reconfigurations heralded by mobile communications. Mobile phones create new kinds of bounded places that merge the infrastructures of geography and technology, as well as technosocial practices that merge technical standards and social norms. (2005, p.3)

A view of the contexts created by mobile phone use as a technosocial situation can reveal the wider temporal and social contexts of a series of related technology-mediated interactions. Analysing technology use in terms of technosocial situations can also reveal the ways in which people's ongoing interactions are spread across a range of physical locations. Ongoing social contexts and social ties that span multiple locations are discussed in the section below.

2.3.5 Social Ties and Mobile Community Networks

Another way of viewing the social contexts available to mobile phone users is to consider the connection of people to people rather than places to places. Mobile phones are now associated with, and provide direct access to, individual voices (Light 2007) rather than specific locations. Researchers have identified a trend in which mobile people increasingly draw on remote social connections to support local action, rather than traditional resources or work colleagues in remote locations (for example Boase 2008; Currie, Tempest & Starkey 2006; Nardi, Whittaker & Schwarz 2002; Perry & Brodie 2005).

Studies of technology use, both mobile and fixed, reveal that a central use of technologies in everyday life is for the establishment and maintenance of social ties with others. The use of technologies for sustaining connections has been described in the literature in relation to relationship maintenance (Boase 2008; Ling 2007; Shklovski 2006; Shklovski, Kraut & Cummings 2008), the expansion and intensification of social networks (Chen & Katz 2008; de Gourney & Smoreda 2003; Palen 2002; Taylor & Harper 2003) and the development of a sense of proximity over distance, or 'presence-in-absence' (Howard et al. 2006). A central focus of studies of social ties is the ways in which people sustain these ties via mediated interaction (see section 2.4.1 for examples using mobile phones).

Recent research has provided a number of concepts to analyse the ways in which people's social ties connect them to remote people and places (see Chen & Katz 2008; Geser 2005; Palen & Hughes 2007). For example, Palen and Hughes (2007) introduce the term *tethering* to refer to the potential for interaction and immediate connectivity experienced by family members as a result of their mobile phone use. In other words, people are 'tethered' to each other via their mobile phones. Palen and Hughes note that the home base is no longer a place; it is extended beyond the physical boundaries of the house, across both work and non-work parts of the day. Similarly, Chen and Katz (2008) discuss the 'umbilical cord' role of mobile phones in keeping college students connected to their parents after they have moved away from home. The 'umbilical cord' of the mobile phone provides emotional and physical support to students as it provides access to parents often and at any time, day and night. Studies such as those of Palen and Hughes and Chen and Katz described above demonstrate that social contexts can be sustained and spread across many locations. Understanding context not in terms of location but in

terms of the mediated social spaces that people work to sustain can provide important insights for technology design.

In the work domain, Nardi, Whittaker and Schwarz (2000, 2002) expand understandings of work contexts by introducing the concept of *intensional networks*. These types of networks are the intense personal social networks that people rely on to source labour and information to get their work done. Nardi, Whittaker and Schwarz argue that the fundamental unit of analysis for modern collaborative work is not the team within the organisation but the individual's personal connections. Workers are increasingly utilising their personal and social networks to support their work (Nardi, Whittaker & Schwarz 2000, 2002). An important contribution of Nardi, Whittaker & Schwarz's studies is the recognition that personal connections can play an important role in the accomplishment of the work itself. Personal interactions have increasingly been identified as a use of mobile phones in many work settings (for example Harper 2001; Messeter et al. 2004; Nardi, Whittaker & Schwarz 2002). However, the specific role of non-work-related interactions in work settings has often been viewed as an intrusion (see section 2.3.3 above) rather than as a resource to use in completing local work activities.

2.3.6 Opportunities for Further Research

The review in section 2.3 demonstrates that mobile people are increasingly accessing and sustaining a range of stable social connections via their mobile phones, wherever they are located. A growing number of researchers are examining the cross-contextual ties and social contexts that people develop using mobile phones (for example Chen & Katz 2008; Ito & Okabe 2005; Okabe & Ito 2006; Palen & Hughes 2007). However, these have tended to focus on interactions between family members, including people's attendance to domestic concerns while at work. As yet, with the important exception of Nardi, Whittaker and Schwartz (2000, 2002), relatively few studies address this

from a work perspective by examining the specific ways in which mobile workers sustain and rely on social contexts in order to conduct their work. This thesis contributes insights into the types of mediated social spaces that freelancers sustain with others and rely on in order to manage their mobility in practice. The identification of different types of mediated social spaces and their integral role in facilitating work practices can sensitise technology designers to a range of cross-contextual interactions that can be better supported through systems design.

2.4 Understanding Mobile Practices through Studies of Technology Use

This section discusses studies of technology use, particularly mobile phones, that provide insights both directly and implicitly for understanding mobile practices. The section addresses two areas within the literature (detailed in turn in sections 2.4.1 and 2.4.2 below): studies of mobile phone use; and studies of technology use, both mobile and fixed.

Firstly, the widespread adoption and use of mobile phones has resulted in the emergence of new social patterns of interaction (Green et al. 2001; Ito & Okabe 2005; Nilsson & Hertzum 2005) and changes to the ways in which people interact over distance. Mobile phones can be and are being carried everywhere, facilitating increased access to others in a diverse range of contexts. Section 2.4.1 outlines some of the reconfigurations of practices that have been documented within the literature. Studies detailed in this section do not often develop specific implications for understanding mobile practices. Yet they do implicitly provide details that can assist with understanding the integral role of mobile phones in facilitating the management of mobile practices.

Secondly, there is a growing number of studies within the literature specifically examining the role of technologies, both mobile and fixed, in shaping people's

mobility and mobile practices. Examples include technology perceptions of the homeless (Le Dantec & Edwards 2008), the use of technologies to support the remote work of intermittent business travellers (Perry et al. 2001), the role of technologies in managing residential moves (Shklovski & Mainwaring 2005) and transnational retirees' use of mobile technologies across continental borders (Williams, Anderson & Dourish 2008). Section 2.4.2 details recently emerging studies of technology use and the insights they provide for designers to enhance people's management of their mobility in practice.

2.4.1 Mobile Phone Use

Studies of mobile phone use within the literature demonstrate, among other things, that there are essential differences in the ways mobile phones are used by different people in different contexts. Research describes differences in the types of uses of mobile phones, technology-mediated social practices, levels of integration of mobile phones into everyday life, and qualities of interaction with the device itself. For example, adolescents texting and emailing friends (for a detailed review of these see Boase 2008), the ways in which older people use mobile phones (Kurniawan 2008), parents maintaining family ties while out of the home (Palen & Hughes 2007) and mobile office workers on business trips (Perry et al. 2001) all use mobile phones in very different ways.

However, studies of mobile phone use also demonstrate a set of common themes encapsulating the ways in which people communicate with others via their technologies. Four central themes within the literature on technology use can be identified: availability, coordination, awareness and information access. These four themes have been well documented within the literature in relation to fixed computing and collaborative practice (for example Dourish & Bellotti 1992; Kendon 1990; Whittaker, Frohlich & Daly-Jones 1994). With computing on the move, these forms of mediated interaction are being reshaped by the immediacy of access provided by mobile phones. Mobile phones are both

undermining prior definitions of social situations but also defining new boundaries of identity and place (Ito & Okabe 2005). The review in the sections below details the ways in which mobile phones are reshaping people's interactions with others in relation to the four themes of availability, coordination, awareness and information access.

Availability

Availability is a fundamental enabler for interaction, providing the potential for communication with others at any time through technologically mediated interaction. People manage their availability to others via their technologies to create and allow opportunities for mediated interactions to occur. As a precursor to the interactions themselves, the theme of availability is threaded throughout the literature yet, with the exception of Licoppe and Heurtin (2001) and Weilenmann (2003a), is little discussed as the predominant focus of individual papers. Where it has been addressed, discussions of availability from a human-centred perspective have tended to centre on three key areas.

Firstly, researchers have explored the ways in which people negotiate or manage their availability for telephone conversations. Examples include examinations of the opening statements in mobile phone conversations, such as 'Where are you?', that establish availability for interaction (Esbjörnsson & Weilenmann 2005; Laurier 2001; Weilenmann 2003a); the sharing of mobile phone numbers and the practice of leaving phones at home to prevent unwanted calls (Licoppe & Heurtin 2001); and other strategies for managing availability, such as forwarding home phone calls to mobile phones (Palen, Salzman & Youngs 2001).

Secondly, a number of empirical studies have examined the pervasive industry paradigm of 'anywhere, anytime' in relation to the actual practices of mobile workers. For example, Perry et al. (2001) discuss the ways in which mobile

technologies, including paper resources, are used by mobile workers to access information as they work remotely. Wiberg and Ljungberg (2001) identify the dependence of mobile telecommunications service workers' activities upon either specific times or places, or both. These studies reveal that the concept of 'anytime, anywhere' oversimplifies the complexities of actual practice. However, it cannot be debated (with the exception of occasional network loss or device failure) that carrying a mobile device for most waking hours provides users with a potential for interaction and availability that was previously not possible with limited access to fixed resources at fixed times of the day. The access 'anytime, anywhere' paradigm is facilitated by the potential for action and availability that mobile devices afford their owners.

Finally, aspects of availability are often touched on within papers that explore the social impacts of mobile phone use. For example, Ito (2004) observed that friends prepare for future absence by informing others of their impending unavailability. In their study of mobile phone use by teenagers, Ling and Yttri (2002) note that accessibility to friends is of key importance to teenagers for developing feelings of group membership.

These studies reveal that the key aspect of technology use that remains unclear when discussing access 'anytime, anywhere' is the complexity of availability from the perspective of the user. In practice, a person's availability to others is shaped and dictated by the demands of the activities, people, contexts and situations encountered throughout the process of daily living. For example, people's mobile activities do not always occur independently of time and location and instead can be highly dependent upon specific times and/or places (Wiberg & Ljungberg 2001). The technology may provide the potential for availability 24 hours a day, seven days a week, but the people who use these devices are not available in such a straightforward way.

The impact of almost immediate availability to others via technology has had wide-ranging consequences for the ways people interact with each other. Within the literature, the impacts have been discussed in relation to the ways in which people handle interruptions in face-to-face situations (Wiberg & Whittaker 2005), designing to provide awareness of remote contexts to gauge availability of others for interaction (De Guzman, Sharmin & Bailey 2007; Oulasvirta et al. 2007), and changes to the way people coordinate their activities with others as a result of people's immediate response to each other (Ling & Yttri 2002). The common thread through studies of the intrusiveness of technology is the question of how to design systems that support the management of availability in response to the demands of the local situation.

Accessing Information

Another key use of mobile phones that has been described in the literature is for access to remote information by mobile people. Perry et al. (2001), O'Hara et al. (2001) and Oulasvirta and Sumari (2007) describe the use of mobile phones as 'proxy' devices. As a proxy, the mobile phone does not directly provide the user with access to remote documents. Rather, phone conversations are initiated to ask others to gather and send the required information to the remote worker. Another form of information exchange is described by Brodie and Perry (2001) in their study of blue-collar workers. The workers regularly interacted with others to request information such as job serial numbers or to detail steps on how to correct a hair colouring problem. Similarly Weilenmann (2003a) describes interactions between an airport control tower and snow-plough operators clearing snow on airport runways. Information exchanges in this instance included updating others on current and future planned locations in relation to plane movements. Mobile phones provided access to people who could share knowledge to assist with or solve local problems.

A range of recent studies address the issue of people's remote access to information in terms of mobile and daily 'information needs', particularly in terms of people's use of the web via mobile phones (Church & Smyth 2008, 2009; Cui & Roto 2008; Dearman, Kellar & Truong 2008; Sohn et al. 2008; Taylor et al. 2008). For example, Taylor et al. (2008) explored the reasons why people accessed the internet via their mobile phones. They found that the most frequent motivation was for keeping aware and informed of latest events, for example by checking news sites or by scanning for new emails. Church and Smyth (2008, 2009) focus on the ways in which contexts of use shape people's mobile information needs. They found that mobile people used the internet to locate information to solve geographical needs (e.g. to assist in navigation activities), temporal needs (e.g. to find out when events are occurring in the future) and social needs (e.g. to solve gaps in knowledge that arise during local conversation).

Studies of remote information access reveal that people's information needs can be highly contingent on the ways in which their practices are spatially distributed and/or mobile. Different people need access to different types of information and also different ways to access it (Sohn et al. 2008). For example, travelling office workers may contact colleagues at a remote office to send them a forgotten document (see Perry et al. 2001). In contrast, a snow-plough operator may contact the control tower to ask for information to shape their upcoming movements (see Weilenmann 2003a). The coordination of people's movements with others via mobile phones is discussed in the next section.

Coordination

Mobile phones have impacted on the ways in which people coordinate their activities with others. Mobile phones provide the means to both quickly and easily negotiate activities with others, which in turn enables more flexible plan-

making. Coordination forms a core use of mobile phones as people negotiate and mesh their activities and interactions with those of others.

Grinter and colleagues (Grinter & Eldridge 2001, 2003; Grinter & Palen 2002; Grinter, Palen & Eldridge 2006) categorise the different uses of instant messaging (IM) and SMS by teenagers. They found that half of the teenagers' communications were for coordinating interaction with others, while the remaining proportions were for chatting and for other interactions such as sharing jokes and pictures. Grinter and colleagues also found that chatting often eventually led to teenagers coordinating to meet with each other face to face. Other studies explore the dynamics of group coordination across a range of mobile and fixed technologies (Axup, Viller & Bidwell 2005; Heyer, Brereton & Viller 2008). Further studies examine the mechanics of 'rendezvousing' between backpackers (Axup, Viller & Bidwell 2005) and university students (Colbert 2005) to assist in the design of devices to support the specific processes involved. This includes managing the adverse effects of noisy environments while people are coordinating activities with others while moving.

Ling and colleagues (Ling & Haddon 2003; Ling & Yttri 2002) describe a 'softening' of time, with mobile phone users tending to 'micro-coordinate' their actions with others at the last minute. They found that mobile phone users often renegotiated and shifted their scheduled meetings with others. Similarly, Ito and Okabe (2005) found that teenagers sent a series of text messages to friends, becoming more concentrated as the moment of interaction approached, "eventually converging in a coordinated dance through the urban jungle" (p.9).

This flexible plan-making has been discussed in different ways by researchers. Palen et al. (2001) note that mobile phones provide people with the means to perform 'commitment management'. They describe this behaviour in relation to specificity, wherein:

> The specificity with which we negotiate social commitment and the time response required of that commitment, is affected by our accessibility. The more limited the human access, the greater the specificity required. (2001 p.121)

Ito and Okabe (2005) note, however, that, although this type of coordination can be viewed as 'loose' in terms of commitment, lateness may no longer be an issue. Friends are aware and informed of others' movements and they are able to capitalise on waiting time to attend to other things. The role of awareness, both in coordinating activities with others and for maintaining connections over distance, is discussed in the section below.

Awareness

Another integral use of mobile phones is for awareness of the activities, situations, moods, locations, contexts and so on of remote people. Studies of mobile phone use have revealed their integral role in providing awareness of the activities of others, including work colleagues, family members and loved ones (Grinter & Eldridge 2001, 2003; Grinter & Palen 2002; Grinter, Palen & Eldridge 2006; Ito 2004; Ito & Okabe 2005; Palen & Hughes 2007; Palen, Salzman & Youngs 2001; Perry et al. 2001; Sherry & Salvador 2001). For example, as noted in the section above, awareness of others' situations can facilitate the negotiation of upcoming collaborative and mobile activities with others. Awareness can also provide reassurance about any concerns, allowing people to ensure that activities or people elsewhere are 'going OK' (Ling 2000; Matsuda 2005; Sherry & Salvador 2001), particularly during emergency and disaster situations (Lorente 2006; Palen 2002).

In their study of Japanese youth, Ito and Okabe (2005) found that the teenagers engaged in 'ambient virtual co-presence', wherein short messages were regularly sent to provide an update on a person's current situation. Examples include:

> "I'm walking up the hill now", "I'm tired", "I guess I'll take a bath now", "just bought a pair of shoes!", "groan, I just woke up with a hangover", "the episode today sucked today didn't it?" (Ito & Okabe 2005, p.7)

Often brief 'check-in' interactions can also provide subtle clues about a person's status and availability for longer conversations, in relation to their physical location (Ito & Okabe 2005). Ito and Okabe also distinguish between brief 'check-in' messages and longer 'mobile text-chats'. They define 'mobile text-chats' as a series and rhythm of exchanges over time that include both quick status updates and longer reflections of everyday happenings. Similarly, Grinter and Palen (2002) found that teenagers engaged regularly via IM and SMS in conversational threads, chatting through a series of short messages over time, such as asking each other about how their weekend was. Rather than being an ongoing background activity such as 'ambient virtual co-presence', chats occurred over shorter periods of time.

Studies that discuss awareness reveal that there are different styles and rhythms to the ways in which people maintain awareness with others via their mobile phones. As Harper (2003) notes, communication exchanges between people are not all the same, "as if a hello were the same as a summons, as if a whisper from a lover is the same as a bellow from a boss" (p.13). Also, unlike remote information needs that often arise in response to local contingencies, awareness practices occur whenever and wherever opportunities arise. Awareness practices are particularly well suited, as Ito and Okabe (2005) note, to the small communication voids between activities. Potential exists for designers to develop mobile technologies to better support the rich nuances of people's social communications with others (Harper 2003).

2.4.2 Technology Use, both Mobile and Fixed

Recent studies of technology use, both mobile and fixed, are specifically developing insights into how different social groups manage their mobile

practices. For example, Le Dantec and Edwards (2008) explore perceptions of technology among the homeless. They found that maintaining a social connection with a larger world, including connections to family via mobile phones, is critical for people dealing with homelessness. Le Dantec and Edwards' study reveals that different types of mobile people can have different levels of power and control over their mobility. They suggest that technologies can be designed to both support and empower disadvantaged people.

Shklovski and colleagues (Shklovski 2006; Shklovski, Kraut & Cummings 2008; Shklovski & Mainwaring 2005) examine technology use during residential moves. They identify some of the ways in which technologies are used to balance ties to previous homes and the demands of new places. They found that technologies performed an essential function in sustaining key relationships with distant family members. Technologies were also used to deal with the move itself by gathering information about the new area, finding places, and coordinating activities related to the move. Shklovski and Mainwaring (2005) suggest that their exploration of residential moves identifies a range of practices around technology use and unmet needs in which future technologies could play a important role.

Williams, Anderson and Dourish (2008) examine the use of mobile technologies by transnational retirees who share their time between Thailand and the United States. The retirees used mobile phones predominantly to maintain connections with families across continents. Williams, Anderson and Dourish found that the retirees experience breakdowns in technology use as a result of technology infrastructure issues and the juggling of multiple bases in different countries, developing work-around practices to deal with these issues. Williams, Anderson and Dourish have developed specific design implications from their findings. These include rethinking the personal nature of portable devices; dealing with the ways in which people's mobilities are tied to locations,

infrastructures and rhythms; and not assuming that mobile users are also computer users.

A common theme across each of the studies discussed in this section is the use of technologies for maintaining stable connections between mobile people and their families. This theme is aligned with findings of studies of the mobile phone use of people more generally, discussed in section 2.4.1. However, studies of mobile people emphasise the essential role that mobile phones play in keeping people connected to the social worlds they leave behind as a consequence of their movements. This theme will be returned to in the discussion of findings in section 6.2.1.

2.4.3 Opportunities for Further Research

The review in section 2.4 reveals that technology use can vary widely between different types of people as their practices, contexts of use and purposes for interactions differ considerably. Researchers argue that a narrowed focus within the literature on particular types of mobile people has resulted in the development of technologies that do not support the majority of technology users (for example Oulasvirta & Brewster 2008; Perry & Brodie 2005). The literature review reveals that studies of different types of users can emphasise particular aspects of technology use that expand existing findings on the ways in which technologies can be designed to support mobile people.

With an increasing focus on social and cultural mobilities, a growing number of studies are directly examining the relationship between technology use and a wider range of mobile practices to inform technology design (for example Shklovski, Kraut & Cummings 2008; Shklovski & Mainwaring 2005; Williams, Anderson & Dourish 2008). These studies contribute rich descriptions of everyday practice and reveal new opportunities for the design of technologies to support mobile people. These studies also demonstrate that further insights

can be developed by continuing to expand the range of types of mobile people and social groups examined within the literature.

2.5 Film and Television Freelancers

The review of the HCI and CSCW literature revealed no studies in which film and television freelancers were the central focus of the research. Nardi, Whittaker and Schwarz (2000, 2002) included data about the networks of freelancers in conjunction with permanent employees and contractors working for stable organisations. In their work, Nardi, Whittaker and Schwarz examine the intense personal networks that employees in stable organisations draw on to source labour for project work. In contrast, the research in this thesis focuses on the practices of the freelancers themselves, as well as those who generate project work for others. A contribution of this research is the empirical examination of the everyday practices and mobile technology use of this little-explored group of mobile workers.

There are also few empirical studies of the everyday practices of this type of mobile worker in the wider literature, such as in the business literature. Rather than exploring everyday practices, the business literature instead examines freelancing practice from a career trajectory or organisational perspective – for example, teleworking from the home office (Baines 1999), career trajectories or paths (i.e. how people move between projects, such as obtaining future work, the boundary-less career) (Blair, Grey & Randle 2001; Currie, Tempest & Starkey 2006; Jones 1996; Pringle & Mallon 2003) and changing organisational structures towards the externalisation of labour (Applebaum 1989; Laubacher & Malone 2003; Malone & Laubacher 1998; Stanworth & Stanworth 1997). The majority of literature on the subject has focused at the organisational level on the influences that have contributed to the growth of flexible work arrangements (Gallagher 2002).

An important exception to an organisational view of flexible work arrangements is Barley and Kunda's (2004) ethnographic study of contingent workers in high-technology areas. Their research provides important insights from the contract workers' perspective, including the ways in which they manage the uncertainty of their ongoing employment by generating human capital (ongoing up skilling), social capital (social networks) and temporal capital (flexibility to manage work hours and down time). However, contingent workers differ from freelancers in an essential way: freelancers do not join an established organisation to complete a part of the project work with permanent employees. This results in key differences between the work culture and practices of contractors and freelancers. This includes the ways in which freelancers network to secure work and the flexibility of their work.

There have also been few studies that explore the replacement of traditional organisational boundaries with other stable resources, such as relationships and technologies, in order to manage the dynamic work roles and projects of freelance workers. Laubacher and Malone (2003) argue that as modern work increasingly tends towards contract and freelance work, the traditional permanence provided by long-term employers is being replaced by guilds with services to support cross-project stability. These services include professional affiliation, health insurance, trade representation, brokerage and networking services that facilitate the movement from project to project. Laubacher and Malone's work demonstrates that contributions can be made to understanding the mobile work of freelancers by further examining the types of established resources and services they rely on for stability in their working lives.

Along with the call for studies that examine the everyday practices of a wider range of mobile practitioners such as freelancers, Alony, Whymark and Jones (2007) state that there is a clear need to examine the interplay of these practices with changing technologies. They argue, for example, that large corporate ICT

infrastructure suppliers do not understand the mechanisms through which the film and television industry works. Hooker, Lewis and Smith (2007) examine how ICTs enable individuals and organisations to collaborate for economic exchange without formal contracts or formal organisational structures. As a starting point for their research, Hooker, Lewis and Smith aim to define the 'e-lance' phenomenon (see also Malone & Laubacher 1998), that is, the ways in which emerging networks of electronically connected freelancers are reshaping the ways in which business is conducted. They note that:

> While networked organizational forms are not new (i.e. the film industry), what is new about e-lance networks is the ability to coordinate work without same-time and same-place interactions through e-collaboration tools. (Hooker, Lewis & Smith 2007, p.325)

Blair, Grey and Randle (2001) analyse findings from a survey of freelancers in the British film industry to question the usefulness of existing models in understanding the nature of freelancers' employment. They argue that, although the key role of personal networks in obtaining future work have been identified for film and television freelancers, how these networks operate is still largely the subject of conjecture.

The review of film and television freelancing practice in the business literature above reveals three key ways in which this thesis can contribute: by describing the freelancers' experience of contract contingent work from the individual's perspective, by detailing the ways in which technologies are used to manage the uncertainty of project work, and by providing insights that may assist organisations in developing systems and structures to support workers as organisations increasingly outsource work and adopt flexible work arrangements.

2.6 A Note on Nomenclature

Section 2.2 above discussed the complexity of the terms 'mobility' and 'mobile' and the ways in which they have been used within the literature. It is important to note that this complexity has influenced the nomenclature I use in my thesis. The literature review reveals that there is no one definition of mobility that encapsulates the diversity of people's mobile practices. One approach that acknowledges this diversity is the relatively recent emergence of the term 'mobilities' in the literature (see section 2.2.3 above). However, the language of mobilities within the literature, including social and cultural mobilities, developed after the start of my research process.

To address the complexity of mobility, I have referred to the freelancers' 'mobile practices' and 'mobility in practice' throughout the thesis. Where using the phrase 'mobile practices', I refer to the many different ways in which people move, including socially, temporally and spatially, without limiting understandings to one particular instance or definition. By using the phrase 'mobility in practice', I aim to acknowledge that mobility is not an abstract concept. Instead, people's movements are accomplished in practice from moment to moment in everyday lives. Together the phrases 'mobile practices' and 'mobility in practice' centre the research in this thesis on ways of understanding the significance of people's movements, and their technology use and practices, within broader social systems or contexts. Details of the ways in which this perspective shapes the research approach taken in the thesis are provided in the following chapter.

2.7 Chapter Summary and Conclusions

This chapter has reviewed literature within the research domains of HCI and CSCW that relates to understanding the mobile practices and technology use of

different types of mobile people. The chapter has also reviewed the relevant business literature that discusses film and television freelancing practice.

In summary, the key findings of the literature review in section 2.2 on understanding mobile practices are:

- Understanding the role of mobility in shaping people's practices and technology use has been of growing importance to HCI and CSCW researchers since the early 1990s.
- Different understandings of mobility can narrow technology design on very specific aspects of people's movements. Early definitions of the term 'mobility' have resulted in a focus in the literature on movement in terms of physical travel or in relation to a remote workplace.
- Rather than defining mobility, researchers are increasingly exploring people's complex mobilities and related technology use, including the social and cultural aspects of their movements and travel.

The key findings of the review in section 2.3 on understanding mobile practices through contexts of use are:

- With the widespread adoption and use of mobile phones, a growing number of studies within the HCI literature are exploring the relationship between mobile contexts and technology use.
- Some researchers have examined the locations in which mobile activities and use occur. Others have explored the social contexts that are being created through mobile phone use.
- Researchers are increasingly demonstrating that understanding context not in terms of location but in terms of the mediated social spaces that people sustain with others can provide important insights for technology design.

In section 2.4, the key findings of the review on understanding mobile practices through studies of technology use can be summarised as:

- There is a wealth of HCI literature that studies the impacts that mobile phones have had on the ways that people interact with each other, such as the micro-coordinating activities and personal archiving of camera-phone photos and information needs while on the move.
- Studies of technology use, particularly mobile phone use, reveal that people's needs and interactions are highly contingent on the ways in which their practices are spatially distributed and/or mobile. Different types of mobile people have very different requirements for technological support in and across diverse contexts of use.
- Recent studies are emerging that directly explore the relationship between technology use and people's mobile practices beyond the everyday practice. These studies seek to open up understandings of different types of mobile practices to identify opportunities for the design of technologies.

The review in section 2.5 on freelancing practices reveals that:

- Within the HCI and CSCW literature, film and television freelancing practices have not been explored in depth. Within the broader business literature, film and television freelancing practices have been discussed from an organisational perspective, with relatively few studies exploring the perspective of the freelancers themselves.
- Within the broader business literature, although film and television freelancers have been recognised as early adopters of mobile technologies, researchers have identified a lack of studies that examine freelancers' everyday technology use.

To conclude, the review demonstrates three key areas in which the research in this thesis contributes to existing understandings of mobile practices. These are:

- by expanding the types of mobile workers and mobile practices considered to date within the literature;
- by contributing to a growing number of studies that are examining people's movements in relation to social and cultural aspects; and
- by contributing to emerging studies that are exploring the types of social contexts that mobile people sustain and rely on across contextual boundaries.

Chapter 3

The Research Process

This chapter situates the research process within a long tradition of phenomenological and ethnographic studies within HCI, CSCW and related fields. To begin, the chapter reviews the contribution of phenomenological research and studies of practices to HCI, CSCW and related fields. This is followed by an exploration of the methodological challenges of studying mobile practices. This includes emerging efforts to address these challenges. An account of the particular choices and steps taken in the research process is then provided. The selection of the substantive domain of film and television freelancers is outlined. Details of the three empirical studies that form the body of the research are provided. This includes explanation of the iterative evolution from one study to the next. The methods that were used to collect and analyse the field data are then described. The final section of the chapter presents the synthesis of findings on the grounded conceptual tools and practical design representations that both structure this thesis and form key contributions to the research.

The HCI, CSCW and related fields include a rich corpus of naturalistic and phenomenologically inspired field studies (for example Luff & Heath 1998; Okabe & Ito 2006; Palen & Hughes 2007; Robertson 1998; Suchman 1987). These studies initially surfaced within the CSCW literature to both explore the lived experience of technology users and inform the design of technologies to support the collaborative achievement of work. The studies shifted the focus of early HCI research from human factors to the role of human actors within the human-computer dialogue (Bannon 1991). In particular, these field studies established the fundamental importance of understanding the social and interactional organisation of activities. The studies revealed that informal aspects of social interaction can be critical to the achievement of activities and need to be considered when designing technologies to support practice (Bellotti & Bly 1996). The studies demonstrated that many technology design problems emerged as a result of insufficient attention to the social accomplishment of work practices (Hughes et al. 1995).

Recognising the importance of these types of studies to HCI, CSCW and related fields, my research adds to this body of work. The research is grounded in an ethnographic approach, following a social constructionist viewpoint (Bryman 2004a; Delamont & Atkinson 2004; Denzin & Lincoln 2000; Guba 1990) from a phenomenological perspective (Crotty 1998; Fetterman 1998; Guba & Lincoln 1981; Macann 1993; Merleau-Ponty 1962; Moran 2000; Moustakas 1994; Osborne 1994; Patton 2002; Pollio, Henley & Thompson 1997; Reynolds 2006; Schutz 1970; Schutz & Luckmann 1973; Van Manen 1990; Welch 2001). The research is based on the premise that understanding lived experience is essential for designing technologies to support people in the management of their everyday actions and interactions with others.

Sections 3.1 and 3.2 describe the contribution of ethnographic studies and studies of mobile practices to HCI research. Specific details of the research process followed in this thesis are then provided.

3.1 Phenomenological Research in HCI

A phenomenological perspective to research is predicated on an understanding of lived experience as constituted in the intertwined dimensions of the spatial, the temporal and the social. Phenomenologists take the view that humans are not abstracted from the everyday lived world, as some philosophies and sciences presume. Instead we are immersed in and inseparable from it (Reynolds 2006). However, the lived world is not just the natural world. The lived world is also a social world that is shared with others over time (Macann 1993). From this perspective, the social and cultural contexts that shape people's experience must also be acknowledged. Phenomenological researchers hold the view that it is not possible to understand individuals and their actions without also exploring the spatial, social and temporal settings in which these actions occur.

Phenomenologically motivated approaches are well established in the field of HCI and related areas. Phenomenological research prioritises lived experience and aims to develop an understanding of how people's experiences are shaped by the contexts in which they occur. From a phenomenological perspective, research is always a question of the way in which we experience the everyday lived world (Van Manen 1990). This type of research has contributed significant theoretical insights to the field, including situated action (Suchman 1987), the role of perceivable embodied action in collaborative practices (Robertson 1997, 2002) and embodied interaction (Dourish 2001b). It has also resulted in a growing recognition of the need to take into account the practices and perspectives of technology users in the design process (for example

participatory design approaches that include users as active participants in the design process (Schuler & Namioka 1993) and studies of work practices in CSCW (see section 3.2 for some of these).

A significant contribution of phenomenological approaches has been the challenging of, as Wright, Blythe and McCarthy (2006) note, the 'design-as-engineering' approach that has dominated HCI for many years. See section 2.3.1 for further detail of the role of positivist perspectives in shaping technology design approaches. In particular, phenomenologically motivated research can reveal assumptions that underpin technology design in HCI (McCarthy & Wright 2004). Phenomenological research provides access to the meaning of objects, "whether the object is real or imagined, empirically measurable or subjectively felt" (Van Manen 1990, p.9). Phenomenologists aim, as Moran notes:

> … to describe phenomena, in the broadest sense as whatever appears in the manner in which it appears, that is as it manifests itself to consciousness, to the experience. (2000, p.4)

As such, phenomenology is particularly suited to exploring the lived experience of complex concepts, such as 'mobility' and 'mobile'. Rather than pre-defining these concepts, exploring peoples' immediate experience through naturalistic studies can allow possibilities for new understandings of mobile practices to emerge.

3.2 Studies of Practice in a Design Context

Phenomenologically inspired fieldwork within HCI, CSCW and related fields has predominantly taken the form of studies of practice, drawing on an ethnographic approach to research. In these fields, studies of practice have included a wide variety of settings, including control rooms (Luff & Heath 1998), design companies (Robertson 1996, 1998) engineering firms (Bellotti &

Bly 1996), power plants (Bertelsen & Bödker 2001), photocopier use and repairs (Orr 1996; Suchman 1987) and hospital work and medical practices (Bardram 2000), among others. The particular advantage of applying naturalistic approaches and methods lies in the sensitisation to the real world and contextual nature of activities. This sensitisation allows researchers to recognise opportunities for ensuring that technology development is integrated with the circumstances of its use (Crabtree et al. 2003b).

With its roots in anthropology, ethnography began as a methodology that anthropologists utilised to gather materials about the everyday practices of natives from foreign or non-western cultures (Atkinson et al. 2001). Over time the anthropological focus on understanding far-away cultures turned to the study of local cultures, in which researchers may or may not already be an active member. In contrast to less immersive methods, such as surveys, ethnographic approaches advocated long-term fieldwork that combined observation techniques with researcher participation (Dourish 2006). As such, ethnographers analyse the significance and meaning of actions to the participants themselves, within their local, historical and cultural contexts (Tedlock 2000). In particular, ethnography takes the view that human behaviour and the ways in which people make meaning of their everyday lived worlds are 'highly variable and *locally specific*' (LeCompte & Schensul 1999b, p.1, authors' emphasis). LeCompte and Schensul note an important difference between ethnographic approaches and other social scientific methods: ethnography assumes that researchers must first explore what people do in practice, before assigning interpretations of those actions drawn from the researcher's personal experience of the field (LeCompte & Schensul 1999b).

Ethnographic studies within HCI, CSCW and related fields have tended to adapt traditional qualitative methodologies to fit, firstly, the design context and, secondly, and more recently, the mobile context.

Firstly, field studies have predominantly been applied within the formative stages of the design process to develop a rich and detailed understanding of the design context. The studies can identify new design opportunities to pursue, or can develop sensitising concepts for designers to use (Crabtree & Rodden 2002; Plowman, Rogers & Ramage 1995). However, the application of sociological methods to the design domain has also resulted in particular methodological constraints and consequences for ethnographic researchers. These include shortened timeframes for ethnographic fieldwork to fit design project deadlines (Blythin, Rouncefield & Hughes 1997; Hughes et al. 1995; Millen 2000) and a narrowed view of the contribution of ethnography in design arenas to design implications alone (Dourish 2006). As a result, a recurring topic of discussion within the literature has been the resulting departures between traditional, more theoretical, approaches (such as 'pure' ethnography applied within anthropology) and those 'modified', or practically applied, to the design context (Anderson et al. 1995; Button 2000; Crabtree & Rodden 2002; Diggins & Tolmie 2003; Dourish 2006; Plowman, Rogers & Ramage 1995). These researchers, among others, argue that, as a result of the hybridisation of methods and also a general lack of clarity when reporting on methodologies used, the distinction between ethnographic studies, ethnomethodological studies and fieldwork is not always a clear. To address this I aim to provide a transparent account in this chapter of the choices driving my research.

Secondly, the development of modern technologies and transportation has resulted in the complex movement of people and information internationally and locally (Urry 2002). As Dourish notes:

> Contemporary ethnography, then, must concern itself instead with transnational flows of people, capital and culture. This is perhaps especially relevant when considering information technologies – technologies that are both means and embodiments of these globalized practices. (2006, p.548)

The dynamic social reconfigurations that are occurring as a result of the diffusion of technology present particular methodological challenges for the study of interactions across multiple real and virtual contexts. Ethnographies have been increasingly adapted from a traditional focus on spatially localised communities to multi-sited examinations of communal practices (Marcus & Fischer 1999). Examples of ethnographic studies of mobile and multi-sited interactions include the technosocial situations created by mobile phone users (Ito & Okabe 2005) and the online and offline practices of internet communities (Leander & McKim 2003; Taylor 2006), among others. See also sections 2.2 and 2.4 for examples of studies of mobile practices and mobile technology use. The specific methodological challenges of studying the mobile context (people, practices, artefacts and settings) place constraints on traditional methodologies. These challenges are described in further detail in section 3.3. In response to these there are a wide range of mobile methods being applied by researchers to understand the performativity of mobility in everyday life (Büscher & Urry 2009).

3.3 The Methodological Challenges of Studying Mobile Practices

There are a number of specific methodological challenges that emerge when, as Dourish (2004) notes, computing moves 'off the desktop' and we suddenly need to keep track of where it has gone. These challenges come into view as researchers follow people and their interactions with others across broadening geographical areas and a variety of social contexts (for example Axup & Viller 2005; Gant & Kiesler 2001; Hagen et al. 2006; Johnson 1998b; Weilenmann & Holmquist 1999). The methodological challenges of studying mobile practices can be categorised as follows: firstly, the challenge of studying the personal;

secondly, the challenge of studying moving bodies and changing locations; and, finally, the challenge of studying the social. These are discussed in turn below.

Firstly, issues arise when studying mobile technologies as a direct result of the physical scale and size of portable mobile devices. Light (2007) notes that significant changes in everyday practices are due to the fact that mobile phones are now associated with 'individual voices' rather than places and are increasingly closely coupled with the human body, from being carried in pockets to being adorned on the body (e.g. as headpieces). As a result of the small scale of devices, along with the personal nature of use, actually observing or recording the actions of the user with the interface or the device's screen can be physically challenging (Hagen et al. 2006). Examples include difficulties in looking over the shoulders of participants to see what exactly they are doing with their devices (Axup & Viller 2005) and difficulties in observing people who walk away from their immediate locations to privately attend to their devices (Sadler, Robertson & Kan 2006b).

Secondly, there are specific problems for the researcher in collecting materials across geographically dispersed locations and across combinations of virtual and real settings. Traditional methods, such as observation, are much easier to apply in fixed settings (Weilenmann 2003a). In contrast, as Weilenmann notes, mobile practices can occur over vast geographical distances or involve geographically distributed and collaborative interaction. Similarly, longitudinal studies of practice also focus on social situations that exist over long periods of time. When studying highly mobile people and situations, such as short-term work projects or backpackers, communities of practice are fundamentally transitory. This fleeting group setting demands a corresponding shift in study context over time. An additional problem associated with studying people in motion is the issue of recording materials while physically moving; for

example, taking notes while walking can be impractical (Palen & Salzman 2002).

Finally, the challenge of studying the social presents the researcher with the question of the appropriateness of their presence in non-work, potentially sensitive, social settings. Mobile technologies are carried across the variety of contexts experienced throughout the day, including private places, such as in the home, residential care facilities and teenagers' bedrooms (for example Crabtree et al. 2003a; Grinter & Eldridge 2001; Isomursu, Isomursu & Still 2003; Vetere et al. 2005), and public places, such as on trains and in shopping centres (for example Weilenmann 2003b; Weilenmann & Larsson 2001). To gain access to situations that are highly sensitive or are overly interrupted by the researcher presence (with associated ethical considerations), mediated data collection methods, such as diary studies and cultural probes, have been more frequently utilised by researchers (Hagen et al. 2005).

Each of these challenges was encountered during the research process. The challenges of studying mobile practices shaped the choices that were made about methods to use and the nature and length of the field research. Specific details of how these challenges and limitations impacted on each of the three studies are outlined in section 3.6 below.

3.4 The Research Process

The iterative and reflective research process that was followed in this thesis is outlined in Figure 1. The process is based on the framework presented in Kane and Luz (2006, p.505). The research process consisted of the following elements:

- the *substantive domain* of Australian freelance workers;
- *data collection*, wherein three iterative studies were conducted to gather data about mobile practices and technology use;

- the *study process*, which describes the common steps taken for each study during research design and evolution;
- *data analysis*, consisting of inductive analysis of field data; and
- *synthesis*, or drawing together the significance of the findings.

As can be seen in figure 1, the research process was not a linear one of data collection, then analysis, then presentation of findings. Instead, these activities overlapped. For example, data analysis began as soon as data collection was underway, rather than commencing only after completion of data collection. Likewise, analysis from one study informed the design of and data collection in subsequent studies, which then informed the analysis of previous studies.

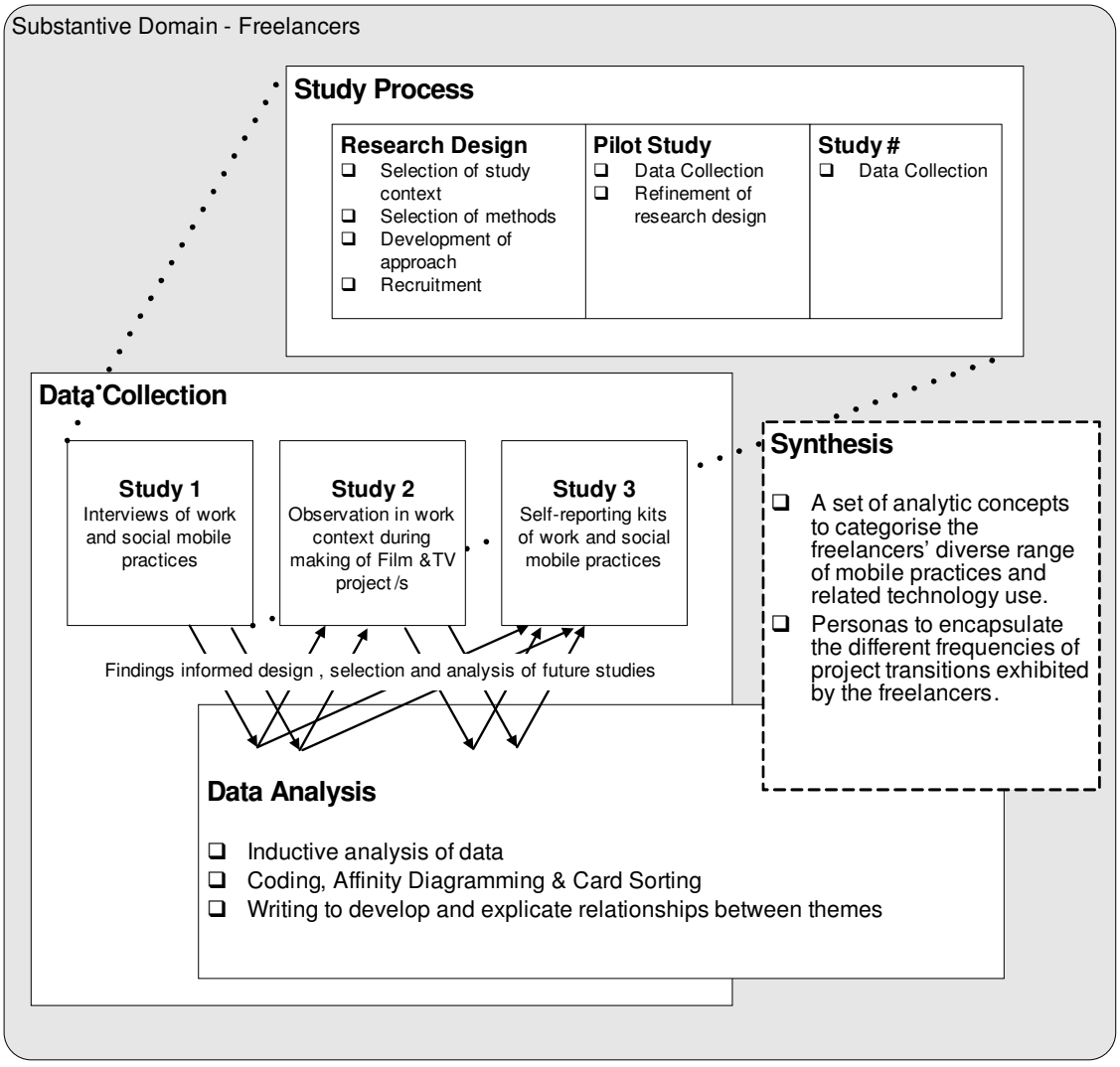


Figure 1: An overview of the research process.

Each of the elements in figure 1 and the relationships between the stages of data collection, analysis and synthesis are explained in detail in section 3.8 below. Wherever possible I have attempted to provide a clear description of how and why the research has been conducted in this chapter to enhance the confirmability of the research through accurate documentation (Kirk & Miller 1986).

3.5 Substantive Domain

As stated in section 1.2, participants were selected from the substantive domain of freelance workers, predominantly from the film and television industry. I initially recruited participants for the research by my asking freelancing friends to put me in touch with people I did not know through their extended freelancing networks. This provided a convenient yet purposive sample (Bryman 2004b) for the research. These participants became sources for further 'snowballing' of recruitment (Bryman 2004b; LeCompte & Schensul 1999b) by providing contact details for other study candidates through their networks. In conjunction with activating networks, requests were also posted for participants on group electronic mailing lists to freelancing collectives. I also cold-called 31 production companies to ask for entrée to any upcoming projects they might have. After sourcing participants and study contexts through each of these selection methods, 23 participants were involved in the research. A small number of these participants participated in more than one study. However, due to challenges in accessing work sites, personal time and film productions, it was not possible to follow any of the participants across all three studies. See appendix A for a listing of the participants and their involvements.

Participants in each of the studies were from a wide demographic, including women and men:

- across age brackets from 27 to 42;

- in relationships, with or without children, or single;
- who lived in Sydney and Brisbane; and
- who worked locally and/or nationally across Australia.

The common characteristic, however, that distinguished each participant was their ongoing employment on short-term work projects with changing employers at changing locations throughout the year. An equal number of male and female participants was sought for all studies (where possible) to eliminate any gender bias in the collected data. Small sample sizes were selected for each study to allow for the collection of in-depth and detailed information about mobile freelancers and their practices, in line with a qualitative approach. All of the participants also recalled their social and work practices before the adoption of mobile phones. This allowed insight into the role of mobile technologies in changing work and social practices over time.

3.6 Data Collection

In order to understand the mobile practices of the freelancers and to address the challenges of exploring mobile practices, as described in section 3.3, an iterative approach was taken. At the start of the research process I planned to conduct a longitudinal study over a period of months or years. However, I quickly experienced issues with, firstly, locating participants who were willing to provide access to both their work and private lives and, secondly, negotiating access to multiple work locations, social situations and employers over time. As such, three iterative studies of practice were conducted to access the freelancers' mobile work situations and social contexts.

The purpose of an iterative approach was twofold. Firstly, the studies allowed the collection and analysis of data, followed by a refinement of the research questions before returning to the field for further in-depth exploration of

emergent themes. Issues identified in early studies were explored in subsequent studies.

Secondly, by conducting a series of studies it was possible to use a range of data collection methods throughout the research process. By nature, mobile situations do not endure for long periods of time. As a result, the series of studies provided access in order to both observe practices during short-term work projects and to explore cross-contextual boundaries. The iterative studies also triangulated both the sources of information and the methods that were used to collect different information about the same topic. The triangulation of methods and sources ensures credibility for qualitative research (Janesick 1998). As I was the solitary data gatherer and data analyser, attempting to gather materials about mobile people and situations over geographically disperse areas, it was important to triangulate the collected data both by using a variety of sources and methods.

The focus in each of the studies was to gather details about the types of interactions that participants had with other people and their technologies. As with Okabe and Ito (2006), this included the gathering of contextual data about the location, setting and situation of people's actions in addition to information on the actions themselves. For example, each of the studies was designed to collect materials about where and when activities occurred. This allowed the gathering of information about series of related communications both within and outside of working hours.

Each of the studies collected information about practices across the period of the week. Drawing on Zerubavel (1985), Palen and Hughes (2007) note that the rhythms of the week form a cyclic temporal structuring that shapes our social lives. Palen and Hughes conducted a study of the use of mobile phones by family members, using the period of the week as a high-level guide for the empirical design of their research. Differences in daily routines and practices on

different days influence the ways in which technologies are used to coordinate, prepare and organise everyday practices of individuals and families. Gathering data across a period of time allows the possibility of identifying the role of temporality in social interaction and hence people's relationship with ICTs (Palen & Hughes 2007). It also allows for the development of a contextual understanding of everyday life settings of technology use, rather than of work or social practices alone.

A common research process was followed across each of the studies. Each study began with a research design phase. Once this was completed, pilot studies were held with freelancers to evaluate study methods and content. This led to an iteration and refinement of the research design process. Finally, pilot studies were followed by the study 'proper', wherein data was collected for analysis and contribution towards the body of data for this thesis. This was an incremental process that evolved over time as the analysis from one study informed the selection of methods and types of information to collect in subsequent studies. The phases of the data collection process are described in further detail below.

3.6.1 Research Design

Considerable time was spent before entering the field to ensure that research processes, methods and tools were selected, as Jordan (1994) notes, based on their suitability for collecting information relevant to the research questions. As LeCompte and Schensul (1999b) note, good research design, although time consuming, saves time, headaches and money while allowing the research objectives to be achieved. Specific choices guiding the selection of individual studies (including limitations due to access issues) are described in more detail in section 3.6.3. However, a specific goal in choosing the situations to study was to ensure, as Eisenhardt (1989) notes, that emergent themes were replicated and extended with further research to fill conceptual categories. In other words,

themes that emerged, or were indicated in earlier studies, were deliberately pursued in further studies to fully explicate those themes.

Methods utilised in this research process included semi-structured interviews, direct observation and informal interviewing and self-reporting kits combined with post-interviews. As Denzin and Lincoln note:

> No single method can grasp the subtle variations in ongoing human experience. As a consequence … qualitative researchers deploy a wide range of interconnected interpretive methods, always seeking better ways to make more understandable the worlds of experience that have been studied. (1998, p.25)

Through the diversity of the gathered materials, it was possible to both deepen the exploration of emergent thematic areas and gather a range of data at different stages. For example, the self-reporting kits allowed for the gathering of detailed information about the specifics of participants' social practices, including their reflections on their own technology use and behaviours. These were aspects that did not emerge in early interviews, due to issues with memory, the duration of data collection periods and possibly participants' decisions on the relevance of seemingly 'trivial' information about daily practices. Approaching the problem from different angles provides both a broader picture of the diversity of mobile practices and triangulation of data, including methods and sources. The combination of these methods particularly suited the collection of data about people's mobile and social practices across contexts.

3.6.2 Pilot Studies

Each of the studies was initiated by conducting a trial or pilot of the method to be used, followed by iteration in the research design process. For example, a pilot interview was conducted prior to the start of Study One, and the self-reporting kit development process (reported in appendix B) began with a series

of small trials to experiment with the place, use and role of specific activities in the kit. Pilot studies are an effective way, with little time commitment before full engagement in the field, to test research questions, explore previously unclear areas, and develop effective communication patterns with participants (Janesick 1998). It is also important to note that the 'test' participant was always a freelancer who, as a highly knowledgeable member of the substantive domain, was able to provide, as Oksman (2006) notes, induction and orientation into the research context prior to 'official' entry.

Materials gathered in these trials were used to develop, rethink and refine research methods. These materials were not included in the body of the analysed data. Instead, the trials were used as a valuable learning experience. This illustrates one aspect of my view of research – as a process and experience of 'learning-by-doing' (Soloway, Guzdial & Hay 1994) and 'reflection in action' (Schön 1991). As a developing researcher, I used the trials to improve the application of the research methods in each study, while at the same time developing my own research skills.

3.6.3 The Studies and their Evolution

The three empirical studies that formed the body of data for this thesis are described in this section, along with an explanation of the evolution from one study to the next. Specific details about these studies, such as the focus, participants and methods used, are detailed in the text and in Table 1.

Study One: • Eight semi-structured interviews, 1-1.5 hours • Participants were freelancers from media industries including technical writers, Film & TV. • The study aimed to identify issues of most concern to participants to guide next studies. • Materials were gathered about work patterns, weekly activities and artefact use. Audio recordings were transcribed in full. • The study revealed emergent themes, including issues for freelancers such as the need for selective hyper-availability at different durations, the use of multiple technological platforms for coordinating project transitions, reliance on the continuity and immediacy provided by mobile phones, and the need for sustaining social connection during unpredictable working hours. • Findings were indicative. Emergent themes required in-depth exploration to gather sufficient detail. Participants contradicted themselves as they talked about their activities.
Study Two: • Observation on a 5-week project during the making of a television advertisement. • Participants were Film and TV freelancers. • The study explored the 'why' of technology use in relation to the collaborative process of mobile project work. The focus was on the ways in which freelancers used their technologies to communicate with people both on and outside of projects. • Material was gathered about patterns of work and daily technology use. Field notes were hand-written and extended to full transcriptions immediately after field work. • The study emphasised the interplay of mobile practices and stable social bases, such as booking agencies and informal networks in the absence of a remote office. The freelancers almost always used mobile phones for activities unrelated to their work. • It was difficult to observe the freelancers' mobile phone conversations as they walked away from the action to attend to personal calls in the work setting. The study revealed that social and personal matters pervaded the freelancers' work, but not how and why.
Study Three: • Eight self-reporting kits (2–3 hrs to complete contents) and post-interviews of 1-1.5 hrs • Participants were Film and TV freelancers. • The study explored the personal and social aspects of technology use. Further information was gathered about the freelancers' practices and technology use outside the work context and across traditional contextual boundaries. • Materials were gathered about work and social activities by collecting data about daily movements and technology use in and across different contexts. Materials included drawings, cartoons, photos, postcards and audio recordings that were fully transcribed. • The study revealed that a predominant use of technology by the freelancers was for sustaining connections, particularly to manage job uncertainty and variability. Sustaining relationships, both to secure work and to keep social lives going during work hours, was essential for generating stability in mobile working lives. • Rather than identifying new themes, the findings from this study provided overarching connections between themes found in earlier studies. The study performed an evaluative function to confirm the relevance and fit of emergent themes to the freelancers' practices.

Table 1: A summary of the three studies

Study One

The research began with a series of exploratory interviews with eight freelancers from a broad range of media industries, including graphic designers, technical writers, and film and television workers. Freelancers were recruited from a range of industries to determine how best to address the research questions. From the phenomenological perspective of the research, it was important to identify the key concerns, experiences and issues from the participants' points of view. To understand their perspectives it was essential to develop a clear understanding of the problem domain that was grounded in and by the real concerns and behaviours of freelancers.

Participants in the study provided details about their work histories over the previous year, their work roles, and their daily movements and activities across the week. They also provided specifics of their mobile phone use across the preceding few days. As such, depending on the day of the interview, data was gathered about mobile phone use on working days and on weekends. Further information was elicited about both the mobile and fixed technologies they used on a regular basis, the types of applications they used and why, and their experiences using portable devices in everyday life. Participants were asked to bring along their phone bills, diaries and portable technologies to the interview to serve as memory prompts and as artefacts that could be used as a concrete basis for discussion.

The freelancers involved in this study were interviewed, using a semi-structured format, for approximately one hour each. Interviews were selected to ensure that research questions were relevant to the participants without the commitment of time required for longer-term in-situ studies. Conducting interviews at this early stage was an extremely effective method for gaining access to detailed descriptions of the day-to-day practices of the freelancers. According to Schensul, Schensul and LeCompte (1999), exploratory

interviewing allows the researcher to expand their knowledge of areas in which little is initially known. Also, an interview guide was developed, containing a list of general topics to cover during each interview. As Patton (2002) advises, the guide was used as a support tool to ensure that certain basic areas of information were covered with each interviewee. The guide was used loosely as a memory prompt rather than as a script or sequence for specific questions. Emergent issues were explored as the participants raised them.

Questions were asked that were open ended, combined with deliberate requests for stories about experiences that people had had, to illustrate key points. I viewed the interviews as a conversation rather than as information extraction sessions. In particular, I did not see myself as a neutral data collector. Interviews were, instead, as Fontana and Frey (2000) note, negotiated accomplishments between myself and the interviewees, shaped by the contexts in which they occurred. I shared stories with the participants as the interviews progressed. The sharing of stories about experiences served two clear purposes in these interviews. Firstly, it provided an immediate means to access concrete examples of experiences that people had previously had to illustrate and clarify key points. Secondly, one tale always led to another. The sharing of stories often escalated to 'even better' stories from the participants, revealing key points through more than one experience. An awareness and sensitivity to the usefulness and role of narratives during subsequent interviews and research stages developed from the very first interview. Narratives then formed a part of subsequent studies and data collection strategies.

This initial study provided 'broad brush' indications of aspects of mobile practices and technology use that would require further explication and exploration. Emergent themes needed to be explored in further detail to understand how and why they formed core practices for the freelancers. As the analysis progressed, it became clear that the interviews provided detail about

one side of the freelancers' interactions with others. An in-depth longitudinal study (Study Two) could provide more detailed contextual information about both sides of the interaction between communication partners. The interviews also demonstrated a gap between the participants' talk about their own activities and the activities themselves. For example, a number of the participants noted that they never switched off their phones. This contradicted concrete examples they provided at other times about urgent or funny situations that occurred when their phones were turned off. Central to understanding the freelancers' practices and technology use was observing these actions in context.

Study Two

For the second study I observed a team of freelancers making a film and television project over five weeks. This second study examined the freelancers' patterns of mobile work practices and how they used available technologies to collaborate with people working on the project and also people outside the project. The project included a week of pre-production, one day of production or shooting, and a further period of four weeks for post-production and stakeholder approval. Varying numbers of staff, with different skill sets, were involved at each stage of the project, ranging from as few as two people during editing sessions to 29 on the day of the shoot. Of these 29 people, 23 were freelancers and six were full-time employees of the advertising agency and its client company.

With a focus on individuals and their roles in the unfolding collaborative work, participants were selected for observation due to their accessibility on site. The participants were the people who were present and working at the sites at which observation occurred. This type of sampling is described as 'opportunistic sampling', wherein selection relies upon the encounters that occur between the researcher and informants while in the field (DeWalt &

DeWalt 2002; LeCompte & Schensul 1999b). These participants, however, represented a wide range of mobile freelance work patterns, with employment periodicity ranging from one day to the full five weeks of the project. In the production offices and during the post-production process, the director or producer introduced the project team members who were present. At the start of each work session I was able to let people know what I was doing there, asking for their consent to observe their practices. In contrast, during the shoot, team members were actively working from the moment they arrived on the set. In this situation, I waited for opportunities to inform people of the research and obtain their consent to participate during short lulls in the work.

The freelancers' practices were observed at four locations throughout the project process, depending on where the main focus of the work was happening. This work and the corresponding locations included:

- preparatory (pre-production) work at the production company offices;
- the filming of the advertisement content at a domestic residence hired for the day of the shoot;
- sound recording at a sound post-production facility; and
- the inclusion of graphics and image grading at an online post-production facility.

The focus of the fieldwork was not so much on the specifics of the freelancers' work activities but on the underlying work that people did to complete a necessarily highly mobile project process. Understanding the dynamics of the freelancers' work practices, and how they were organised, enabled and supported by technology use, was seen as key to understanding the role of mobility in practice. Data was collected about the ways in which the freelancers' work was supported or enabled by their physical movements and technology use throughout the project process. This included their interactions with others

while they moved, the technologies they utilised, and the various locations in which the work occurred over time.

I attended the freelancers' work locations as an observer with a moderate level of involvement in the field. This researcher role sits between the spectrum of passive to complete involvement, wherein the researcher attends the field to observe yet plays only a small part in the unfolding activities (DeWalt & DeWalt 2002). My level of involvement was predetermined by my low level of experience with the film-making process. I did not have the necessary skills or knowledge to operate camera equipment or produce a television advertisement. I did however attempt to ensure that my presence was not a hindrance and assisted wherever I could, by collecting and carrying artefacts, going on coffee runs and giving my opinion when asked about small aspects of the work. During each period of observation, I had many informal conversations with participants during breaks and lulls in the work. In these conversations I followed the lead of the participants as they described the significance of their actions. I asked the occasional question to clarify actions and processes I did not fully understand. This enabled the topic of conversation to be focused on areas of particular interest to the study (DeWalt & DeWalt 2002). I also gathered copies of the two paper documents that were used to support the project work: the call-sheet listing contact details for all of the staff, OH&S information and directions to the work locations; and the storyboard demonstrating the overall narrative structure of the advertisement as a guide for the workers.

One of the key findings of the second study was that the freelancers relied almost solely on their mobile phones to interact with others while at work. However, they rarely used their mobile phone in relation to the locally unfolding work. They used their phones for managing upcoming work and for connecting with friends and family. As a result, it was difficult to observe the freelancers' technology use; they walked out of earshot of others to attend to

these personal concerns at work. It was possible to collect in-depth information about mobile phone use on the rare occasion when it was directly related to the immediate work situation. However, without information about the predominant use of mobile phones for personal concerns, it was not possible to obtain a holistic picture of the role of technologies in managing mobile practices with others across projects and contextual boundaries.

Another key theme that emerged from this study was the interplay of mobile practices and stable social bases. The freelancers' mobile work was supported by a range of people, places and technology that spanned across projects and temporary work locations. Further detailed exploration was required to fully understand the role of technologies in allowing the freelancers to access this range of stable resources and relationships. In the third study it would be necessary to access information on both the use of technologies for sustaining practices and personal and social interactions in the work sphere.

Study Three

To address the limitations identified in the earlier studies, the third study consisted of eight self-reporting kits distributed to film and television freelancers, followed by post-interviews. The focus in this study was on technology use and practices leading up to and during out-of-work events across work and social contexts.

The method used in this study, which I call the 'self-reporting kit', draws upon both cultural probe methods (such as Gaver, Dunne & Pacenti 1999; Kjeldskov et al. 2004; Mattelmaki 2005 and Vetere et al. 2005) and self-reporting diary studies (including Carter & Mankoff 2005 and Grinter & Eldridge 2001). Self-reporting has been found to be a particularly useful data collection method for gaining access to socially sensitive situations and locations (for example Crabtree et al. 2003a; Crabtree et al. 2002; Mattelmaki & Battarbee 2002).

Participants in the third study provided details about their daily movements and activities across a consecutive five-day period – three working days and two weekend days. This period of data collection was constrained by the self-reporting method itself. During the pilot study, time emerged as a critical element in the design of self-reporting activities. (See appendix C for a discussion of this constraint on the kit content design.) The freelancers with heavy workloads did not have a lot of spare time to take part in the study. As a result, to attract participants to the study it was important to develop self-reporting activities that did not require long periods of time to complete.

Hagen et al. (2005) identify a number of limitations with self-reporting methods such as cultural probes and diary studies. These include, firstly, recording information about indirect and/or involuntary participants and, secondly, recording digital media in locations in which the use of photos and/or video are prohibited, such as shops or cinemas. In addition, Carter and Mankoff (2005) observe that in-situ recording requires work on behalf of the participant and may be a distraction from their activity at hand. They further note that the use of interviews to interpret the recorded information removes the participant from the immediacy of the events as they occur.

The above issues were addressed in the research design phase of the study through the careful selection of kit contents. The contents were developed based upon information obtained from previous studies, to provide a contextual base for the kit items. The combination of items within the kit allowed the participants to choose which elements they felt comfortable completing in different contexts. The inclusion of a range of reporting media types, such as audio recordings and drawings of practices, avoided the need to record visual media in inappropriate places. The kit contents were also designed to capture narratives about the freelancers' personal experiences. These narratives had an unplanned benefit during the post-interviews: they

allowed the participants to reflect on and talk about the significance of their practices and technology use.

The kit development, including selecting contents and trialling the kits on freelancers before implementation in the full study, occurred over a number of months, undergoing a series of design evolutions. Initial contents were developed and adapted from Gaver et al.'s (1999) descriptions of the cultural probe contents used in their study of retired people's experiences of place. With this as a starting point in my pilot study, I began with similar elements, such as postcards, a disposable camera and a diary. These elements were trialled and iterated in order to gain an understanding of the types of responses that people provided and the match between this type of information and the research questions. A full description of and reflection on the iterative research development process for Study Three, along with photos of the final kit contents, is included in appendix C.

The final contents of the kit included the following:

- *Mover's and Shaker's Maps.* In these mobility maps participants recorded their daily movements, including both the places they travelled to throughout the day and the significance of these places for the activities completed there.
- *The Story Box.* This was a small audio recording device with instructions to record small narratives of a range of mobile phone experiences. The experiences were linked to the extremes of 'heaven', 'purgatory' and 'hell' to stimulate participants' recall about the small and the large moments of mobile phone use in their everyday lives.
- *Postcard Central.* Wrapped up like a present, these postcards each listed a single provocative question to elicit experiences and concepts from the participants' perspective. Examples include 'What is mobility?', 'How

have mobile devices changed your life?', 'Tell us about something a) meaningful and b) useful that you have stored or saved on a mobile device. For each of these, when was the last time you accessed this and why?'

- *Say Cheese.* The participants were provided with a disposable camera with directions for a range of photos to take while out and about. Examples include taking a photo of 'Your home', 'Your current mode/s of transportation', 'The mobile technologies you own', 'The contents of your bag/s and/or pockets. Repeat this if the contents change at any time over the weekend'.
- *Australian Splendour.* A blank template for a 'day in the life of' cartoon was provided for the participants to draw an ordinary day during the kit recording period. Stickers were included in the kit to assist the participants with this activity, along with a sample cartoon of an everyday event from the comic *American Splendour* (for example Pekar & Collier 2003) to emphasise the ordinary nature of both the content and the drawings.

In addition the kit contained a range of lollies and chocolates for the participants to nibble on while completing the range of tasks in the kit. Figure 2 is a photograph of the final kit contents presented to the participants.

Figure 2: The self-reporting kit contents.

Once completed, a post-interview of 1-1.5 hours was conducted with the participants to further contextualise and interpret the completed kit contents with the participants themselves. The post-interview was an important extension of the kit that was used to gather contextual information on situation and significance, in addition to the 'what' of the participant's everyday practices. An interesting side-effect of the self-reporting process was that the kit contents provided the participants with highly detailed memory prompts of their recent activities. To ensure that this detail was not lost, the post-interviews were conducted as soon after completion of the self-reporting phase as possible.

The post-interview also directly affected the choice and style of activities included in the kit. An interview allowed the kit contents to be targeted to collecting more fragmentary information, minimising the quantity and duration of situated logging required of participants. The interview then was used to collect further specific detail around the recorded information. Details were

gathered about the role of technologies beyond mobile phones for sustaining relationships across work, social and project boundaries in the post-interviews.

3.7 Recording of Data

Across all three of the studies, data was recorded and collected using a rich range of media. Interviews were recorded using an audiotape recorder. Notes were not taken during the interviews, as I felt that this would intrude on the conversational style of the interviews. Observations were recorded throughout the day as 'scratch' or 'jot' notes (Bernard 1995; Sanjek 1990) on a notepad as the work progressed. This notepad was put away during both formal and informal breaks in work. As suggested by DeWalt & DeWalt (2002), these 'jots' – short words, phrases and sentences – were recorded primarily as memory aids and later extended to full field notes. While observing practices, a digital camera was used to take photographs, again as memory prompts after the event. Video and audio recordings were not taken as these were too intrusive on the flow of conversation and action. For the third study, the participants provided a rich assortment of data in the form of audio recordings, photographs, drawings, cartoons and written responses on postcards. Across all three of the studies the audio recordings were transcribed and photographs were printed so that all of the data was available in one common medium for analysis. The analysis process is described in the following section.

3.8 Data Analysis

The goal of interpretive data analysis is to compare findings to similar and/or dissimilar phenomena (for example with findings in the literature) and to develop a shared understanding of human practices in particular settings (LeCompte & Schensul 1999b). The analysis focused on both the issues and concerns raised by the participants themselves and their actions and

interactions with others as they managed variable work conditions and ongoing job uncertainty.

The analysis drew on different analytical orders of the human world, from a social constructionist perspective, as a conceptual frame to examine the data. Social anthropologist Jenkins (2004) describes three distinct orders, drawn from work by sociologists Giddens and Goffman:

- the *individual order*, made up of embodied individuals and that which goes on in their heads;
- the *interaction order*, the social world as constituted in relationships between people; and
- the *institutional order*, the established ways of doing things in the human world of social patterns and organisation.

Jenkins notes that these three orders simultaneously occupy the same inter-subjective and physical space, making it impossible to talk about one without at least implying the others. This conceptual frame assisted me in thinking and talking about the different temporal, social and spatial dimensions of the freelancers' experiences. A focus on people, their relationships and the social context of their actions allowed the exploration of the significance of instances of technology use for managing mobile practices.

At a methods level, a set of data analysis methods was developed for use in each of the studies, including categorising, memo-ing, card sorting and affinity diagramming. The data analysis process was refined and influenced by particular methods described within the literature (for example Fetterman 1998; Glaser 1992; Lincoln & Guba 1985; Miles & Huberman 1994; Patton 1990). As Janesick (1998) notes, the researcher develops a system of coding and categorising the data early on in the process of analysis, as there is no one best system for analysis. In this research, a combination of data analysis methods

assisted in the development of an interpretive and grounded understanding about the freelancers' everyday practices and technology use.

Further to this, as both a researcher of mobile technologies and a person who uses these technologies, I led, as Oksman (2006) notes, a 'double' role throughout the research process. In addition to simply observing and analysing the activities of other people, I experienced the phenomenon under study. Although this is not addressed in detail in this thesis, it is important to note that I reflected on my own experiences of both everyday mobile practices and technology use in relation to the research findings in order to check for resonations of interpretations with my own personal experiences.

The complete data set gathered during data collection (including photographs, transcriptions and documents) was analysed by systematically coding the data and recording emerging ideas. The specific details of the data analysis process employed in this research are provided below. This process was common across all three of the studies.

3.8.1 Data Transcription

The analytic process began while making full transcriptions of the collected data. After completing each study, time was spent, as per Emerson et al. (1995), taking in the entire record of the experience of data collection as it evolved over time. Across the three studies, this included the transcription of 24 hours of interview data; handwritten field notes taken during 42 hours of observation; and the transcription, where possible, or transfer of eight self-reporting kits (consisting of 2-3 hours of data recording by the participants themselves) to electronic format. The transcription of data was not a selective process: all field data was transcribed in full (verbatim or by writing extended field notes). This ensured that I was fully sensitised to both highly relevant and potentially relevant information (Patton 1990). Any data that could not be transcribed, such

as artefacts, were organised, stored, read, re-read and categorised by hand. These items, including paper documents distributed on location and kit items such as mobility maps, were then linked back to the transcribed data via a series of codes and written links in memos. All electronic data was then stored in projects using NUD*IST Vivo (NVivo) (Fraser 1999).

3.8.2 Emergent Themes within the Data

Drawing on a range of data categorisation techniques described by Glaser (1992), LeCompte and Schensul (1999a) and Miles and Huberman (1994), the data was 'descriptively' grouped as soon as it was transcribed. Descriptive categorising attributes a label or phenomenon to a segment of text (Miles & Huberman 1994) to represent its meaning. Categorisation is the first step to conceptualising the data and serves to organise the copious amounts of data that have been collected (Bryman & Burgess 1994). Constant comparison was used to identify and distinguish between different themes. This allowed the identification of, as Janesick (1998) notes, repeating indices of behaviour that occur over time and in various periods during the studies. The constant comparison process provided an initial way of removing redundancies and identifying similarities and differences between already labelled concepts. In addition, where possible, participants' own words were used to label themes, to keep these close to the informants' meaning. As such, themes identified during the analysis process emerged from the data. This inductive approach ensured that there was no predetermined characterisation of the phenomenon under study. A predetermined characterisation results only in a variation of parameters to test the characterisation (Suchman 1987).

Data categorisation was conducted both on paper by hand and using NVivo software. An example of NVivo themes is provided in Figure 3. This figure is a screen capture of an interview transcription with accompanying themes. Once the data was fully grouped, these low-level themes were printed on paper and

then grouped by hand. Due to the scale and quantity of the data, I found it difficult to group these themes into higher-order categories on the computer. NVivo was used mainly for data storage and initial data labelling and as a starting point for extensive writing and further categorisation (i.e. linking and grouping by hand).

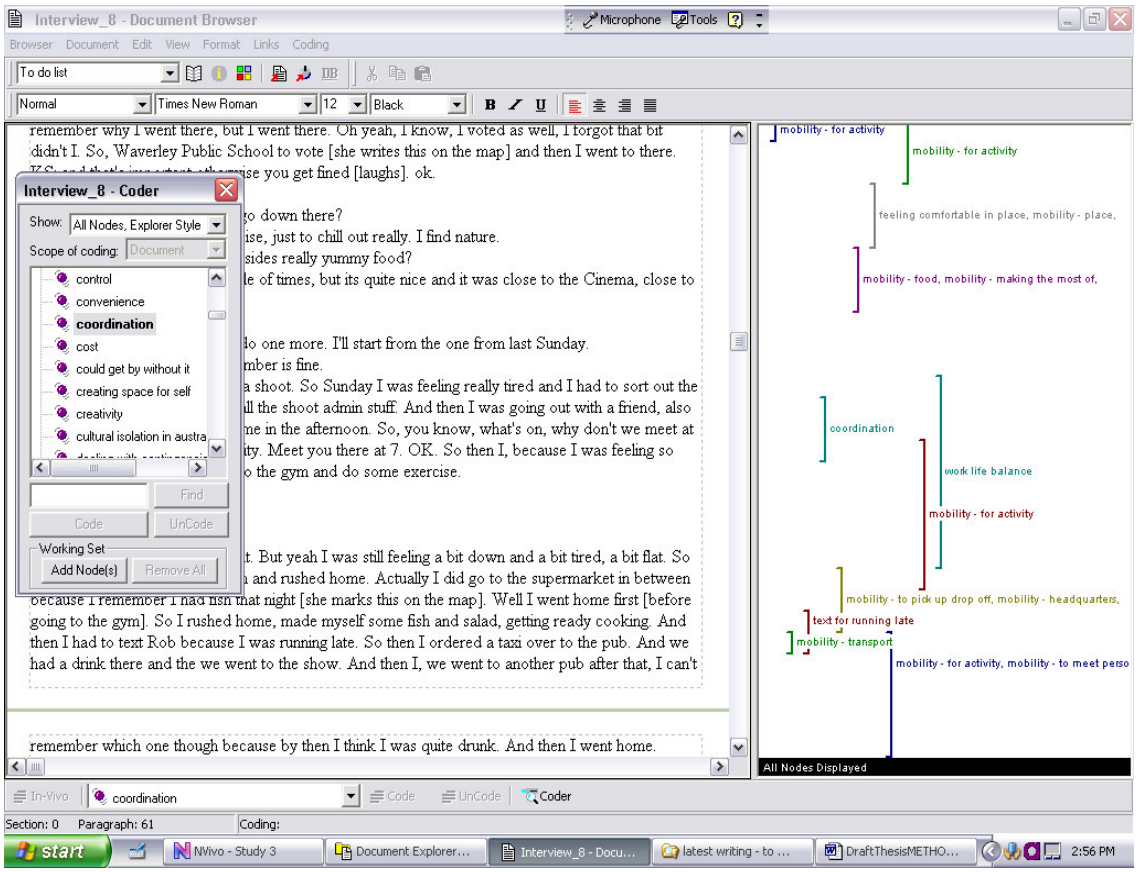


Figure 3: Example of data coding using NVivo software.

3.8.3 Grouping Themes – Card Sorting and Affinity Diagramming

After the initial labelling phase using NVivo, themes were handwritten on cards. Cards were then sorted into groups to identify relationships between lower-order themes. Groups of cards were then organised into affinity diagrams (Miles & Huberman 1994) to further explicate relationships, using large pieces of butcher's paper. Where possible, after identifying higher-order themes, I then returned to NVivo to recode the data. The higher-order themes, or 'inferential' codes (Miles & Huberman 1994), were developed to illustrate

emergent patterns. For example, the theme of *transitioning* was developed to encapsulate the different uses of technology for managing uncertainty and change. Lower-order themes related to *transitioning* included micro- and macro-coordinations, improvisations and dealing with contingencies. This process is demonstrated in Figure 4, Figure 5 and Figure 6.

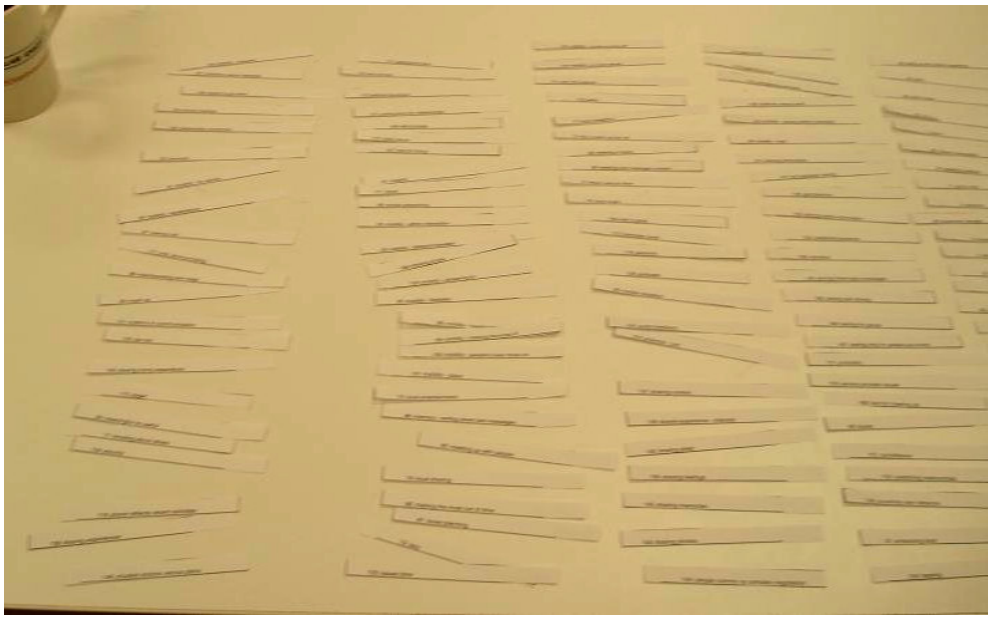


Figure 4: Example of listing of low-level themes from NVivo on paper.

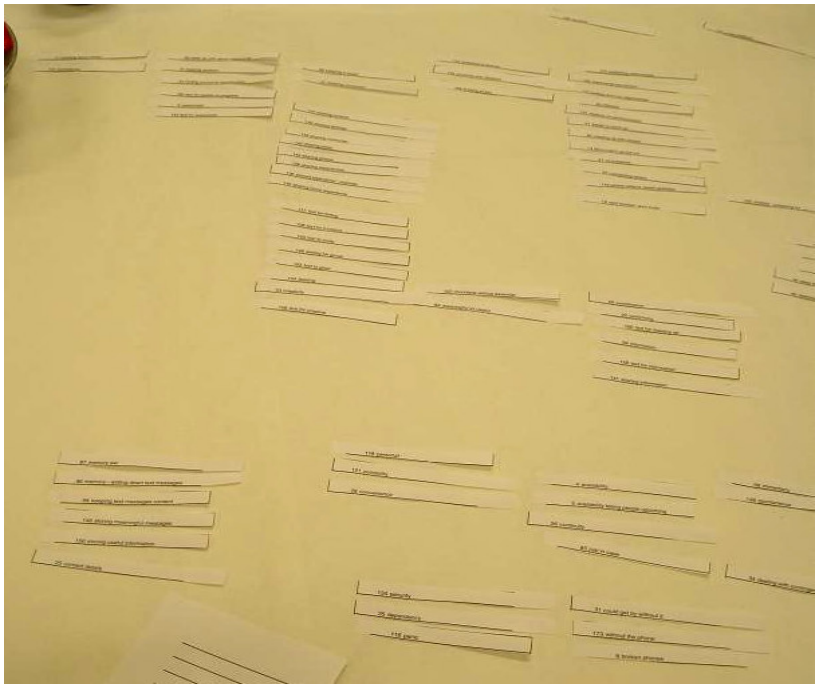


Figure 5: Example of sorting and grouping of themes on paper.

Figure 6: Example of identifying relationships between themes on paper.

3.8.4 Personas

During the data analysis, I identified three different patterns of project transitions among the freelancers involved in the studies:

- freelancers who frequently changed jobs, sometimes on a daily basis;
- those who experienced monthly to quarterly job transitions; and
- those who experienced relative stability as they worked predominantly out of an established office across projects.

Three personas were developed to represent these patterns, drawing on the HCI literature on scenarios and personas (for example Grudin & Pruitt 2002; Nielsen 2002). These personas were a useful tool for thinking through the complexity of the freelancers' project transitions and technology use. The personas represent the freelancers' different reliances on places, transport, technology and resources as a result of their varying job frequencies. The personas are included in appendix B.

3.8.5 Analysis through Writing

Once higher-order categories were developed, they were immediately written up in point form and then full form to progress the analysis. During and after completion of the writing process, emergent themes from each of the studies were compared with the extant literature. The literature was used as a secondary source of data to test and confirm the developing understanding of mobility from field data. Glaser (1992) describes the derailment that can occur in qualitative data analysis as a result of contending with preconceived concepts and assumptions from literature in the research domain. He proposes that researchers should not review any of the literature in the substantive domain so that themes are truly emergent. This is almost impossible to do, although I attempted to 'bracket' the literature and leave thoughts of it aside while analysing the data. Comparing findings with the literature in the later stages of writing allowed the identification of convergences and divergences between the data and the research domain. Reading the literature at this stage played an important role in further explicating themes and the relationships between them.

Finally, each study was analysed separately during the iterative study process. Findings were then compared across the studies to identify common themes. Sensitivities to themes that developed in later studies were then applied back to earlier studies. This revealed new patterns in the data and resulted in additional NVivo coding. The iterative 'feed-back' and 'feed-forward' between studies formed a useful mechanism for cross-checking the validity of emergent themes and for evaluating the completeness of findings.

The findings chapters of this thesis were then written up using the central themes as the organising principle. Data samples have been drawn from each study and used to support and best illustrate the analysis where relevant in each of the findings chapters.

3.9 Synthesis

As discussed in section 3.8.3, higher-order themes were developed by grouping and identifying relationships between lower-order themes. The higher-order themes encapsulate both the freelancers' experience of change and their technology use for the management of change in daily life. This section provides a brief summary of the higher-order themes identified in the field data. The themes introduced here are detailed in chapter 4.

As discussed in chapter 1, the concepts of 'mobility' or 'mobile' were difficult to apply in relation to understanding the freelancers' everyday practices. Instead, the concept of *temporariness* was developed to characterise the freelancers' changing work and social practices. Themes of *flux* and *stability* and the *micro* and the *macro* were then developed to categorise specific instances of the freelancers' experience of temporariness. The concepts of flux and stability collated lower-order themes associated with different patterns of movement over time. Examples include changes within projects (such as changing work locations and variable working hours), changes between projects, and moving home. The freelancers experienced different durations of flux as they negotiated their way through a period of change. At the same time, they relied on a range of stable social structures and connections during periods of flux. For example, they found it difficult to secure upcoming work if they did not have a resource base of contacts to mobilise at times of upcoming unemployment.

The concepts of micro and macro provided access to the different durations of flux and stability exhibited in the freelancers' lives. These aspects were conceptualised from lower-order themes explaining the different durations of activities. For example, a number of the freelancers experienced a high level of flux at both the micro and macro levels as they changed job locations and projects, sometimes daily. However, others experienced a high level of stability

at the macro level as they worked for a single production company in a single location for months at a time.

The different durations of flux and stability resulted in different intensities of technology use to manage these in everyday practice. I identified three essential practices that encapsulate the ways in which the freelancers used technologies to manage change: *availability, transitioning* and *sustaining* practices. Availability practices consist of the variety of mechanisms, methods and norms through which the freelancers managed the blurring of remote contexts into local settings via technologies. Transitioning practices consist of the use of technologies to deal with periods of change. This includes informing others of upcoming movements and coordinating the next job while working on the current project. Sustaining practices consist of the use of technologies to keep relationships and social situations going over time. This sustaining work then both provided structure and formed a resource to assist in the management of change.

3.10 Chapter Summary and Conclusions

The focus of this chapter has been on the research design, approach and procedures taken in the research. To address the research questions, a series of three iterative empirical studies were conducted from a phenomenological perspective. These studies were designed to explore and understand the freelancers' lived experience of and use of technology to manage mobility in practice. Methods used across the studies included interviews, direct observation and self-reporting. The data was analysed using an inductive approach. The analysis was synthesised into a set of grounded analytic concepts to represent the freelancers' experience and management of change in their lives. These higher-order concepts and detailed findings are outlined in

chapters 4, 5, 6 and 7, along with their contribution to researchers and designers within HCI.

Chapter 4

Conceptual Tools for Understanding and Managing Mobile Practices

This chapter introduces a set of analytic concepts that describe characteristics of the freelancers' mobile practices and the ways in which the freelancers use technology to manage these practices. These concepts form the theoretical contribution of the thesis. The central characteristic of temporariness, which shapes the variability of the freelancers' work, is identified and discussed. Two dimensions are then outlined to describe the freelancers' experience of temporariness in their daily lives in relation to flux and stability, at micro and macro levels. The role of technologies in managing this experience is then examined in relation to three key practices: availability, transitioning and sustaining. Together, these concepts form orienting tools that may assist designers as they develop technologies to enhance people's management of their mobility in practice.

The freelancers exhibited different frequencies of project transitions, across daily, weekly, monthly, quarterly and half-yearly projects. An important finding of the research was that these different project durations significantly impacted on the ways in which the freelancers used technologies to interact with others. Their availability to others, intensities of technology use, selection of technology to use and reliance on different types of remote people, places and resources changed as their relative job security varied. For example, freelancers who changed projects daily relied almost solely on mobile phones for the bulk of their mediated interactions with others, both work and social. Freelancers who worked in a single location for a period of time (such as a few months) were often able to utilise available landlines and internet access to attend to personal relationships during the work day, reducing the time spent conducting these social activities out of work hours. An essential factor that influenced the freelancers' ability to manage change was the temporary stability experienced for the duration of a project and a range of longer-term stable situations they relied on during times of change. The varying durations of stability also occurred more broadly in the freelancers' social lives.

Drawing on this finding (and others discussed in detail in chapters 5, 6 and 7, *temporariness* was identified as a central characteristic of the freelancers' work and social involvements. Two dimensions were then identified through data analysis to characterise the freelancers' experience of temporariness. These are *flux* and *stability*, at *micro* and *macro* durations. The freelancers engaged in three key practices while using technologies to manage these: *availability*, *transitioning* and *sustaining* practices. These three practices formed the essential means by which freelancers managed their dynamic working lives and the impacts on social lives. These analytic concepts are described in turn in the remainder of this chapter. Empirical examples from the self-reporting kit are provided throughout this chapter to demonstrate the concepts. Further detailed empirical

evidence is provided in chapters 5, 6 and 7, along with a discussion of the design implications and contributions of these concepts to the field of HCI.

4.1 Temporariness

Sherry and Salvador (2001) describe two aspects of mobile work: *motion* while conducting work activities and *remoteness* from a distant work base. When considering the types of daily activities conducted by the freelancers, their mobile work cannot be characterised by either of these terms. *Motion* was not a central or regular part of their local work activities; a large portion of the film-making process involved work on specialised equipment at temporarily established work locations. Also, the freelancers' work did not often require collaboration between team members separated across distances and/or time. Individuals travelled to a work location to collaborate with others and then dispersed to other places on completion of the work. With no remote team members to communicate with, or to draw on for remote support, the freelancers' work was not marked by physical separation, or remoteness, from a distant workplace or office.

Instead, the freelancers' mobile work and social practices can be characterised by temporariness. For example, their employment was marked by temporary work projects that existed for finite durations, with end dates negotiated prior to the start of the project. The projects themselves provided temporary stability for the duration of the work. This was then followed by change as the freelancers located and secured the next job. Some freelancers experienced temporariness on a short-term basis: they encountered new locations, situations and variable working hours as they changed projects daily or weekly. Other freelancers experienced intermittent temporariness as they worked on projects for longer periods of time, such as weeks or months. Common to all of the

freelancers was the temporariness, at different durations, of their involvements in a variety of social situations.

4.2 Flux and Stability

The different patterns and frequencies of the freelancers' project work and the changing locations of the work itself demonstrated a range of different durations of temporariness along a spectrum from *flux* to *stability*, discussed in turn in sections 4.2.1 and 4.2.2 below.

4.2.1 Flux

Flux was experienced in the freelancers' daily lives as a period of change. Flux was marked by a period of initiation or the transition from one situation to another as the freelancers prepared for and engaged in new activities, travelled to new locations and began new work projects. Experiences of flux occurred as the freelancers' regular activities and behaviours were transformed into new ones, and as one stable physio-social situation dissolved and was replaced with another different stable physio-social situation over time. Flux was characterised by a period of unpredictability or uncertainty as upcoming plans were shaped by emergent contingencies, changing schedules and exploration of options. Flux required the management and negotiation of upcoming transitions with others. It was often marked by periods of concentrated coordination and improvisation in the freelancers' lives to mesh their upcoming movements and activities with others.

Some of the freelancers worked in ongoing flux. They changed jobs and work locations on a daily or weekly basis, often with no access to fixed infrastructures in which to interact with others and relying predominantly on mobile phones to contact others. In their social lives the freelancers described less frequent experiences of flux, or periods of social transition, while they were moving house, starting or ending relationships, or making the most of an unexpected

break between jobs to organise a holiday. It is also important to distinguish here between travel between different locations, and an experience of flux. Everyday travel to a regular work location is not an experience of flux, unless unexpected contingencies occur. Instead, travel to regularly visited locations forms a stable pattern in daily life. Travel in this case can become perfunctory, repetitive and unproblematic. This form of stability, and the concept itself, are outlined below.

4.2.2 Stability

In contrast to flux, stability was experienced in the freelancers' daily lives as a period of constancy. For example, they developed and sustained ongoing relationships with other freelancers to assist with securing future work. They also relied on others, such as advertising agencies and production companies, to generate and fund project work. The continuity of phone numbers provided by mobile phones was also essential to ensuring ongoing contactability despite frequently changing job locations. Computers in the home environment formed a stable base from which to manage the meta-project work of providing services to clients, such as creating invoices or exchanging contracts for upcoming projects. Stability often required ongoing interaction with others to sustain social connections. Stability was predominantly marked by ongoing communication and awareness of others' lives through regular (although not necessarily frequent) interaction both in person and via technological mediums.

The stability the freelancers experienced marked a range of situations, locations, activities and relationships with others. Some of the freelancers worked in relative stability. At times they changed jobs, and often work locations, on a quarterly or half-yearly basis. Some spent periods of time working from home, while between jobs, to locate and bid for new projects. In this sense, the home environment formed another temporary workspace, much like any other location they encountered through their work. Those who worked for longer periods of time in one location often had access to landline telephones and the

internet with which to manage their social lives. In their personal lives, the freelancers described stability, or periods of social constancy. This occurred as they maintained friendships and a sense of self through their involvement in various communities of practice and modes of self-expression, such as engaging in hobbies, going to see bands and seeing movies with friends.

4.2.3 Relationship between Flux and Stability

The concepts of flux and stability are intertwined as a duality in the lives of the freelancers. Within the literature, mobile work has tended to be associated with absence from a resource-rich office (for example Axtell, Hislop & Whittaker 2008). The majority of the freelancers did not have a remote office space to depend on. Instead they relied heavily on both their personal physical spaces (such as the home) and the stable social bases they formed through their relationships with other freelancers and staff at production companies.

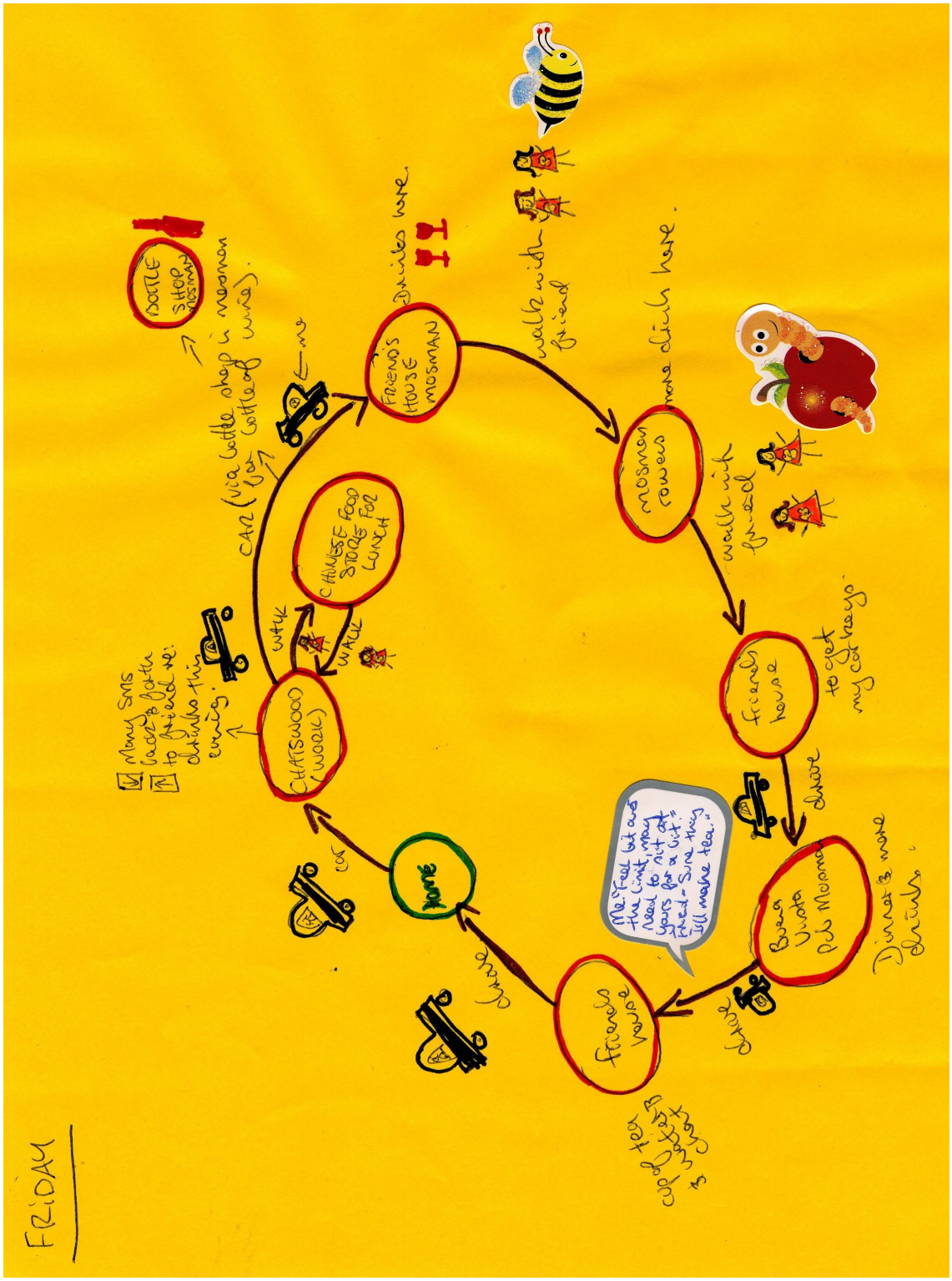
The freelancers were constantly experiencing layers of flux and stability at different durations. This occurred as a result of their involvements in multiple social worlds. They managed many relationships, organised many social events with others, and travelled to many locations for various reasons as part of their daily lives. Also the freelancers experienced both flux and stability within each of the situations they encountered. For example, freelancers working on short-term projects, such as daily or weekly, experienced frequent flux and very short-term stabilities. Freelancers who worked on longer-term projects experienced longer pockets of stability marked by less frequent, intermittent flux. These different durations, infused in the themes above, present another related dimension along which to categorise mobile practices – the *macro* and the *micro*. These are discussed in detail in section 4.3.

4.2.4 Example of Flux and Stability

Patterns of flux and stability are demonstrated in Figure 7. This is a Mobility Map completed by one of the participants, Emma. In this map, Emma outlines her physical movements and mobile phone use during one Friday at work.

Stability is exhibited as Emma's travels to her first destination of the day, her work. Emma works as an editor on projects for periods of months. Her work forms a temporarily 'stable' base as she inhabits a workspace provided by the production company for the duration of the project. She leaves her work only to collect her lunch. In the Mobility Map, Emma does not list any mobile phone interactions related to her work activities with her colleagues, or to manage her travel to work. Her work provides a temporary stability for the duration of the project.

In contrast, Emma exhibits flux as she manages her upcoming evening with her friend. Emma's night is marked by numerous venue changes as she and her friend travel from one location to another. Emma spontaneously changes plans at the end of her evening. She travels home via a friend's house to rest until her alcohol level drops to a safe driving level. Flux is characterised by her spontaneous plans, multiple location changes, and the use of technologies to coordinate these movements and activities with friends.



(Self-reporting Kit Activity)

Figure 7: Mobility Map of Emma's Friday at work followed by a night out with friends.

4.3 Micro and Macro

The freelancers' mobile practices ranged in duration along a spectrum from the micro to the macro. Analysing data in terms of micro and macro social orders is not new (for example Jenkins 2004 for a discussion of distinct social orders, drawn from work by sociologists Giddens and Goffman). However, what is new here is the consideration of mobile practices along this dimension. Research on mobile practices within the literature has tended to examine mobility in terms of the day-to-day movements of mobile workers, as they go about their work from one location to another. Few researchers within HCI have examined the implications for daily technology use that occur as a result of transitions between longer-term, more stable situations. (For an important exception see exploration of the relationship between technology use and people moving interstate by Shklovski and colleagues, e.g. Shklovski 2006; Shklovski, Kraut & Cummings 2008; Shklovski & Mainwaring 2005.) Management of these longer-term transitions by the freelancers formed a significant, often daily, use of their technologies that was regularly interspersed among the general management of day-to-day activities.

It is also important to note that the terms micro and macro do not describe only two types of flux and stability. As noted above, the freelancers exhibited practices along the spectrum from micro to macro. For example, stability at micro levels was experienced by freelancers who change projects on a daily or weekly basis. For this short duration, their involvement on a project was stable. An example of stability at a longer duration is represented by freelancers who changed projects on a quarterly basis. Stability over an even longer timeframe was represented by the freelancers' ongoing relationships with friends and other freelancers over years. The dimensions of micro and macro provide a way of becoming sensitised to a range of different mobile practices by considering shorter- and longer-term durations of flux and stability in the freelancers' lives.

4.3.1 Micro

At the micro level, the freelancers managed and responded to events and activities that occurred in the short term. For example, they used their mobile phones to deal with unexpected opportunities and contingencies (such as having an accident) they encountered while travelling. Micro practices were commonly handled using mobile phones as the freelancers' plans for the immediate future were shaped by emergent events in the moment. The freelancers relied on their mobile phones to manage the emergent consequences and opportunities in terms of travel, time-management, locating places and people, and negotiating activities with others. Examples of aspects of this type of micro activity management that have been discussed in the literature include dealing with contingencies, making the most of down time and dealing with problems during travel (see Oulasvirta et al. 2007; Perry 2007; Tamminen et al. 2004).

4.3.2 Macro

At the macro level, the freelancers managed and responded to situations that occurred over longer durations, to deal with both flux and stability. At this granularity, situations endured over time through a series of ongoing and related interactions with others. For example, the process of changing projects often involved a chain of interactions over a period of time to negotiate interviews, start dates, pay rates and contracts. The freelancers described a range of macro situations in their lives that lasted from a few weeks to many years.

Technology use differed when the aim was to achieve a shorter-term collective goal with others, in contrast to the series of ongoing interactions that formed sustained relationships with others over years. However, macro activities tended to be characterised by interaction over time via a combination of

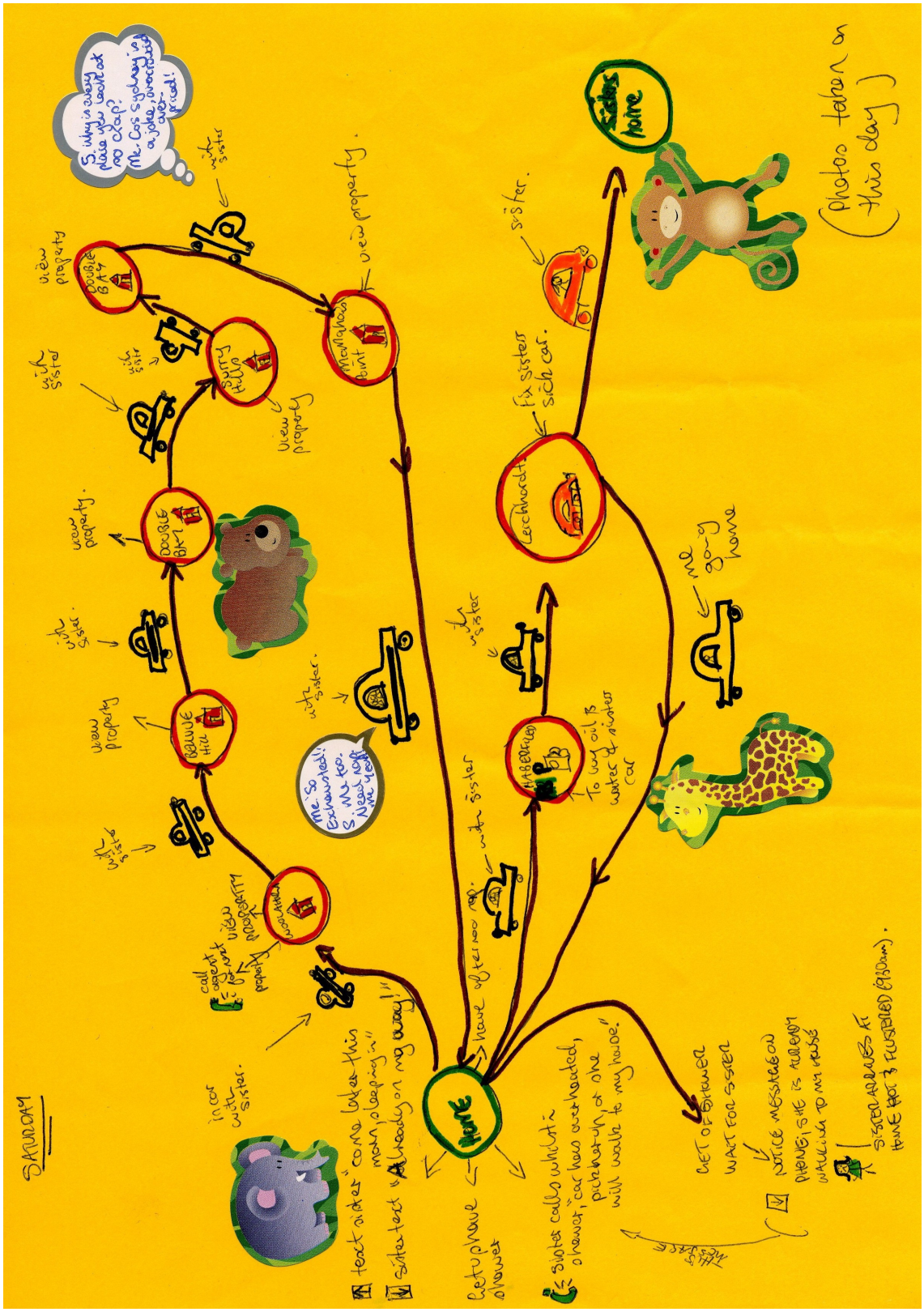
technological and paper mediums. This included email, various instant messaging applications (such as Skype and MSN Messenger), landline calls, mobile phones, and paper diaries to record schedules. Aspects of longer-term macro practices that have been discussed in the literature include the management of less frequent transitions in people's lives, such as the impact of interstate moves on relationships with friends and family (Shklovski 2006; Shklovski & Mainwaring 2005), and the ways in which people develop a sustained sense of connectivity with others (Ito & Okabe 2005; Okabe & Ito 2006).

4.3.3 Relationship between Micro and Macro

Macro practices were made up of a related series of micro-interactions with others over a period of time. For example, the longer-term macro process of organising a new job often culminated in, as Ling and Yttri (2002) term it, the 'micro-coordination' of face-to-face meetings as the transition concluded with a specific event or activity with others. As another example, the freelancers described their use of mobile phones to record unexpected events and funny moments as they happened. In conjunction with other types of regular interactions, these then sustained longer-term relationships when they were shared with friends. By considering macro practices it is possible to place single interactions within their wider social context, to track related mobile communications across diverse physical locations (Ito & Okabe 2005).

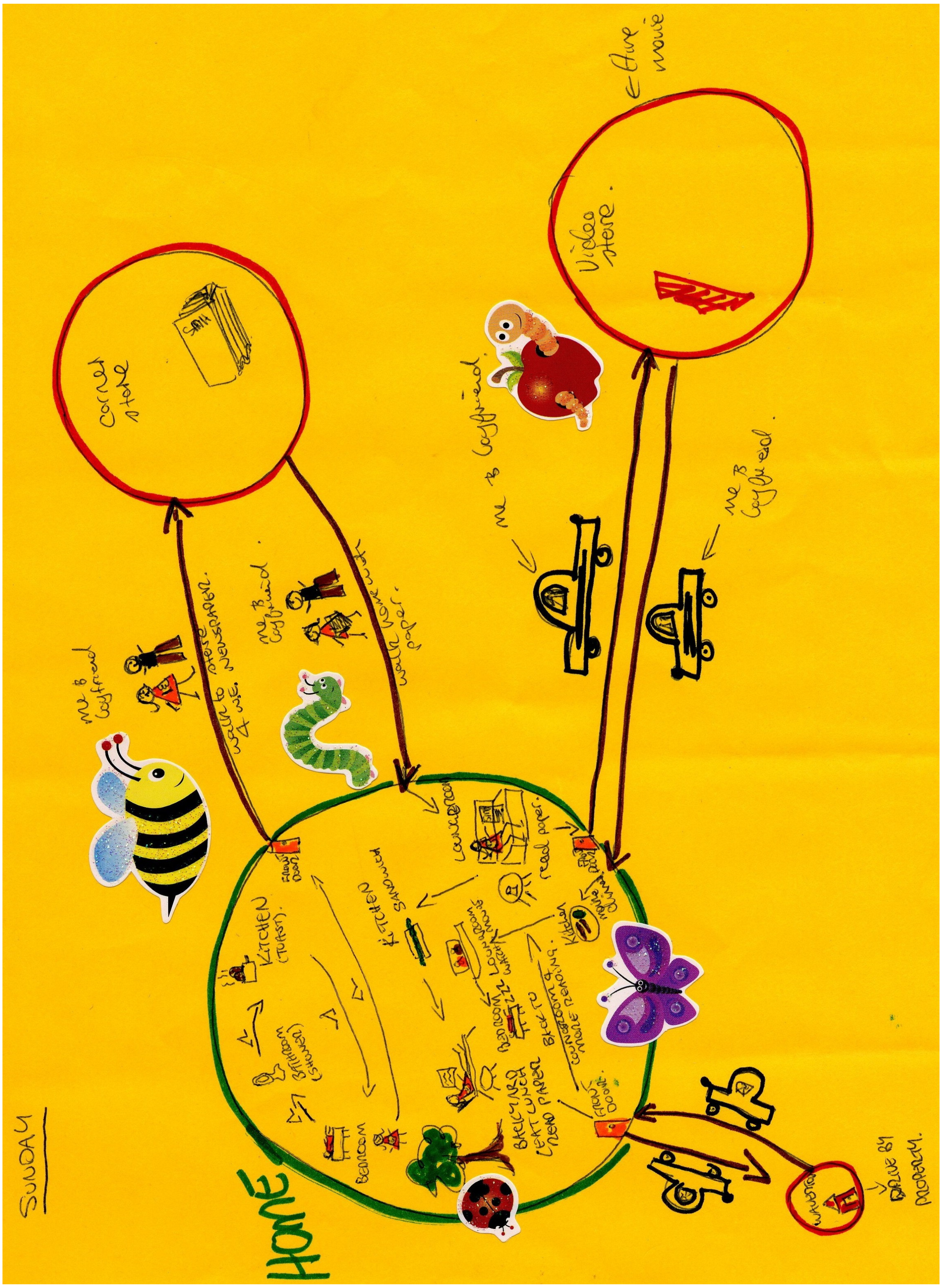
4.3.4 Examples of Micro and Macro

Patterns of micro and macro are demonstrated in Figure 8 and Figure 9 below.



(Self-reporting Kit Activity)

Figure 8: Mobility Map of Emma's Saturday looking at properties to buy.



(Self-reporting Kit Activity)

Figure 9: Mobility Map of Emma's Sunday, a quiet day around the house.

Figure 8 is a Mobility Map of Emma's physical movements and technology use during a Saturday while looking at properties to purchase. This map demonstrates an experience of micro and macro flux. Micro flux is experienced by Emma as she deals with the contingency of her sister's car breaking down before they travel to inspect houses together. This unplanned event requires negotiation and additional unexpected travel (as her sister walks to Emma's home). Micro flux is also demonstrated as Emma and her sister travel from one property location to another. In her interview, Emma describes the use of the internet to line up the properties in the day or two before her house-hunting. She also uses her mobile phone on the day to obtain the address of the next property to inspect. Technologies play an important role in negotiating activities in the short term at micro durations.

The map also represents an experience of macro flux. Although it details a single day in Emma's life, it indicates an ongoing pattern described by Emma as she visits properties each weekend over a longer period of time. The map demonstrates how this less frequent (macro) experience of change is marked by heavy technology use, additional practices and travel beyond her usual weekend activities.

In contrast, Figure 9 provides an example a more 'usual' weekend day for Emma as an example of macro stability. This map describes a quiet day spent with her boyfriend at home. It demonstrates the stable role of the home base. Emma makes short trips out of the home base to visit a property, the video store and the corner shop, each time returning to her home. The use of technologies to manage change does not play a large role in this day for Emma.

4.4 Availability, Transitioning and Sustaining Practices

The freelancers exhibited three key practices while using technologies to manage their experience of flux and stability: availability, transitioning and

sustaining. They engaged in *availability* practices to prioritise and manage the overlapping of remote concerns onto their locally unfolding situation. For example, they accepted incoming calls from unknown caller IDs on their mobile phones as these were likely to be potential employers. They engaged in *transitioning* practices to manage and respond to change and uncertainty in their lives. For example, they relied on their mobile phones to coordinate the transition between projects. At the same time, mobile phones provided backup for dealing with contingencies and opportunities that occurred in the immediate moment. The freelancers engaged in *sustaining* practices to keep relationships and situations going over time. For example, they relied on their mobile phones to maintain and activate their relationships with other freelancers to secure future work. Further examples of these three practices are outlined below, with detailed findings given in chapter 9.

4.4.1 Availability Practices

The freelancers managed their availability in response to the particular demands of the situations they encountered on a daily basis. Their choices about availability relied heavily on the contingencies arising out of the immediate task at hand, with these needs evolving over time. The freelancers' choices around when, where and how to use technologies to interact with others was an important precursor to the interactions themselves. This included the movement of activities from one technology platform (such as email) to another (such as a mobile phone) as the immediacy required for interactions increased. This also included the negotiation of mobile phone use in relation to the immediate needs of the local activity and environment.

The freelancers engaged in a range of practices to manage their availability to others. Practices included choosing which technology platform to use based on the urgency of the interaction, choosing whether to prioritise the incoming call over the local activity, using features of the device to select and reject calls,

establishing availability in the opening sentences of the call, moving away from the action to attend to answered calls while at work, and negotiating freelancing norms on the acceptability of certain calls in work settings, including consequences when these were violated.

4.4.2 Transitioning Practices

The freelancers described their transitions from old situations to new ones, from one location to another, in which mediated interactions played an important role. These types of transitions required the use of technologies to manage, negotiate and mesh one's movements with those of others. Technologies, particularly mobile phones, were used to deal with any unexpected contingencies and for the micro and macro coordination of upcoming activities with others. The transitioning process often resulted in communication hot-spots for the freelancers. This occurred particularly at the macro level during the process of renewal, reconfiguration or replacement of one work project with another. At the micro level, the freelancers engaged in transitioning practices as they negotiated travel to new locations, contacted friends to let them know they were running late, and dealt with any contingencies they encountered.

As an example, one of the core uses of mobile phones by freelancers was for the securing of future project work with others. The move between projects was characterised by a period of interaction and negotiation prior to the physical relocation to a new project. This is similar to Shklovski and Mainwaring's (2005) finding that interstate residential moves began well before and continued well after the actual physical move to a new location. However, unlike in Shklovski and Mainwaring's findings, the freelancers' moves between projects often did not continue after the start of a new project. This was, for the most part, due to the end of the projects themselves on completion of the work. As a result, the series of interactions that occurred prior to starting a new job formed the majority of the work required to transition between projects.

4.4.3 Sustaining Practices

The freelancers used their mobile phones extensively to sustain personal connections with others both during and out of work hours. They used them to connect with other freelancers and mobilised these connections to assist with securing upcoming work. They also relied on them extensively to connect with family and friends while working long and non-traditional hours, or working away from home. Mobile phones provided the freelancers with a way, as one participant, Samantha, noted, "to keep your social life going while you're at work". As an example, another participant, Nathan, noted that during periods of temporary absence due to work his usual frequent short interactions with his wife during the day were replaced with longer conversations with his children at the end of the day. These conversations provided him with a way to emotionally deal with his absence in response to variable work demands.

These changes in practices were not related to the actual physical distance between people. Working long hours at a location close to home, and leaving and returning to the home after family members were asleep, could have as much of an impact on personal relationships as travelling to remote locations for work. Instead, the changes were related to the duration of physical absence from others as a result of their work demands. During periods of absence, the freelancers relied heavily on their mobile phones as a temporary substitute for usual time spent together in person.

4.4.4 Relationship between Availability, Transitioning and Sustaining

Availability practices overlapped with both transitioning and sustaining practices. Establishing availability for interaction, via technologies and face-to-face, was an essential first step for communicating and meeting with others. For example, the freelancers broadcast their availability to other freelancers, via email, phone calls and Facebook, to locate upcoming work as their current

project drew to completion. This was then often a trigger for either conversations with others about upcoming work opportunities and work leads (i.e. a transitioning practice) and/or for conversations with freelancing friends to find out the latest events in each others' lives (i.e. sustaining practice). Transitioning and sustaining practices are also related across the micro and macro. Micro transitioning practices, such as organising to meet up with a friend in subsequent days, could support macro sustaining practices more generally, as friends sustained friendships over time through regular catch ups.

4.4.5 Example of Availability, Transitioning and Sustaining

The three practices of availability, transitioning and sustaining are demonstrated in the cartoon drawn by one of the participants, Anita, in Figure 12. In this cartoon, Anita outlines her day at work on a Sunday and her use of technology. The cartoon begins with a phone call from Anita's father as she is rushing to get ready for work. She manages her availability as she prioritises her immediate activity over the incoming call and later calls him back when she can talk. The cartoon also demonstrates a level of freedom for Anita as she manages her social life while at work on a non-traditional work day. She is alone in the office and able to immediately attend to her mobile phone for social interactions, both for incoming calls and texts. During a traditional work day, incoming personal calls would be more likely to be rejected while she is working with others.

Anita's cartoon also demonstrates transitioning practices. Anita has a friend who sometimes works down the road on weekends. Anita decides to break up her work day to see if a friend wants to meet for coffee, contacting her by her mobile phone. She first establishes if her friend is available for coffee; they then agree a time and meet in person at a nearby café. This provides an example of transitioning practices to negotiate short-term upcoming events. An example of the use of technology to manage longer-term transitions between situations is

demonstrated in Figure 8. Emma uses her mobile phone to contact a property manager for an address. In her post-interview Emma also describes her use of the internet to locate properties. Both of these technology uses are transitioning practices. Further examples of longer-term transitions between situations, and the range of interactions that constitute these, are provided in chapter 7.

Anita also engages in sustaining practices throughout the day as she connects with her friends and loved ones. She outlines a number of interactions with her boyfriend to share details of each other's activities. She swaps text messages with friends that activate her 'smile-ometer', allowing her to continue to feel connected while at work on a non-traditional working day. Anita also uses her mobile phone to spontaneously play a practical joke on her boyfriend. Examples from Anita's day demonstrate the types of interactions that form sustaining practices. These included sharing contexts through awareness and sharing information and jokes, rather than the coordination and negotiation of upcoming events with others.

Figure 10: A 'day in the life of' cartoon completed by Anita, pg 1.

Figure 11: A 'day in the life of' cartoon completed by Anita, pg 2.

(Self-reporting Kit Activity)

Figure 12: A 'day in the life of' cartoon completed by Anita, pg 3.

4.5 Chapter Summary and Conclusions

This chapter introduces and defines:

- a central characteristic of the freelancers' mobile practices – *temporariness*;
- two dimensions of temporariness – *flux* and *stability* – at *micro* and *macro* durations; and
- three key uses of technology to manage temporariness: *availability practices*, *transitioning practices* and *sustaining practices*.

These analytic tools provide two specific opportunities to technology designers. Firstly, they sensitise designers to a range of activities beyond the everyday that can be supported through technology design. This includes the management of local and short-term change (such as navigation, travel and contingencies) and also longer-term transitions between social situations (such as changing projects, moving homes and initiating new relationships). Secondly, identification of the three key uses of technology to manage temporariness

provides practical access to understanding the ways in which mobility is achieved in practice. By focusing attention on these three practices, designers may be able to enhance people's management of their mobility in practice through technology design. These opportunities and further implications for design are discussed in the following three chapters, which present the research findings. The three chapters are structured as follows:

- **Chapter 5** examines the freelancers' mobile practices in terms of flux, including ebbs and flows of freelancing work, and different durations of freelancing projects from the micro to the macro.
- **Chapter 6** presents the freelancer's mobile practices in relation to stability, or the range of stable bases, locations and relationships that freelancers rely on to manage change between projects.
- Although technology use in discussed in Chapters 5 and 6, it is described only as it relates to the practices of flux and stability. **Chapter 7** provides specific details of the freelancers' technology use, in relation to the three concepts of availability, transitioning and sustaining practices.

Chapter 5

The Freelancers' Experience of Flux

This chapter details the freelancers' experience and management of flux through everyday practice and technology use. The chapter begins with an outline of the film and television project process. The freelancers' experience of flux is then categorised in relation to their transitions between projects, travel to new work locations and variability of working hours. The skilled practices the freelancers have developed to manage flux are discussed, along with the role of technologies in enabling these practices. These findings demonstrate that important possibilities for technology design can be opened up by considering the freelancers' management of two key aspects of flux: longer rhythms of mobile practices, and the collaborative movements of mobile groups.

As a contextual background for the findings presented in the thesis, this chapter begins by providing an outline of the film and television project process. This outline provides descriptions of the different freelancing roles and the freelancers' involvements at various stages of this process. These different roles will be referred to throughout the remainder of the thesis. The freelancers' use and reliance on a range of technologies, both mobile and fixed is then outlined. The freelancers' everyday experience of flux is then detailed. Drawing on Perry (2007) (see section 2.2.4 of the literature review), the objective here is to distinguish between the mobile work itself and the work required to be mobile. Specific implications for technology design are then discussed, including developing ready to go mobile toolkits and coordinating the movements of mobile groups.

5.1 The Film and Television Project

Across the three empirical studies, the freelancers described their involvement on projects in terms of three distinct project phases: pre-production, production and post-production. These three stages are described in this chapter in relation to the project process observed in Study Two (refer to section 3.6.3 for specific details of the study and figure 13 for an overview of the project process). This example is used to demonstrate the relative lengths of project phases and the intensities of staffing and resources required at different stages of a film and television project.

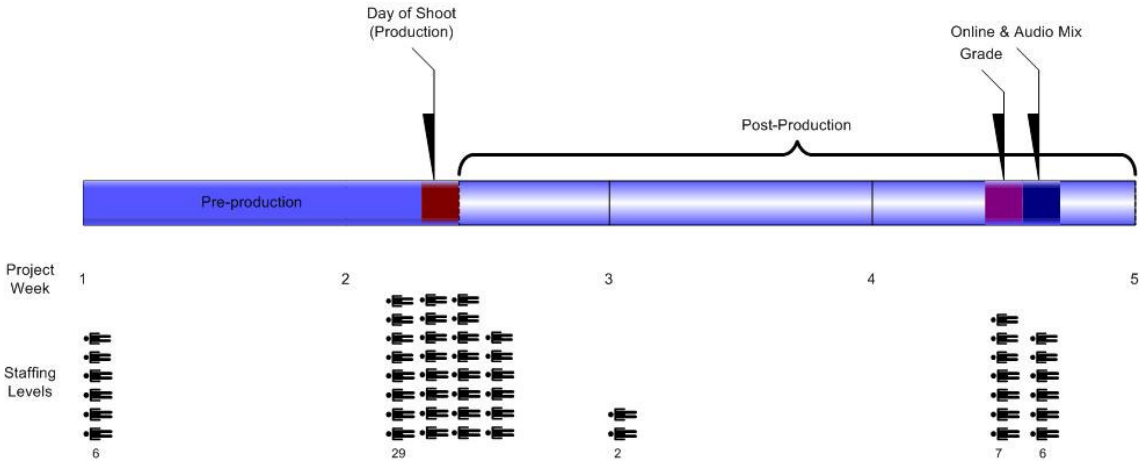


Figure 13: The project process during the making of the television advertisement, including project stages and staffing levels.

5.1.1 Pre-production

Pre-production is the project phase in which everything needed for a shoot is made available, functional and ready for the intensive stage of production ahead. For the television commercial examined in this research, the director and producer initiated this process after receiving the go-ahead for the project from the advertising agency. Together the director and producer worked as a pair to develop ideas and coordinate the necessary resources and people for the making of the film content. The director spent his pre-production time developing his creative ideas about the advertisement content. He worked up a storyboard for the shoot that represented the specifics of scenes, camera angles and ideas for particular shots. In addition, he was responsible for directing the work, making any decisions needed about the film content and supervising much of the preparatory work that would influence the look and feel of the captured footage, such as wardrobe, prop and location selection. Both the director and the producer had an additional communicative overhead as they had to obtain ongoing approval of creative content changes to the advertisement.

The producer spent his pre-production time in heavy communication via email and telephone, both landline and mobile. The main aim of this work was to

resource the film by coordinating the locations, people and equipment needed for both production and post-production. This included booking freelance staff directly via their mobile phones or through booking agencies, organising work contracts for the freelancers, and ensuring that the freelancers possessed and trialled the equipment they needed. In addition, the producer spent his time collating all the information needed by the production team into a single document for distribution. Named the 'call-sheet' by the freelancers, this document listed contact details of all team members, relevant OH&S details, directions on how to get to the shoot, and starting times for each work location. The producer's work predominantly involved the coordination of others and resources, in contrast to the director's creative work. As one participant, Simon, stated, "the phone is never far away from the ear of a producer".

Part of the work during pre-production was also conducted by additional freelancers hired to complete specific roles. This work included sourcing props and wardrobe items and checking that camera equipment was working by recording and developing test footage. The freelancers hired for this preparatory work travelled to various locations to gather resources and then returned to the production company offices to confirm with the producer and director. For example, the wardrobe assistant went shopping for clothing for the actors. This was followed by a meeting at the production office with the actors to try on different clothes for the shoot, and to take photographs to ensure the right look was achieved for the client's purposes. In another example, camera equipment was collected and tested at the offices by a freelancer. Samples of film were then sent for development to ensure correct equipment operation prior to the shoot. With such forays out of the office by the director and producer, and intermittent visits to the production office by various freelancers, the production office tended to be a hub for this preparatory phase of the work.

5.1.2 Production

Once the team and set location were booked in, a single day of production – 'the shoot' – occurred. This was the phase of the project in which team members gathered together on location to create and record the raw footage for the advertisement. The work itself on the day involved arranging a series of camera set-ups from different angles to record scenes from the storyboard.

Staff employed at this stage can be split into three categories: firstly, actively involved roles, which consisted of staff with the specific expertise and knowledge to make the advertisement; secondly, support and facilitation roles, with people attending the work locations to provide critical support services as needed at intervals throughout the day; and, finally, additional supervisory staff, such as the advertising agency representatives and the client, who provided input into the direction of the work as it developed. These roles and associated work practices are described in further detail below.

Firstly, key team members creating the film content included the director, director of photography (DOP) and sound recordist. These team members were recording and developing the raw audio and visual materials for the advertisement. For example, the director requested additional takes of the video footage, in which he provided instructions to actors and the DOP, moved props and repositioned camera angles to capture the footage he needed. Additional staff members in this core group included the artistic director, actors, wardrobe and makeup, key grips, props people, catering and nurses. These additional freelancers conducted the tasks of setting up the location with lighting and props, arranging live feeds from the camera on video screen displays, preparing the actors with hair, makeup and clothing, and so on.

Secondly, support roles on the shoot predominantly included the producer and the runner. Neither of these staff members took an active part in creating the film footage. However, they were on location to assist where necessary and

particularly to immediately handle any contingencies that occurred. The runner was the only team member to leave the location during the shoot. The runner collected additional resources so that the filming of video content could continue with minimum interruption. For example, the runner was sent to the production company to gather paperwork needed by the producer for an impromptu meeting with another potential client after the shoot. This allowed the producer to remain on location and contribute to the locally unfolding work as needed.

Finally, additional people attended the shoot in supervisory roles, with only intermittent and limited involvement in the unfolding work; these included the client and advertising agency staff. Both the client and advertising agency staff provided direction, approval and input to the unfolding work processes, yet were not directly employed as team members on the project. As an observer, I was able to blend quickly into the local work situation on this type of project by joining these project stakeholders in their predominantly observational roles at each project stage and work location.

5.1.3 Post-production

At the end of the day's shoot, the raw footage for the advertisement had been filmed and the project moved into the post-production phase. An excerpt from field notes provides an example of the post-production stages:

> *The producer, Greg, says to me … "So basically after the shoot what happens is, here look on the whiteboard [on the wall next to the door in their office]. Here is a layout of the time schedule for the project. So you can see that once we've shot the footage, we'll have it edited and then we'll send it to Fox Studios in America so that they can approve the animation content because the ad uses their footage. Then we'll be doing final post on the twenty-third and twenty-fourth of March. Which day would you prefer to come along? There will be a full day on the twenty-fourth which will be really boring, people will be sitting around and reading magazines*

> *while a post-operator will be adding graphics and making miniature modifications to certain shots. Why don't you come along on the twenty-third? That'll be much more interesting. That's when the grade happens, they colour the footage and that'll take about two hours."*
>
> (Field notes)

In this phase, work centred on converting the raw footage into the final polished product for screening on television. Steps in this process included converting the raw footage from tape to digital format; editing this down into a shorter, more coherent structured narrative; adding voice-overs and audio effects; touching up the look of the product by grading the work to enhance colours and the feel of the footage; and online editing to add animation or textual effects.

These steps in the post-production phase occurred in a variety of locations. Unlike the shoot, which was not computer based, this work centred on computer workstations with specialised software in a number of different locations. The producer rented these workstations at post-production facilities. The post-production facilities provided the required equipment and a technical editor to operate it. Again, unlike at a traditional established work location, team members arrived and departed with few resources other than the footage itself.

At these sessions, a small team made up of the editor, the director, the DOP (at times) and advertising agency representatives were present. These team members provided direction to the editor to develop the advertisement to completion. On completion of the online editing, tapes were given to the director for distribution to the advertising agency and the client for approval, and subsequent submission to the television networks.

5.2 The Freelancers' Technology Choices

The freelancers relied on a range of technologies both mobile and fixed to support their mobile practices. Mobile phones were critical for securing work. They provided immediate contact to the freelancers. The freelancers cited a lack of time for doing anything more sophisticated than using their mobile phone to make or receive calls and text messages. With little free time on their hands, the freelancers predominantly used their mobile phones for quick communicative purposes, relying on the basic functionality of phone calls and text messages. The freelancers tended to use their mobile phones to make calls for work purposes, and to call and send text messages to friends and family.

Convergent PDA phones were used by two of the freelancers, as these provided the added functionality of maintaining extensive contact lists that were essential for producers. PDA phones provided producers with access to contact details wherever they were able to make calls in busy schedules. Although described as an integral support for communication in earlier freelancing days, pagers were no longer used by any of the freelancers. These had simply been replaced by mobile phones that provided more direct and immediate access to the freelancers and potential work opportunities.

Fixed technologies performed a different role in the freelancers' lives. They provided connectivity, rather than immediacy to the freelancers. The freelancers used computers and the internet predominantly to connect with others via Facebook and to exchanges emails. Land-line phones provided an alternative to more expensive mobile phone calls. Central to the freelancing work life was a busy schedule, often long working hours and changing work locations. As a result, time spent on computers was often limited to short and sharp bursts of activity during heavy work periods, and longer more exploratory time spent browsing the internet and consuming information while between jobs.

Specific details of the different ways in which the freelancers' used technologies to support their mobile practices are discussed through-out the remainder of this thesis. As noted in section 4.5, this chapter and chapter 6 focus primarily on the freelancers' mobile practices, including where relevant the role of technologies in supporting these practices. Chapter 7 focuses on technology use itself, and the ways in which the freelancers interacted with others via their technologies, both mobile and fixed.

5.3 The Freelancers' Experience of Flux

This section outlines the freelancers' experience of flux as a result of the temporariness of their mobile work. The freelancers managed flux through a combination of practices and technology use that intermingled with the daily work activities themselves and their social lives. The freelancers discussed their management of flux in terms of three key aspects: transitions between projects, encountering new work locations, and adapting to variable working hours. These are described in turn below.

5.3.1 Project Transitions

The freelancers worked on short-term projects that consisted of collaborative teams of workers coming together to develop film and television content. On completion of the work, the project itself dissolved, making way for freelancers to obtain employment on other newly established projects. The term 'project transitions' is used here to refer to the freelancers' longer-term movements from one project to another. The freelancers managed their project transitions in relation to:

- the ebb and flow of their employment and managing pipelines of upcoming work;
- the move between projects; and

- the different rhythms of project transitions.

The Ebb and Flow of Freelance Work

The freelancers in this research described the experience of their mobile working lives in terms of the transitory nature of their project work, resulting in unpredictable working hours and unreliable future employment. They moved from project to project, working for different employers on a regular basis. In particular, the freelancers' unpredictable employment prospects tended to be ruled by the timing of upcoming work opportunities. They identified two extremes of securing upcoming mobile project work. Firstly, at times they experienced a flow of work projects. This occurred when they secured a series of well-paid, well-timed and interesting projects. This flow of work projects resulted in the knowledge and certainty of job security as multiple projects were locked in. A pipeline of projects was established, often with short breaks between, allowing the freelancers to take stress-free holidays knowing that they would have work to return to. For example:

> *Kirsten: How did you become a freelancer?*
> *Rachel: The company I used to work for, as of about three or four months ago, went into liquidation. But I saw the writing on the wall and I got out and started freelancing. I wondered how I'd ever get jobs or work but I've been run off my feet and have actually had too much work in the last three months. So I've had about, including weekends, days off in the last three months would be about four or five days. But thankfully, one big major client has just finished. I did two projects with them back to back and that finished last Friday. And last Friday I also got told of my work for January, I won a contract so that's great.*
> *Kirsten: So you can take a break in between jobs?*
> *Rachel: Yes, it takes the stress off so I can finish this job and hopefully tie up loose ends here. And then there's that nice big chunk [of work] in January. And I've got a chunk for February coming up too.*
>
> (Interview)

Secondly, the freelancers at times experienced difficulties in securing work, resulting in periods of unemployment. For example:

> *Kirsten: Can you give me run down of the last twelve months, where you've worked and for how long?*
> *Dana: Last November, I worked for about six weeks on a kids' show for [a production company] … Then after that I cut a documentary again in someone's production office … and then when that finished I was unemployed for about two months over summer. I didn't do much, I kind of had bits and pieces where people would ring me up and ask if I could cut a promo for a documentary or something like that. They'd just lend me their laptop and I'd just do that at home … So there were a couple of little jobs like that, little promos and stuff. Then I started getting a few ads over January when things started to pick up again …*
>
> (Interview)

At times of job uncertainty, the freelancers explained, they would accept unpredictable short-term contracts, long under-paid working hours and periods of unemployment between projects. With no guarantees of work, they often had to piece together anything they could find to gain continuing employment and income. At times of employment uncertainty, the freelancers said, they experienced high levels of stress. For some of the freelancers, periods of unemployment were the only times they had holidays or breaks from work. However, without knowing where the next dollar would come from, they could not experience these breaks as relaxing downtime. Instead the freelancers for the most part spent such times trying to locate their next project.

The Move between Projects

In the act of changing from one project to another, the freelancers described the need, for peace of mind, to make the transition between projects as smooth as possible. Their mobile phones were essential for managing the ebb and flow of their project transitions. The freelancers outlined the central importance of informing others of their availability for upcoming work when facing

unemployment. It was also essential to be able to receive and return calls from potential employers as quickly as possible. During the flow, the freelancers would often secure work simply by being contacted by others with employment opportunities. During the ebb, they had to activate their personal connections with other freelancers and staff at production companies to locate work. Their mobile phones were their first point of contact for securing work, and use of mobile phones was often followed by a series of technology-mediated and face-to-face interactions to negotiate upcoming employment.

The series of interactions prior to starting a new project demonstrate that the move between projects would often begin well before the physical relocation that occurred when the freelancers moved to a new project work site. Shklovski and Mainwaring (2005) describe the relocation of people interstate in relation to two parts: the physical part and the interactional part. Similarly, it was possible to distinguish between two parts of the freelancers' move between projects: the physical act of relocating to a new work location and the interactional precursor to this, as the freelancers started to take action to manage their upcoming job uncertainty. The transition between projects was marked by a period of flux as the freelancers located, secured and negotiated their next project with others. The freelancers' experience of flux ended as they invoiced past clients for completed work and settled in to the regular routines of their work on a new project. The durations of flux and stability varied among the freelancers, depending on the length of their involvement on projects. These are described below.

Different Rhythms of Project Transitions

One of the particular advantages of this research was the opportunity to observe a range of durations of project work among the freelancers. With different lengths of employment on individual projects, the freelancers managed their project transitions on a daily, weekly, monthly or quarterly

basis. Three project transition 'rhythms' emerged in the analysis: *micro flux*, *intermittent flux* and *macro flux* (see appendix B for a characterisation of these patterns). The freelancers' experience of flux intertwines spatial, temporal and social dimensions, as the frequency of project transitions impacted on the stability of work locations, working hours and project durations.

It is important to note that, although they are presented separately here, these three rhythms are not exclusive categories. Freelancers who tended to work on short-term projects of days or weeks also at times secured work on longer projects. Likewise freelancers, such as editors, who tended to work in three-month blocks also at times gathered daily or weekly project work to fill gaps between longer projects. However, the freelancers predominantly tended to secure ongoing project work within one of the three rhythms. The three rhythms capture essential characteristics and intensities of the freelancers' practices and technology use while managing their project transitions at different durations. These three rhythms are examined in turn below.

Micro Flux

Freelancers who experienced micro flux were those who changed jobs on a half-daily, daily or weekly basis. An example from an interview with one of the participants, Ed:

> *Ed: [The project work] I do often it's week by week you know. I got a booking for five days the other day, which is the longest for me in about three weeks. It's good.*
> *Kirsten: Do you get a call the day before [the job]?*
> *Ed: Often the day before and invariably that's the one you can't do. But obviously our lives live and die by the mobile [phone]. I think "Gee, I'm having a terrible week" and you're feeling suicidal, then you get one phone call and it will be a five-day job. Well that sort of looks after that two-week block. It's enough.*
>
> (Interview)

The length of their involvement on projects was brief, either because the project itself was short or because they completed their work on a project within tight timeframes. Due to the short-term nature of their work, the locations and hours of their daily work tended to be unpredictable and could vary from day to day.

Freelancers of this type tended to work either in one or more locations for a brief period to complete their work on a short project. They frequently encountered new locations. They also tended to experience changeable working hours as conditions varied on each new project. For example:

> *Kirsten: The day that I observed you guys on the train project, it [the work] started at six in the morning and went until four or five. Is that a standard day for you?*
> *Ed: It's really varied. We have a half-day sort of call, half-day rate in this business, half-day and full-day rate. Half a day is anything up to four hours. Today was a full four hours but sometimes it's eleven until two...*
> *Your big full days can be, counting driving and stuff. I had one the other day I had to be in Bathurst for a commercial by eleven one morning. And then we had to shoot all round the Central West and I got home at quarter to one that night. So I'd been going from eight until quarter to one and had to be back in Hornsby at seven in the morning or seven thirty in the morning. You know eight until one that's seventeen hours. Five hours sleep then the next day get up and put in a fourteen-hour day.*
>
> (Interview)

To summarise, freelancers of this type experienced micro flux as they worked frequently in new locations, with new colleagues, on new projects. This experience of micro flux is characterised by the persona of Scott in appendix B.

Intermittent Flux

Freelancers who experienced intermittent flux were those who worked for a temporary period of time on projects over weeks or months. For example:

> *Kirsten: In the last twelve months can you give me a quick rundown of your work?*

> *Louisa: Twelve months ago exactly I was working on [a show] for [a production company]. And that was at Bribie Island [for three months]. Originally I thought I was going to be commuting from Holland Park up to Bribie Island but it ended up being a lot further. The days ended up being a lot longer. So I lived at Bribie basically five days a week and then came home for two nights a week.*
>
> *Straight after that finished I worked on [another show], which was a live-at-home job [for three months]. I commuted down to the upper Gold Coast every day so that was about a thirty-five-minute drive. Straight after [that show] we went overseas for two months.*
>
> *Then I came back and I had about a month off, maybe six weeks. Then I did a one-month gig down in Coolangatta, which is about an hour and a half drive maybe even an hour and forty five. That's at the other end of the Gold Coast. I lived down there and I didn't come back at all during that month, but my partner came down almost every weekend for one day.*
>
> (Interview)

The freelancers' involvement on projects was marked by short-term stability punctuated by periods of change as they transitioned between projects.

Freelancers of this type typically had access to fixed resources in a temporary workspace provided by the production company or post-production facility. This temporary workspace then became their work-base for the length of their employment on a project, often forming the only location in which they worked. Their work hours also tended to remain fairly stable for the duration of the project.

Variability occurred as the freelancers moved between projects. For example, short breaks between projects contrasted with times of work:

> *Rachel: The last couple of weeks have been really intense. It [the work] has been nearly all day every day, sixty to seventy hours a week. But then it's the bizarrest experience because you're [working] hugely intense hours and then it'll stop. And suddenly you're like I'm sleeping in tomorrow. I'm going to get my legs waxed. Then I'm going to go see my accountant. Then I might go and see a movie. And*

> *then you might have that kind of life for two or three days. But then you go home and do paperwork, pay your bills and that kind of thing. And then it's [work is] crazy again. And then it's like oh, I might go to the beach today, I might go for a bushwalk. So, it's quite a chameleon kind of existence.*
>
> (Interview)

At the start of new projects, these freelancers encountered new locations, new work teams and new work conditions, such as different hours of work. Their experience of the new quickly settled into established routines, locations and relationships for the duration of the work.

To summarise, freelancers of this type experienced macro flux as they periodically moved from project to project. Their work on projects was characterised by the temporary establishment of work locations, relationships with colleagues and available infrastructures for the duration of the project. This experience of intermittent flux is characterised by the persona of June in appendix B.

Macro Flux

Another pattern of project work was that of the producer and director. Technically they can be labelled as freelancers, as they worked with different team members on different projects, they invoiced the production company for their hours, and they were given a space to work in within the company with the knowledge that this was not a permanent arrangement. An example from field notes is:

> *The producer, Greg, says to me … "I guess we are kind of freelancers, not many people know but in our industry, most people are not paid a salary, they are provided with an office space and paid on commission as they win jobs …*
>
> *So the production company here pays for the overheads of running an office, administration costs and electricity. The way it works is that when projects are finished, whatever profits are made are shared between myself, Simon and the*

> *company owners. So it's a little stressful when you don't have any upcoming work."*
>
> (Field notes)

However, their work situation was effectively stable for long periods of time across projects. In contrast to other types of freelancers discussed in this research, they worked in a well-established office space and they established long-term relationships to secure an ongoing source of work. The producer and director worked together as a pair well beyond the span of single, short-term projects. The longevity of their work situation relied upon their success in generating business for the production company. They effectively worked as ongoing employees within the company.

The producer and director often worked as a pair out of the office. They travelled to various locations to source and conduct the shoot and to oversee post-production. Similarly to Perry et al.'s (2001) business travellers, they spent time preparing for temporary absence away from an established office space by gathering resources to take with them for use in the field. They relied on their mobile phones to support their current and upcoming work projects while away from alternative fixed resources, such as landlines, computers, the internet and email. They used their mobile phones and laptops on location to deal with unexpected contingencies, to conduct other work activities during downtime, to access remote resources, and to keep clients informed of changes and progress. This experience of macro flux is characterised by the persona of Elliot in appendix B.

This type of worker is similar to others studied within the literature, such as office workers who work while temporarily away from established work bases (Axtell, Hislop and Whittaker 2008; Perry et al. 2001). Although they are included here, this type of worker rarely experiences flux. Their practices are described in further detail in the following chapter to demonstrate the counterpoint of stability these types of workers provide to freelancers who

experience flux on a more regular basis. The remainder of this chapter instead focuses on the practices and technology use of freelancers who experience micro and intermittent flux.

5.3.2 Adapting to New Work Locations and New Projects

The freelancers exhibited a high level of self-sufficiency in response to the temporariness of their work settings, relying on each other rather than remote, resource-rich workplaces. They demonstrated their self-sufficiency by applying highly specialised skill sets to their work, bringing all of the equipment they needed or might need to conduct their work (including their mobile phones) and making do with whatever was available locally. They were not reliant on either distributed resources or distributed colleagues to conduct the core of their work. Once they were at their work location/s and in conjunction with fellow team members, they either carried, embodied or were provided with all of the necessary skills, knowledge and resources to complete their work.

The freelancers demonstrated an ease of application of their professional skills in a variety of roles across a range of work settings. They moved onto new projects and adapted their skill sets (such as editing knowledge) to the specific needs of each project. For example, when attending the shoot, I found it surprising that the work operated so smoothly. Despite having never been there before, team members arrived on the set on time ready to begin their work. They greeted fellow employees they'd never met before and with very little briefing conducted their work skilfully and effectively. Despite changing work contexts over time, their work practices recurred. They knew what to do when they arrived on location and simply did it. The freelancers match Schön's (1991) description of professional practitioners who develop a repertoire of expectations, skills and techniques that can be applied to many variations of particular types of cases.

Despite the temporariness of their work projects, the freelancers had highly stable work practices. They were skilled professionals who applied their knowledge to the individual demands of each project, adapting and responding easily to the local work situation. An excerpt from field notes provides an example of the way in which freelancers adapt to local contingencies:

> *Greg, the producer, asks, "Do you know what the props people do on site?" I say, "No, I don't, what do they do?" Greg says … "They work together with the artistic director and they look after props. They are very talented and resourceful and can solve a problem with the minimum of resources. They bring along a truck full of gizmos that might be made for one purpose but they'll use it for something else. They can make something out of nothing, you have a problem on set and they whip something up out of a lackey band and a piece of string. They're amazing.*
>
> *Once I was working on an advertisement where we had a hundred extras running in a stampede towards a hot dog stand that they knock over and water runs out of it onto the street. So after the first take, the extras were back in their starting position and the hot dog stand was turned upright and ready for the next shot, we realised that the one thing we hadn't thought about was the water on the road. We couldn't have a wet road, the continuity of the ad would be all wrong. The sun was shining and we couldn't wait for it to dry naturally. We realised that we needed to somehow dry up the road for each successive take. So the props guy on that shoot said leave it with me, disappeared onto his truck and came back a little while later with a flame-thrower. He shot flames all over the road to evaporate the water and we did that about another five or six times until we got a good take. So they're pretty clever and useful to have around."*
>
> (Field notes)

The freelancers did not spend time preparing for every possible contingency they could imagine encountering while mobile. Instead, they took their toolkits of resources and their skills and adapted these to the particular demands of the local work situation. Essentially they were well prepared for whatever they might encounter while mobile.

Perry et al. (2001) found that mobile document workers spent time preparing for intermittent travel by selecting which resources to take with them while temporarily out of the office. In contrast, the freelancers seemingly did not prepare for their movement between project and work locations; instead they were ready to go at almost any time with transportation, a ready-packed toolkit and processes in place to manage unexpected contingencies. This high level of preparedness, along with their fundamental adaptability to the particular constraints of the local work context, allowed the freelancers to be highly adaptable. They were practiced at 'being prepared' for their upcoming mobile work. They could not always rely on remote resources or people to assist with their work.

The freelancers described four 'just in case' behaviours to manage the unexpected contingencies that occurred when they worked in new locations or started new projects:

- Firstly, they travelled with a mobile resource kit, transporting a range of different tools, equipment and artefacts to ensure that they were prepared for any circumstance.
- Secondly, the projects themselves include in-built processes and roles to respond to local events and movement, such as having a runner, call-sheets and visiting locations to step through the shooting process prior to the shoot.
- Thirdly, they used cars, bikes, vans and other personal modes of transport rather than public transport to be in control of their physical movements.
- Finally, they carried mobile phones wherever they went.

Mobile Resources

Along with their specialised knowledge, the freelancers also demonstrated their self-sufficiency by carrying essential tools of their trade with them to and from each work location. Although the freelancers worked to creatively build film content during their employment, they also left the project only with the resources (if any) they arrived with. Team members, such as the sound recordist, makeup artists and DOP, often travelled to their new jobs with a wide range of frequently used or potentially useful equipment in the work car, work truck or work bag. Wiberg and Ljungberg described the use of the car by service technicians as an "on-line, on-wheel home base" (2001, p.9). Similarly, I found that the bag, car or truck used by the freelancers was a travelling every-ready collection of useful and essential resources for getting the job done. For example:

> *Kirsten: What things do you carry around with you on a daily basis [for work]?*
> *Owen: As well as my mobile phone I've always got a bag full of CDs, software and utilities, diagnostic tools, networking applications, useful stuff like that. I also permanently carry around an external forty-gig hard drive, which also has a lot of information and stuff that I'd use on a day-to-day basis. As well as two memory sticks. And just a diary for writing the times down that I've worked. Oh and also a Bluetooth adaptor, headset for the phone.*
>
> (Interview)

An essential item in this toolkit and the minimum resource carried by all of the research participants at all times was their mobile phone. Other mobile technologies were rarely used by the participants on location.

At each of their work locations, freelancers took the time to set up resources in a temporarily claimed space within the new work environment. Equipment, props and tools were carried from the relevant repository (for example from a freelancer's car, truck or bag) and deposited ready for use in these newly appropriated and temporary work areas. At the completion of employment or

the working day, the resources were then transferred back to the repository ready for use on the next project. For example:

> *Kirsten: What do you actually do with your camera when you're not working? Well, with your equipment? Do you store it at home?*
> *Ed: I store stuff in a big van. I've got a van which is all safe and secure and it's got a tracking system in it and I figured it's easier to keep a van really safe and secure than the house. So I just leave it all in there, because the house is tiny anyway, get everything out of the house and put it in the van. It's good; it's nice to have everything you own pretty much with you all the time just in case something happens.*
>
> (Interview)

The freelancers noted that they carried additional potentially useful resources that they may or may not use in unforeseen circumstances. The inclusion of these types of items has been termed in the literature 'opportunistic carrying' (Robertson et al. 2005) and 'planful opportunism' (Perry et al. 2001). People choose to carry extra items as a way of being prepared for the unexpected and unpredictable opportunities presented by being mobile. Often the highly mobile freelancers carried more resources with them to counter contingencies than did the intermittently mobile freelancers. The freelancers who were employed on projects for shorter periods tended to rely more heavily on a mobile resource base consisting of larger stores of artefacts in their cars or trucks. This short-term work was often more time critical, requiring immediate action to resolve any issues to prevent budget blowouts resulting from delays to the work.

In-built Processes in the Project

Without a remote workplace to rely on and with the majority of the freelancers on location involved in the locally unfolding work, three in-built processes were identified in the project to manage any unforeseen contingencies on the shoot. Firstly, team members stepped through the shooting schedule on location prior

to the shoot. Secondly, as part of standard practice, the producer employed a runner on the shoot. Thirdly, a call-sheet was distributed to all team members prior to the shoot to provide details of the project, such as locations and contact details. These are described in further detail below.

Firstly, an integral part of the pre-production process was time spent by team members on location to identify any contingencies before the expensive production stage of the project. During the making of the advertisement, the producer, director and DOP walked through the planned filming process in situ prior to the shoot to ensure that there were no unexpected surprises. For example, when testing the best angles for the shoot, it was found that a key prop, the fridge door, did not open in the right direction for best visibility and needed to be replaced before the upcoming shoot. This resulted in a flurry of negotiation and mobile phone calls between the advertising agency representatives, the director and the producer to obtain approval for the additional cost of hiring an appropriate model, make and style of fridge for the shoot the following day. By stepping or walking through the planned process, potential sources of difficulties could be ironed out without delaying the shoot.

Secondly, the runner performed an essential mobile role during the production process. The runner's role was solely to gather any last-minute overlooked items needed to achieve what Bardram and Bossen call *mobility work* – the "right configuration of people, resources, knowledge and place in order to carry out tasks" (2005, p.136). In both work projects observed in Study Two, the runner provided an effective backup in case of contingencies, particularly to gather and deliver essential artefacts such as technical equipment in the event of malfunction. The inclusion of a runner in the project specifically enabled the core work to continue without diverting valuable time from the project to gather any overlooked items. In contrast to the runner's role, all other team members were central to the unfolding work on location and needed to be

physically present for the duration. One of the aims of the pre-production process was to ensure that everything and everyone needed to complete the work on the shoot and during post-production was locally available for the duration. The runner's role specifically provided the essential mobile backup to deal with any unexpected aspects that might have been missed in this careful preparatory process.

Thirdly, one of the very few paper documents created for each project was a call-sheet. Its role was described by one of the freelancers:

> *Rachel: The call-sheet is everything. It's got everyone's phone numbers on it. It's got the location of where we are going. It's got directions [to the shoot]. It's got where to park, how much the parking costs, who the site contact is, the schedule for the day, what scenes are being shot at what time, the talent, the actors, all their details.*
>
> (Interview)

Team members on the shoot were emailed by the producer with detailed directions, maps and parking instructions, to specifically minimise the overhead work required to travel to a new project location. Rather than each individual team member conducting this work separately, part of the producer's role was to spend time collating this information as a preparatory activity prior to the rollout of the job. This reduced the overhead of navigation work needed to plan travel to new locations. The call-sheet also provided a resource of contact details for use in the case of an unexpected problem on the morning of the shoot, such as getting lost or running late. Again, due to the preparedness of the freelancers, this was very rarely the case. The freelancers tended to print out the call-sheet prior to the shoot on home computers. It then became a tangible paper resource that could be carried along both to navigate to work locations or for 'just in case' contact details.

Transportation

The freelancers almost always drove to their changing work locations, allowing them to be in control of the when and where of their physical movement. In particular, this allowed them to respond to emergent needs of each project they worked on, such as unexpected long hours. This also allowed them to maximise the use of their travel time as private time spent in their car attending to personal or pressing work calls. For example:

> *Kirsten: So you're saying you use your phone a lot less on the weekends?*
> *Ed: Yes a lot less. Except on this Saturday [when I worked], I picked up the producer first thing in the morning. She was with me right through to six-thirty. And when you've got someone else in the car you tend not to make many phone calls, none really unless it's really essential. I don't like the 'oh yeah yeah' whatever it might be, I don't like blabbing with someone else next to me. I'm sitting talking to her. So there were no phone calls driving around that day, which is really unusual. Normally I'll get in the car and you'd try and catch up. Because when you're working, phones have to be off all the time pretty much. You can't take calls when you're filming. When you get in the car you've got ten missed calls and you're trying madly to catch up by the next location.*
> *Kirsten: Is it mainly work stuff then that you're trying to catch up on?*
> *Ed: Yes, social ones [calls] always wait. And it's just work calls, yeah. And it comes in fits and starts. But normally you might have a day off at home and you won't get a single phone call but you'll have a busy work day and the phone rings off the hook. And you can't do two things at once. It's frustrating but Murphy's Law, it's how it just seems to happen.*
>
> (Interview)

This was often the only time they had during long working hours to make personal calls, and a number of the freelancers (particularly the highly mobile freelancers) used their mobile phones for catching up on calls for upcoming project work or connecting with friends, making the most of their daily travel time.

Who Can I Call?

The freelancers' connections with people via their mobile phones became a knowledge resource to draw on to deal with local contingencies. With no remote team members to contact to ask for information to solve local problems, the freelancers drew on their broader social networks for this knowledge. Depending on the specificity of information needed, examples ranged from calling someone's mother to ask a grammatical question to contacting a fellow editor to ask specific advice on which shortcut key to use on the particular software platform being used. Perry and Brodie (2005) describe the formation of informal mobile communities of practices as mobile workers strike up relationships with people in their local environment to assist with problems. Perry and Brodie provide examples such as borrowing tools or resources from similar types of mobile workers nearby. For the freelancers who did not have access to anyone else on location besides fellow team members, this type of local problem-solving was conducted via their mobile phones. Their social ties formed a knowledge resource to draw on. They were able at times to contact other freelancing friends or family who were not involved in their local work situation. These types of interactions with people unrelated to the local work situation were important for the achievement of unfolding work activities.

In practice, however, mobile phone calls were rarely made to colleagues in other work locations. Often there were no remotely located colleagues to contact due to the locally contained nature of the work. However, the freelancers used their phones frequently during the day. Very little of this was in relation to the immediate work situation. Instead the freelancers used their phones to field calls and text messages from their friends, family and potential employers, and to deal with personal business during working hours. Although the freelancers described the necessity of mobile phones for 'just in case' uses related to their immediate work, they rarely used their phones for this purpose.

This demonstrated the effectiveness of the freelancers' careful preparedness for any contingency. Mobile phones were almost always ready for use, along with the other potentially useful resources that the participants carried, as a 'just in case' tool where needed for work purposes.

The freelancers noted that the demands of transient and sometimes highly physical work made it difficult to use more complicated informational portable devices, such as laptops, in changing locations. They particularly required support for immediate communication with others to respond to the unpredictability of their work. This tended to be about managing both project transitions and impacts of variable hours on social lives, rather than changing work locations. The freelancers' adaptation to variable working hours is discussed below.

5.3.3 Adapting to Unpredictable Working Hours

The freelancers described a wide range of impacts of unpredictable working hours on their future employment and their personal lives. The variability of their day-to-day work rarely impacted on the locally unfolding work itself. As a co-located team, everything and everyone they needed to do the work was present and available for the duration of the local activities. The unpredictability of the freelancers' working hours required the management of their outside-work activities with others.

The freelancers described adaptations in their social lives to manage the uncertainty of their day-to-day and longer-term availability to others. These adaptations, presented in turn below, include:

- spontaneous action rather than long-term planning; and
- fitting personal and social lives around work activities.

For each of these aspects, mobile phones played a critical role in allowing the freelancers to manage the impact of their variable working hours on others. The

freelancers were not able to manage this variability without being able to inform, shift and negotiate their movements with others in the moment.

Spontaneous Action Rather than Long-Term Planning

A characteristic of unpredictable working hours and uncertain upcoming employment was that the freelancers often did not know in advance exactly how long an activity might take. For example:

> *Kirsten: How do you manage your time if you don't have a diary?*
> *Louisa: Well when I'm working I don't need to. I don't socialise heaps outside of work when I'm working … When you're working away you're probably socialising with people at work. And that's an on a spur-of-the-moment 'do you want to go out for drinks' kind of thing. Then when I would go out on the weekends I would only organise it on that day.*
> *With the work thing, I don't organise things in advance very much and it's crazy. People will try and pin me down, including very close girlfriends who are like 'let's do something on the weekend'. I say 'I can't, I just can't commit until Saturday'. Because at work there's a possibility of being called in. Or there's a possibility that Friday night blows out of proportion at work and you come home shagged. Or there's a possibility that you've been sitting in close proximity with someone, a producer, for twelve hours a day. And you just come home and all you want to do is spend some time by yourself. So that's why I don't have a diary because I never plan in advance.*
>
> (Interview)

As a result, the freelancers adapted to this uncertainty by acting quickly and spontaneously to organise personal activities. Plans were made in the short term as certainty about schedules unfolded.

Researchers within the literature have found that planning has become more flexible as a result of the immediacy provided by mobile technologies (for example Ling & Yttri 2002). The freelancers also provided evidence of this

behaviour generally in their day-to-day socialising with family and friends, particularly as a result of mobile phone use. For example:

> *Kirsten: [Pointing at the postcard on 'how has your mobile phone changed your life'], [you say here that] you can be less organised?*
> *Ellen: Well, there you go. You read that didn't you [laughs].*
> *Kirsten: Do you think this is a good thing, being less organised and more spontaneous?*
> *Ellen: I think the spontaneous is good. I don't know about the less organised. But they do kind of tend to go hand in hand. Spontaneous is a nice way of, a positive way of, saying not being organised and not planning. There's a certain level of excitement that comes along with that … I think in my life there are certain things I plan ahead for, but I do tend to be a bit more last minute and spontaneous.*
> *Kirsten: What sort of stuff would you be planning ahead for?*
> *Ellen: Like concerts. Things that I'm really forced to plan ahead for. But I don't know. These [plans] are kind of hard for me in terms of even a weekly move sometimes, for social things. I don't know why, I don't know when that happened. But I used to be a real planner, you know, planning things, what's happening next weekend, the weekend after that ...*
>
> (Interview)

However, what is different for the freelancers is the difficulty in making plans for the future as they experienced both micro and macro flux. Spontaneous action rather than planning was necessary for managing periods of, or ongoing, unpredictability in their upcoming work hours. This particularly impacted on their ability to plan activities in their personal and social lives.

The impact of variable working hours on personal lives was experienced at different durations of the micro and macro. From day to day, last-minute planning occurred as the freelancers used their mobile phones during working hours to organise outside-work activities. For example:

> *Steve: Like everyone now knows you can change things at the drop of a hat. So everyone's more fluid. You can have four or five different sets of plans in a day. You*

can leave the house in the morning and think right I'll work until four and then I'll go to the beach and have a swim. Then all these things change in the day and you change them on the run.

(Interview)

From project to project, last-minute planning occurred as the freelancers faced sudden or imminent unemployment. This occurred as projects ended and start dates shifted or periods of unemployment began. The freelancers described difficulties in planning holidays in advance. For example:

Kirsten: What about holidays, have you taken holidays in the last twelve months?
Thomas: [I've] not had a proper holiday in, I've never had a proper set holiday due to the fact that it's hard to gauge when the work will be there and when it won't. I get time off but it'll just appear. It's hard to plan. I've never had a four-week break and planned 'OK in April I'm going to have four weeks off and go over here or do nothing' …

(Interview)

Unexpected breaks in employment could occur a day or two before the break began, while the variability of day-to-day work hours unfolded during the working day. For example:

Steve: Cancellations of large slabs of work have been fairly common for me this year. It's common every year I suppose in our industry, but receiving phone calls saying yes this job won't be happening next week for five days. Suddenly you're left with nothing to do for five days and no income. That's [not] very pleasant. There's been a lot of it this year for some reason.

(Interview)

So far in this section I have discussed the impact of work on social lives during periods of flux, particularly as the variability of work hours evolves from day to day. One of the key benefits of the freelancers' spontaneous schedules was the ability to fit personal lives around work activities and projects while working non-traditional hours. This is discussed below.

Fitting Personal Lives around Work Activities and Projects

A characteristic of the freelancers' work was the potential blow out of hours worked on individual projects. The freelancers described intense periods of work in which they worked 12 or more hours on weekdays, over weekends and on night shifts. An aspect of their work during non-traditional hours was the flexibility to fit in personal activities while working alone. For example:

> *Katie: I went home, had a sleep, came back on Friday and I worked all weekend. I worked every day. I worked on Saturday. I went in at nine o'clock in the morning. But I had to go out and look at a couple of houses [for purchase]. So I was travelling back and forth to Bondi Junction doing a couple of hours' work, leaving for an hour and a half, coming back for a couple of hours, leaving again.*
> *Work on weekends varies from work during [the] week. [There is] more flexibility to fit in personal stuff. Then you know I kind of managed to squeeze in seeing a movie and a band. On Sunday I did the same thing. Went to work in the morning, squeezed in lunch at my granddad's house, went back to work, went and saw a movie and after that went home. And then we're back to Monday and it's the same story. Yep, no break.*
>
> (Interview)

Work on weekdays was for the most part prioritised over social lives. However, during non-traditional hours of work, the freelancers' personal lives were allowed to more extensively pervade the daily work activities. An additional aspect of this was the access provided via technologies to friends and family while at work. Mobile phones, landlines and internet technologies (if available) were used more freely for social purposes during non-traditional working hours. In contrast, during traditional work hours, mobile phones were more heavily relied upon for immediate access to friends and families. The flexibility to fit social activities into working hours provided a way of maintaining social lives while also working long hours. The ability to fit these personal interactions into work hours was also often spontaneous, as the freelancers made the most

of opportunities and breaks between work activities to tend to their personal relationships.

5.4 Discussion

A number of key findings of the research have been introduced in this chapter, including the ways in which freelancers have adapted their practices, technology and artefact use to the temporariness of their work; the self-sufficiency of the freelancers' practices across changing work locations; and the impacts of unpredictable working hours on social lives. The following discussion focuses on how these findings may assist in the design of technological support for mobile people, including some specific implications for design.

5.4.1 Different Rhythms of Flux

Understanding mobile practices in terms of flux provides insights into some of the ways in which the freelancers' technology use and practices are shaped by the temporariness of their mobile work. In section 5.2.1, three different rhythms of flux were outlined, as the freelancers' project involvements endured over different periods of time. The different rhythms demonstrate a relationship between the frequency of project transitions and the freelancers' dependence on physical spaces, technology and social interactions with others. This is revealed in the data by the differing practices of freelancers when working on short or long jobs. While working on short jobs, the freelancers experienced variability frequently and relied more heavily on mobile devices. On longer jobs the freelancers settled into temporary patterns of relatively stable working hours and locations. The freelancers on longer jobs tended to rely on a combination of fixed and mobile technologies until they experienced communication 'hot-spots' on their mobile phone towards the end of projects.

The freelancers' project transitions necessarily involved a series of interactions with others to set up, negotiate and initiate the conditions of each new project. When considering the different granularities of the freelancers' experience of flux, from micro to macro durations, this series of interactions highlights the possibilities for mobile technology design that are afforded by taking into account a range of aspects of flux in people's lives. If mobility is viewed as movement between physical locations, physical issues such as way-finding are prioritised. Alternatively, if mobility is viewed as movement between more enduring social situations, interactional issues relating to establishing and ending social involvements are emphasised. By examining different durations of flux, designers can support the very different practices that people engage in to enable, coordinate and manage their short- and long-term mobile practices with others.

The research findings indicate that designers could benefit from identifying the different durations of flux that people experience, rather than focusing solely on movement between physical locations. For example, the freelancers' encounters with new locations of work required little technology use to manage, while they frequently used their technologies to manage ongoing project transitions and variable working hours. In particular, the different rhythms of the freelancers' project work significantly impacted on the intensity of their day-to-day technology use. By becoming sensitised to a range of short- and longer-term mobile practices, designers can become aware of different intensities and types of technology use. This can provide designers with insights into ways of supporting not just one particular aspect of mobility in practice (such as navigation between locations) but a range of longer-term social and cultural movements (such as changing projects or moving homes or countries).

5.4.2 The Freelancers' Mobilisation Work

In section 2.2.4, Perry's (2007) concept of mobilisation work was identified as a useful approach to thinking through the work involved in enabling mobile practice. Mobilisation work is the additional work on top of a mobile activity that makes the nomadic work possible. Applying the concept of mobilisation work to the practices of the freelancers reveals that their adaptability to flux occurs as a result of a combination of their ongoing preparedness across contexts and flexibility in response to local circumstances. As in Perry's findings, the freelancers' developed systems, strategies and processes to both prepare for the unpredictability of upcoming flux and to maximise their ability to adapt to local contexts. However, unlike in Perry's findings, the freelancers did not require access to remote colleagues or resources and did not pre-plan around work tasks in order to be mobile. Instead, they managed flux in practice by:

- establishing ready-to-go mobile resource kits that can be adapted to the specificities of any local work context;
- allocating the management of collaborative group movement to one team member (such as preparing navigation details for others or gathering additional resources during the shoot) while others focus on the work itself;
- crossing work and social contextual divides, including managing the impacts of variable work conditions on personal lives and drawing on personal relationships to solve local contingencies;
- conducting contextual walk-throughs on location prior to the work itself; and
- selecting immediate transport modes to allow the short-term coordination of upcoming activities with others.

These management practices indicate opportunities for designers to develop technologies to support the practices of mobile people. The discussion below focuses on design implications that arise when considering three of the five management practices mentioned above: ready-to-go mobile toolkits, coordinating mobile groups and crossing contextual divides. These three practices have been selected for discussion here as they involve technologically mediated interaction. The remaining two practices also present opportunities for design yet are beyond the scope of discussion as they involve people's physical presence and movement at specific locations or on modes of transport.

5.4.3 Ready-to-go Mobile Resource Kits

Technology design has tended to produce mobile phones that have increasing numbers of applications available to users. One approach to mobile technology design has been to provide users with a fixed array of standard applications, whether they are useful to individual users or not. For example, current mobile phone handsets often provide a basic suite of applications such as calendars, alarms, calculators, games, cameras, music players and internet access. More recent approaches, such as Apple's iPhone or Google's Android operating system, are providing adaptability to users in the form of flexible configuration of devices and downloadable applications (Goggin 2009).

Findings from this research reveal that mobile people carry adaptable resources, information and technologies to support their practices. For example, different freelancers carried very different resources to changing work locations. Yet each had a ready-to-go adaptable resource kit that was consistently carried to each job. Of significance to technology design, the freelancers carried everything they thought might be useful to their work, and nothing more. Their selection of useful resources was streamlined; only items that were relevant to their work were included in the portable resource kit.

This indicates a different starting point for mobile technology design. Rather than requiring access to unlimited applications, the freelancers required the ability to locate, select and streamline a few applications that were specifically relevant to their skills and activities. The freelancers also required adaptability to allow them re-shape and re-select available applications over time as work responsibilities and activities evolved. An important aspect of this was being able to locate and use specific resources quickly and easily in order to respond to local contingencies.

This type of adaptability can be provided through technology design by allowing users to more easily configure and reconfigure their technologies. At one level this can be achieved by making it easier for users to select and reject applications on their devices – for example, allowing users to remove 'basic' functionality included on most mobile phones to date, such as camera, music, video, internet and other applications they will not use. At another level this could be achieved by making menu structures configurable to display relevant applications in tiers or groupings determined by the user. For example, systems could provide the most frequently used applications at the highest level, while other less useful applications provided on the device could simply be hidden or removed. The iPhone has some of this capability, with the ability to dock most used functionality at the bottom of screens and 11 home page screens with moveable application icons, so that users can group applications onto different screens ('Introducing iPhone 3Gs' 2010). However, the iPhone does not allow for the removal or hiding of basic applications beyond shifting to secondary screens (McKillop 2008). Opportunities exist to further think through flexibility at the level of menu structures and to provide more choice to the user on the applications available to them.

Allowing users to select and create downloadable applications provides another level of configurability for technology users. Android and iPhone are two

devices currently on the market that provide downloadable applications. These devices generate two benefits for users: firstly, users can select and download the applications they have on their devices from a centralised database on the internet; and, secondly, in the case of the open-source Android, users can develop their own applications for the device. These benefits, however, present particular difficulties for freelancers, who are often time poor due to the demands of their work. Both of the centralised online application stores for iPhone and Android are largely designed to allow any and all users to browse broad lists of application categories. It may instead be useful to consider ways of providing quick and targeted access to applications that meet the needs of different user groups. This raises issues of how to best categorise, label and centralise resources or applications so that they are quickly locatable. The central insight here is that busy mobile people can benefit from technological systems that allow them to locate, select and streamline the applications available to them on their mobile devices.

5.4.4 Management of Collaborative Group Movement

The findings of this thesis also suggest opportunities to support the coordination work of the movements of collaborative freelancing teams. As noted in section 2.2.1, studies within CSCW have tended to examine the practices of mobile workers connected to remote offices and centres of coordination, or of loosely coupled collaborative groups. Similarly, in HCI the coordination of upcoming group activities has tended to be examined in relation to social activities and mobile phones (see section 2.4.1), yet not often in terms of work activities. The freelancers' collaborative mobile work presented another pattern of group movement: tightly coupled work that required preparatory work by the producer to coordinate group movement.

Although current portable technologies, such as GPS systems and internet applications on smart-phones, are making it easier to navigate to specific

locations, this is clearly distinguishable from the coordination work of the producer. In addition to navigation information, the call-sheet provided the freelancers with essential information that was both highly specific to the upcoming location of the shoot (where to park, what time to start, etc) and also highly specific to the project (contact details of other team members, OH&S details, emergency contacts, etc). The producer's preparatory work, and the freelancers' use of the information the producer provided, was not well supported by existing technologies or applications. For example, the creation, distribution and use of information were spread across multiple technological platforms and paper mediums.

Opportunities exist to consider ways of best creating, distributing and consuming group information to individuals for work purposes. This includes design decisions on how to better support these actions across technological platforms, both mobile and fixed. For example, with the improved access to the internet via iPhones, it could be possible to create and place call-sheet information online for access by freelancers via handsets while on the move. Design decisions could also focus on how best to view information on mobile handsets. The call-sheet was often several pages long, and particular sections of the document were relevant to particular problems they encountered, such as navigation or contact information. For example, systems could be developed to easily allow the transfer of contact details that are collated by the producer onto the mobile phones of individual freelancers. This could help to reduce the reliance on paper lists, improving the accessibility to important contact details on mobile devices.

Opportunities also exist for facilitating the last-minute shifting of agreed plans as local contingencies emerged. For example, the freelancers' work could be postponed at 6am on the day of the shoot if the weather turned bad. The freelancers required quick dissemination of 'yes' or 'no' action based on

immediate contingencies. Essential to this was the feedback from large teams that they had received the information and were aware of the change in plans. In practice, the producer managed this by either texting or calling individual team members on their mobile phones. One possible way of facilitating this through design would be to allow groups of contacts to be more easily created and accessed on mobile phones. On a range of mobile handsets, contacts can currently be allocated to groups to allow the broadcasting of text messages. However, the set-up, access and categorisation of groups are not often well suited to quick and ongoing flows of group communication. For example, simple improvements could be made by improving the visibility of groups in menu structures and allowing return text messages from group members to be accessed together in one location rather than as individual texts in a generic inbox.

5.4.5 Crossing Work and Social Contextual Divides

The freelancers' practices reveal an important theme that is interwoven with the findings in this chapter and following chapters: that in order to manage their mobile practices the freelancers require technological support for ongoing cross-contextual actions and interactions with others. This theme is introduced in this chapter, while specific design implications are discussed in further detail in sections 6.2.2 and 7.4.2.

The findings in this chapter reveal that an important part of managing flux for the freelancers was also managing the impacts of work activities on social lives. Having the ability to keep loved ones informed of changes to work schedules was important to the freelancers for easing their minds and allowing them to continue with their work or extend working hours. The freelancers also relied on their personal connections to remote family, friends and other freelancers to solve gaps in local knowledge.

The examples in this chapter reveal that work and personal lives for the freelancers were intertwined and at times inseparable. The freelancers used their technologies to engage in two distinct types of social interactions while at work: to contact family and friends, and to manage project transitions. Although managing project transitions was not often about the current job, this played an integral role in facilitating work for themselves and other freelancers in the future. At times one milieu would win over the other, for example some freelancers' work lives eroded their social lives as they fielded frequent calls from clients out of working hours, while others simply switched their phone off after work. However, the significance of this finding for designers is that technologies that are designed to support work practices in work contexts only do not support actual practice. Distinctions discussed in this and subsequent chapters between work and social time, weekdays and weekends, are made to demonstrate both the ongoing and frequent cross-contextual practices of freelancers and their importance for supporting the work itself.

The findings demonstrate that it is important to consider the essential ways in which social and personal uses of technology can be supported by designers in work contexts. As noted in section 2.3.3, research in HCI has often viewed personal and social interactions in work spheres as an intrusion and diversion from local activities. The important finding here about the freelancers, supported by the findings of Nardi, Whittaker and Schwartz (2000, 2002), is that personal and social connections can play an important role within the community or to support the local work itself.

The implication for technology designers is that systems developed to support mobile practices can be explicitly designed to facilitate cross-contextual interaction. This expands the focus of design on ways to enhance social and personal interactions that may be relevant to the local work, as well as focusing on ways to balance access and control in order to minimise intrusions. Specific

design insights related to managing contingent availability and cross-contextual interactions over time are discussed in sections 7.4.2 and 7.4.3 respectively.

5.5 Chapter Summary and Conclusions

In this chapter the freelancers' experience of flux has been illustrated in terms of changing projects, changing work locations and changing hours of work. The freelancers skilfully managed their experience of flux by carrying resources and mobile phones, through a range of processes embedded into the projects themselves, and by using cars and vans to maintain control over travel. The analysis reveals that existing definitions of mobility within the literature do not fit the freelancers' experience of flux. Instead the analysis demonstrates that a focus on understanding the ways in people manage their mobility in practice can provide practical insights for technology design. A number of opportunities and implications for technology design have been identified, including the importance of:

- examining the practices of mobile people in terms of short- and longer-term flux to make visible a range of mobile practices that can be supported by technologies;
- designing adaptable ready-to-go mobile toolkits; and
- facilitating the coordination of group movements by individuals.

This chapter has examined the freelancers' experience of flux, yet the analysis indicates that understanding mobile practices in relation to flux alone provides only part of the picture of the ways in which mobility is managed in practice. The next chapter explores the role of stability in enabling and shaping the freelancers' mobile practices.

Chapter 6

The Freelancers' Experience of Stability

Chapter 6 analyses the role of a range of stable bases in shaping the freelancers' mobile practices. Stable bases that endure beyond the length of individual projects, such as booking agencies, production companies, homes and ongoing social relationships, were essential for allowing the freelancers to manage change. This chapter describes the types of interactions and relationships the freelancers form with others to generate ongoing stable bases. It outlines the ways in which stable bases assisted the freelancers in managing their frequent job changes and variable work conditions. The analysis concludes with a discussion of the informal and social nature of the stable bases the freelancers relied on, including some specific design implications. The analysis highlights the importance of examining experiences of both flux and stability in order to understand the ways in which mobility is achieved in practice.

The previous chapter outlined the adaptability of the freelancers as they encountered changing locations, hours of work and projects. Similar to the 'hot-deskers' described by Brown and O'Hara (2003), the freelancers developed a flexibility in dealing with their work environment and the variability of their working hours. They were able to transform almost any location into a place of work. They also quickly adapted their schedules to manage the impacts of work on personal and social lives.

The focus in this chapter is on the flexibility the freelancers' developed in relation to their project transitions by generating and relying on a variety of stable social contexts, rather than a remote office. The aim is to explore the role that both temporary and longer-term stabilities, such as relationships and work spaces, take in supporting the freelancers' mobile practices.

The freelancers did not have colleagues in established and remote work spaces to depend on. Instead they formed temporary stabilities for the duration of projects. Across projects, they relied on systems of formal and informal social and physical infrastructures for locating and securing future work. These stable contexts existed beyond the brief duration of the project. For example, freelancers could not operate without having production companies to generate the projects they worked on. Yet they were not employed by production companies across projects; they freelanced for multiple companies to secure ongoing work. They also relied on personal employment networks and the continuity of mobile phones to be contactable for recruitment on upcoming projects. These stable bases influenced their technology use and mobile practices and are detailed in the remainder of this chapter.

6.1 The Freelancers' Experience of Stability

This section examines the freelancers' experience of stability as a result of the temporariness of their mobile work. The different forms of stability that the

freelancers experienced and relied on, both during and across projects, are discussed. Shorter-term contexts (micro stability) provided the freelancers with temporary stability, influencing their choice and use of technology, their reliance on locations of work, and the duration of their relationships with others. Longer-term contexts (macro stability) supported the freelancers through periods of flux as they moved from project to project. Both shorter- and longer-term stabilities in the freelancers' working lives are discussed in turn below.

6.1.1 Micro Stability

The freelancers described a period of temporary stability for the duration of their project work with team members. This short-term stability was experienced in relation to three temporary aspects: work locations, work hours and work relationships.

Firstly, depending on the rhythms of freelancing work, at times the freelancers experienced short-term stability in relation to work locations and access to technology infrastructures. Work over a short period of time in temporary locations provided an opportunity for the freelancers to appropriate spaces to store resources for the project duration. For example, when working in a single location for a period of time longer than a day, the freelancers typically carried additional resources to and from work on the first and last day of their project involvement. Additional resources included, for example, one editor carried note pads, pens, a stick drive, a hard drive, spare cables and call sheets to his first day at work. In between times, they left some of the resources they used in their day-to-day practices, such as cables and note pads, at the work location. Temporarily stable work locations also at times presented opportunities to access fixed technologies, such as landlines and the internet. The freelancers were able to supplement their mobile phone use for social purposes by utilising these fixed resources to engage in social activities in work breaks. Temporary

predictability in work locations provided the freelancers with regularity in travel to known locations, without the need for ongoing navigation to new locations.

Secondly, for projects with durations longer than a day or two, work hours tended to fall into predictable daily rhythms. In the example of the temporary stability associated with macro flux provided in section 7.3.1, Louisa describes how during a project she works in a single location, often living away from home for a period of time. Her patterns of work and social practices fall into regular routines of time spent away, visits from her partner and visits to her home. For the duration of the project, her work hours tended to fall into predictable daily patterns. These hours could be hectic or relaxed, yet tended to remain fairly stable for the duration of the project. Temporary predictability in work hours provided the freelancers with the ability to arrange social activities with others without the last-minute pressures of flux, such as shifting arrangements and unexpected work schedules.

Thirdly, the freelancers also experienced short-term durations of relationships with other freelancers as they worked together on projects. For example, Steve distinguishes between patterns of mobile phone use for short-term work relationships as opposed to long-term friendships:

> *Steve: I use the phone heaps more when I've got a job on. And another good feature about phones is phones have that twenty or thirty phone numbers that you've just been talking to throughout that week. So they have a short-term memory of what's going on in your life at that time …*
> *So that's a really useful tool in just how your life changes from week to week, you can quickly go back through the twenty numbers. I think that's kind of interesting in terms of patterns of behaviour. But then, you know friendships aren't like that.*
> *Kirsten: Why is that?*
> *Steve: Because not all of your friends you contact all the time. You've got your 'what's going on' for you in that week, in that month. And that's all the contacts*

> *that you need to make some money. Then [there are] your close friends who you're in contact with, like my wife and like my brother. And then there's the outer circle. [They] are the ones who drift in and out. When some event's coming up or something you call them. But then there are the friends that you talk to each month.*
> *Kirsten: So there are different rhythms to the kind of communication that you're having [with others]?*
> *Steve: Yes, rhythms to it.*
>
> (Interview)

Steve demonstrates the short-term nature of current work relationships by identifying his mobile phone use for work purposes as 'what's going on' this week or month. Mobile phone call logs display a short-term intensity of use that reflects the interactions required to negotiate the latest work project with others. This includes both work and social interactions. For example, as Louisa described, during a project she often socialised with other team members as well as working with them. However, after completion of the project the freelancers did not actively pursue ongoing interaction with ex-colleagues unless longer-term friendships were established. The role of longer-term relationships in providing stability for the freelancers during project transitions and their encounters with daily contingencies are described further in the next section.

6.1.2 Macro Stability

Along with shorter-term stability that lasted for the duration of projects, the freelancers described a number of longer-term stable bases that they relied on to manage their mobility. These included:

- informal employment networks;
- production companies, to generate the projects;
- mobile phone contact details;

- booking agencies, to help manage the coordination overhead of securing work; and
- home as a base for meta-project work.

These resources are discussed in turn below. The freelancers' interactions with and use of these stable resources and relationships formed an integral part of their technology use and management of job uncertainty.

Informal Employment Networks

The freelancers' informal employment networks with others formed an essential resource as they managed their frequent project changes. Without ongoing connections with similarly mobile freelancers, obtaining future work was often extremely difficult. As Katie describes, freelancing project work is generally not obtained through traditional approaches to gaining employment:

> *Katie. But I haven't, I tried for a while when I was unemployed like those last two months over Christmas. I went on the dole or whatever they call it, Newstart Allowance, but I was getting so many little jobs that were paying me [quite well], like in comparison I get paid quite a lot of money compared to any random person who's doing a couple of days' work, that kind of made it useless. And I had to do this thing of ringing people up and sending out CVs and all the rest but that never gets me work. I could do that for work and I'd probably never get a phone call out of it.*
>
> (Interview)

Employment was primarily gained through a system of recommendations and word of mouth. There were two sides to the recommendations process: producers locating staff, and freelancers recommending others. In the excerpt below, the recommendation process for both producers and other freelancers is exemplified. As an initial step in the process of staffing projects, producers either drew on lists of past colleagues or asked for recommendations if their preferred freelancer was not available for the upcoming project.

Kirsten: Going back to having a list of people you can call when you need work, is any part of your communicating with these people to do with networking?

Rachel: Oh huge, huge, yes. Because even though I've got, filed under D for directors, I'll have fifteen names come up. And in my head I've got my first, second, third, fourth, fifth choice of person who I like working with. If quite often these people just aren't available, they'll be working on another job. It's the same with any freelancer. If I'm talking to my favourite cameraman, I'll say "Look you can't do it next week. You're busy. Who do you recommend?"

And quite often they'll actually do it in the reverse way. Because they have their own little networks. So, say you've got two cameramen, they basically have a gentleman's agreement that if one person is busy they'll give the other name and likewise … but it's always, "can you recommend someone?" And lots of "who do you know?", the names, "so and so said you're great to work with". Well if they said you're good to work with, I want to work with you too.

(Interview)

Secondly, when receiving calls about upcoming jobs, the freelancers were able to accept the work or recommend other freelancers for positions. The freelancers often generated employment opportunities for each other as they passed on the names of others when they were not available for the work themselves.

The freelancers relied heavily on their personal and social networks to locate work and at times solve local problems. Rather than being deliberate or formal, the freelancers' networks were informally established and expanded as a direct result of frequent job changes. As the freelancers moved from project to project they established connections with their new work colleagues. For example:

Kirsten: Is networking something that you do?

Owen: To tell you the truth, when I worked for [a production company in a permanent position], I tended to do a lot more [deliberate] networking then. Just because there was a lot of time where you could sit down and just talk to people and find out what they were doing. Now being freelance, whenever I am working I

> *actually have to do a job rather than have downtime and sit round and speak to people. But I have met a lot more people since I've been freelance. So definitely I would be networking in that respect I guess, I would not have met these people if I'd not gone freelance.*
>
> (Interview)

This exposure to new people worked to generate employment opportunities in three key ways. Firstly, the freelancers were able to indirectly gather contact details via the call-sheet and crew lists provided on each project. For example:

> *Kirsten: when you leave a job, do you take anything with you?*
> *Louisa: No, just, I always, the one thing that I always keep from my job is a crew list with phone numbers and email addresses of people. And I have a filing place for them in my filing cabinet. But that's probably about it. And gain a couple of pens along the way.*
>
> (Interview)

Call-sheets were often kept and stored in paper format after completion of a project. This provided both a backup list of contacts in the event of mobile phone loss or failure and also a resource to draw on to locate past colleagues. In this way freelancers could easily track down a phone number, refer to the project they worked on together, and develop relationships as needed from there. As a result, the freelancers' ongoing exposure to new people on new projects, with contact details readily available, provided a means for easily building their employment networks.

Secondly, all of the freelancers described the importance of doing a good job on each project to secure future work. Having a good reputation in their small industry was important. By doing a good job, the freelancers found that their names ended up on producers' lists of potential employees for future work (as described above), and ex-colleagues were likely to contact them for new projects when sourcing staff. It was also important when recommending others to refer freelancing friends they knew were available for work and who would

do a good job, to assist busy producers in their search for staff. Passing on the details of other freelancers reflected well on them if the work their friends completed was of good quality.

Thirdly, when the freelancers did not have work lined up, they connected with other freelancers on a periodic and often regular basis to find upcoming work. As Katie notes, she would "generally just call a few people that I know and tell them that I'm looking for work". In particular, the freelancers maximised their access to potential jobs by connecting with other similarly mobile freelancers. For example, editors connected with other editors to find out about upcoming work opportunities. Similarly DOPs connected with other DOPs to cross-recommend work. If unsuccessful in generating work, networks were cast wider as freelancers contacted production companies to locate projects. This, however, was a less frequent, more time-intensive approach to finding work. The production companies often only conducted one or two projects at a time. A freelancer, on the other hand, could potentially hear about multiple job opportunities on a daily or weekly basis as they regularly fielded calls for work. Informing other similarly mobile freelancers of their availability for upcoming work was essential for the freelancers in gaining ongoing exposure to future employment.

By cultivating a good reputation, meeting new people on new projects and informing others of their availability for work, the freelancers generated employment opportunities. These were manifested as calls from production companies and ex-colleagues as a direct result of previous work together. The stable role of production companies in supporting the freelancers' project transitions is described below. Further detail about the types of technology-mediated interactions that the freelancers engaged in to maintain their employment networks and generate work opportunities is provided in section 7.3.1.

Production Companies and Producer/Director Pairs

Another stable resource the freelancers relied on to generate work opportunities was the producer/director pair. The producer/director pairs, either working from home or at production companies, were responsible for developing creative ideas, applying for funding, and bidding for jobs with clients. Unlike the freelancers who moved from one project to another, the producer/director pairs created the projects themselves. Essentially, they facilitated the work sphere in which the freelancers travelled. In this way, freelancers employed to complete a stage of the project were provided with work through the longer-term ongoing establishment of projects via the producer/director pair and any relationship they might have with a production company.

An important part of the work of these pairs was the creation of future projects by bidding for and generating work through contacts with potential clients. On winning projects, the producer would spend a large proportion of the pre-production time staffing and coordinating the projects. The producer would perform the *articulation work* (Strauss 1985) or the coordination overhead that tied together various actors, tasks and groups of tasks to achieve the work itself. The producer's job on a project was to make calls to gather the necessary resources, people and information to get the work done. After negotiating employment, the freelancers employed on the project then did not have to worry about these types of activities. When they arrived at a job, this type of preparatory work had already been conducted, paving the way to the immediate start of work on location. This was another process that facilitated the ease of the freelancers' ability to move their work from one location to another.

The Continuity of Mobile Phone Numbers

Mobile phones were an essential tool in the management of the freelancers' frequent job changes and during times of unpredictable working hours. Mobile phones provided continuity of contact details over time. As a result, potential and past employers were able to reach the freelancers, sometimes years after first contact. Friends and family were also able to contact the freelancers without having to continually inform others of the most recent landline phone number (if one was available for the duration of the work). For example:

> *Louisa: David and I shared a phone, which we did successfully for about two or three years. We used to have one phone between us. It was actually when, even when I started doing freelance in fact and then it was just whoever needed it most would take it. And then what happened? David went on tour. It was the first job that David and I did away. He went away. So we bought a second Telstra phone with a good deal between the two phones rather than calling from hotels and stuff. This means that I still get calls for him for work because I kept the original number. And the main reason I got a mobile phone in the first place and the main reason I have to keep it is that my home phone number has changed in the last ten years probably five or six times, especially when we were renting. [It's] the continuity. And literally I have had phone calls from producers that I haven't seen for five years. Just out of the blue they'll remember you and give you a call. So that continuity of number with the mobiles is very important for freelance work.*
>
> (Interview)

As described above, a system of recommendations is used in the freelancing industry to hire teams for projects. Mobile phone numbers were often exchanged and distributed between parties, often without the freelancers' knowledge. Having the same contact details over time was essential for the ongoing receipt of calls about work. If contact details were not up to date, it was possible for the freelancer to drop out of the loop of potential upcoming employment. The freelancers described the importance of building up a solid

base of past employers to generate future employment opportunities and incoming calls about new work. The continuity of mobile phone contact details facilitated the formation and maintenance of relationships to secure employment. The stable base provided by these networks is described below.

Booking Agencies

As noted in chapter 5, all of the freelancers regularly interacted with others to coordinate their transitions from one project to the next. They regularly fielded calls from potential employers and negotiated upcoming projects with others. A few of the highly mobile workers in this study, particularly those with equipment needed for the shoot (such as cameras, props and rigging), utilised booking agencies to handle this communicative work for them. Instead of the heavy communication overhead required to manage their frequent job changes, they remained in communication with one or two agencies.

Booking agencies provide a service to both sides of the staff recruitment process. The producers in this study used them to locate staff, and freelancers, who changed projects frequently such as daily or weekly, used them to coordinate and book future work. For example:

> *Greg's desk phone starts ringing. He picks it up and answers it. He has a conversation, saying "Really? Oh that's no good. Does that mean you won't be able to work tomorrow?" Greg hangs up the phone and says to Simon, "Guess what? Doug has had a car accident and looks like he won't be able to come on Wednesday." Simon says, "Oh was it bad?" Greg replies, "No, it's just that his truck is a write-off, so he has no way of getting his equipment there." Greg says, "He's going to try and sort out an alternative, but it's not definite. I'm going to book someone else just in case." Greg picks up the landline and makes a number of calls. He rings different booking agencies until he finds an agency that has someone available to work that day. He says, "Book that in, thanks, bye". Greg turns to me and says, "Yes, quite a*

> *few freelancers go through booking agencies, especially people with heavy equipment, like cameramen or props people."*
>
> (Field notes)

A system of tentative bookings for staff and equipment was employed and confirmed as the work approached. Producers made bookings with multiple agencies or multiple freelancers to ensure that at least staff were available. A backup 'hold' was made on staff in case one team fell through at the last minute due to unforeseen circumstances. The backup bookings were cancelled as firm bookings were made shortly prior to the start of the work. A downside to this practice was that the producer would need to make more calls to schedule staff for the project. Additional calls were placed to make tentative bookings, to confirm concrete dates, then to negotiate the short-term and changing availability of highly mobile freelancers for the work. An excerpt from the field notes provides an example of a producer's interactions with a booking agency:

> *Greg's mobile phone starts ringing and he fumbles around with it, trying to drive and plug the phone into his hands-free kit, putting the call on speaker-phone. He manages to plug in the cable and then holds the phone in his left hand while he steers with his right. Greg says "Hello". The office assistant, Jason, replies "Hi Greg, I've got some bad news. The props people you booked are not available for Wednesday, their truck has broken down." Greg says, "OK, well, we need someone so can you get onto the booking agency and re-book the other props people? When was the hold we had on them cancelled?" Jason says "This morning". Greg says, "Oh, bad timing. If you can give me a call and let me know how you go, I'll be back in the office in about twenty minutes."*
>
> (Field notes)

Booking agencies provided a single port of call for the producers, allowing them to tap into a number of different freelancers at once and simply book in whoever was available for the work. From the other perspective, the utilisation of booking agencies by the freelancers helped reduce the number of incoming calls they fielded and had to manage for the coordination of their work.

Booking agencies did not replace the usual informal process of obtaining work via personal networks (see below for a discussion of these). Instead they supplemented the process by providing an alternative means of securing work. They assisted by taking on part of the ongoing coordination work required to transition from one project to another.

Home Base

In addition to their day-to-day work activities, all of the freelancers also conducted work tasks outside of traditional working hours, such as invoicing clients and emailing potential employers to negotiate start dates and contracts. These additional tasks were part of the work involved in managing their employment on each of their projects. Almost all of the freelancers used a computer in the home environment from which to conduct these meta-project tasks across projects. For example:

> *Ed: It's really hard, I think, in our work to stop and leave it alone.*
> *Kirsten: In what way?*
> *Ed: Well, you might do twelve-hour days. When you get home you've got to check your emails and look at stuff for the next day. And do your online banking and stuff like that you have to do, do all the running of the business.*
> *Kirsten: Like invoicing?*
> *Ed: Invoices, yeah. I really try not to do that stuff. I really try, you've had a full day's work, when I get home that's the end of the day. That's really crucial. Some guys go home and do their invoices and stuff that night but I always wait until I have a day off during the week. You tend to get one every week or two at least, depending on work.*
>
> (Interview)

A few of the freelancers also set up computing equipment, such as an editing suite, in the home environment from which to conduct smaller projects. These were used out of working hours to conduct personal projects and favours for friends. For example:

Kirsten: Do you ever work at home?

Owen: Occasionally I will do some work at home. If I've been on a fifteen-hour shift and there's stuff [more work to do]. I've actually got an edit suite at home. I usually get roped into doing friends' videos, as you always do being an editor. I've done a couple of those jobs. I've trained a couple of people at home on my system. I've also taken files home to upload to other people just because I've got cable internet at home. And obviously all my invoices are done at home on my home computer as well. But I try not to take work home if I can avoid it.

(Interview)

For some of the freelancers, their home also at times became another temporary work space as projects were completed on home set-ups or on laptops brought along by clients. For example:

Kirsten: Can you give me rundown of the last twelve months, where you've worked, how long for and what you've done?

Katie: Last November, I worked for about six weeks on a … and then when that finished I was unemployed for about two months over summer. I didn't do much, I kind of had bits and pieces where people would ring me up and ask if I could cut a promo for a doco or something like that. They'd just lend me their laptop and I'd just do that at home. Or I was able to go and borrow the edit suite of the guy I was working for before. He was away over Christmas. He just said if you need to do anything just let me know how much time you spend and I'll just bill them at a discount rate. I could just go up there and use that.

(Interview)

Work in the home environment was much more common on smaller projects for post-production freelancers. This was a way of minimising project costs and helping freelancing friends complete their own projects. Other freelancers, such as producers and directors, used their home as a temporary base between projects. Without an established office space, they needed somewhere to develop ideas and bid for new projects when they were not provided with a temporary work space by clients. At these times the home environment simply

became another temporary location for their work, much like the other places they worked in.

The final use of the home for work purposes was as a repository for work resources. Without an established office space on which to base their mobile work, the freelancers instead regularly stored work artefacts in the home environment. For example, the freelancers travelled to new work locations with their ready-packed work vans, cars and bags (see section 5.2.2). At the completion of their work they returned home with these resources and parked or stored them at home. They also brought home any relevant paper resources from projects that might be useful in the future, such as call-sheets, which were then deposited somewhere in the home for later use.

As a result of these types of work activities in the home environment, the freelancers' homes tended to become an additional place of work, albeit an informally recognised one. A traditional separation between the home and work spheres was not completely possible for the freelancers. Without an ongoing established work space, homes became an informal store for work resources and additional work activities. In this sense the home provided an informal yet stable base for the freelancers' mobile work practices.

6.2 Discussion

This chapter has examined the freelancers' experience of stability in terms of the micro stability during short-term projects and the macro stability provided by a range of stable bases beyond the lifecycle of individual projects. Macro stable bases were characterised by informal and social connections that formed useful resources for the freelancers to draw on that, with the exception of the home, were not tied to specific locations. Implications for understanding mobile practices and for design are discussed below in relation to informal and social

bases, connecting mobile people to mobile people, and designing to support temporary and longer-term stable bases.

6.2.1 Stable Bases

Understanding mobile practices in terms of stability as well as flux provides important insights into some of the ways in which the freelancers managed the temporariness of their project work. The findings of this research demonstrate that the freelancers had no remote workplace to rely on while changing projects. Instead they relied on a range of informal and social stable bases to provide stability amid their frequent location and job changes. The freelancers' social connections to others across a broad range of different locations, rather than a centralised work location, provided key support during periods of flux in their lives. Interactions with staff at production companies, with other freelancers, with friends and family and with booking agencies were all mediated by technology and were not tied to travel or activities in specific physical locations. These social connections transcended individual projects and allowed the formation of stable bases that freelancers could draw on to manage the unpredictability of their work. Exploring and understanding stability shifts the focus of design away from remote access to information and people at specific locations, and towards remote access to services and connections across many locations over time.

In addition to the blurring of contexts due to technology use (discussed in section 2.3.3), the findings in this chapter reveal that for the freelancers this blurring spread beyond technology use alone. Although technology-mediated interactions with other team members for work purposes were on the whole not allowed to intrude on social time, the freelancers' work invaded their personal lives in other ways. Work activities were often conducted in the home environment on computers, for example to invoice production companies for recently completed work. Work artefacts were often stored in and around the

home – in bags, cars and vans – ready for the next day's work. The freelancers also invested time out of working hours to connect with other freelancers in order to generate locate upcoming work.

The important finding here is that, although the freelancers often tried to keep their work and social lives separate during a project, the stable bases they relied on were almost always informal and social – for example, their homes and their social ties to other freelancers within the community. In the absence of a remote office or remote team members to rely on during work projects, the freelancers' stable bases were generated instead from their wider social connections and their personal lives. As noted in section 2.3.5, the role of personal (non-work-related) actions and interactions in facilitating work has been largely overlooked in the literature. The findings of this thesis instead reveal that design opportunities can be identified by re-examining the relationship between social interactions in work spheres and vice versa.

In the mobile HCI domain, designers and researchers have, not surprisingly, tended to focus predominantly on mobile practices in terms of flux at the micro level. This is evidenced through an emphasis in the literature on the spatial aspects of mobility (for example in terms of navigation, travel or geographical relocation) and on the role of local settings in shaping mobile practices (see sections 2.2.1 and 2.3.2). In the CSCW literature, researchers of mobile practices have also tended to examine practices that occur in relation to the remote stable base formed by the established office or work organisation (see sections 2.2.1 and 2.2.3). However, the overlapping of mobile practices and stable bases in this research suggests that to develop a holistic understanding of mobile practices it is not enough to inspect mobile contexts or access to remote offices alone.

By instead considering the stability provided by different social bases across multiple locations over time, opportunities for supporting mobile practice through technology design are revealed. The findings in this chapter are similar

to those of Williams, Anderson and Dourish (2008), who discuss the mobilities of transnational retirees in terms of the ways in which these mobilities are 'anchored' by specific locations, temporal rhythms and infrastructural constraints (see section 2.2.3). In addition to the three 'anchorings' identified by Williams, Anderson and Dourish, the findings in this chapter reveal that stable bases – or using Williams, Anderson and Dourish's term, we might call 'social anchorings' – are also essential for providing stability to people's movements. By examining the range of bases that mobile people rely on, including locations, rhythms of practices, technologies and social connections, a range of opportunities can be identified for supporting mobile practices.

The importance of stable bases in the lives of mobile people is also indicated, although not always explicitly addressed, in the work of researchers who have examined the social mobilities and social ties of different mobile people (see sections 2.2.3 and 2.3.5). The findings in this research extend existing studies by directly suggesting that designers could benefit by considering the types of bases that different people rely on to stabilise their mobile practices. In particular, an important part of the freelancers' technology use for managing their mobile practices was the creation and maintenance of social connections (see section 7.4.2 for further discussion of this). The freelancers required technological support not only to assist them in managing flux but to assist them in managing stability. Designing technologies to manage different types of stability at short and longer term durations is discussed below.

6.2.2 Creating and Archiving Temporary Groups

The role of mobile phones for sustaining relationships with family and friends has been explored within the literature (for example sections 2.3.5 and 2.4.1). However, technology design has rarely considered supporting people's involvements in terms of how they last or how they change over time. By considering the different forms that short- and long-term stability takes in

mobile people's lives, it may be possible to design technologies to better support the ebb and flow of mobile practices.

Practical approaches to supporting short-term stability can include designing systems that provide flexibility in linking, grouping and archiving contact lists. For example, mobile phones currently provide long lists of individual contact details. Shortcuts have been designed to improve access to a particular contact, for example with speed-dial options and pressing buttons on the keypad to 'fast-forward' to contacts starting with a particular letter. The findings in this chapter indicate an alternative approach to structuring contact lists in terms of durations of relevance. For example, in section 5.3.4 it was suggested that freelancers could benefit from technologies that allowed them to transfer a grouped contact list of current team members to mobile devices. This type of grouping would be particularly useful to freelancers for the duration of a project. After completion of the work, however, only one or two contacts may be useful as the freelancers form ongoing friendships with other team members. At the same time, the freelancers noted that it was important to keep contact lists of past team members as these could form useful resources in the future.

By providing adaptable contact list structures that can be configured by the user, designers could better facilitate the management of rhythms in people's lives. For example, a simple system could be designed to allow freelancers to archive a past project team contact list and also to drag and drop one or two contacts from this group to a regularly used list of individual contacts. Rather than grouping individual contacts into roles that can blur across contextual divides (for example fellow freelancers can become friends and friends can become sources of future work), the idea proposed here is to provide people with ways of separating rarely used contacts from regularly used ones to improve the accessibility to both. Allowing users to easily configure their own

groups of contacts and also place individual contacts in more than one group, as relevant, would enhance this process.

One design suggestion that Williams, Anderson and Dourish (2008) make to support the social mobilities of transnational retirees is allowing users to simply change country codes of groups of contacts as they move from one country to another. The implication I present in this section builds on and extends Williams, Anderson and Dourish insight by suggesting that designers first need to assist users in creating temporally relevant contact groups. Williams, Anderson and Dourish's design insight, however, also demonstrates that group characteristics can change over time and need to be configurable. This supports the argument presented in this chapter: that by considering the needs of different types of mobile people in terms of durations of involvements, it may be possible to identify further opportunities to support people's management of their mobility in practice.

6.2.3 Supporting the Nuances of Social Networks

Securing ongoing work was an important concern for the freelancers. They created long-term stability through their connections with three stable bases in order to locate future work: booking agencies, informal employment networks, and connections to production companies. The freelancers activated their connections to these three different bases at very different times and in very different ways to secure work. Key to this was having the ability to quickly connect with other similarly mobile freelancers to gain maximum exposure to work opportunities. Existing social network sites such as Facebook, LinkedIn and Twitter can offer peoples with ways of networking with others. However, the findings in this chapter indicate that technological solutions can be developed to better support the nuances of people's connections with others. This could include consideration of ways to provide technologies and services

that consolidate the many different approaches that freelancers take to achieve the single goal of locating work.

Rather than using existing systems, such as Facebook, that allow people to create and invite others to join groups, the freelancers could benefit by being able to distinguish groups within their own connections. Choosing when and how to share information with other freelancers in their networks would also be useful. This could include design consideration of ways of allowing people to easily mark connections in terms of useful characteristics for different social groups. For example, freelancers could indicate the type of work they specialise in (e.g. documentary, television advertisements or corporate films). They could create groups within their own extended networks to indicate the people they would recommend for work, and then share this with colleagues. They could create different groups in order to share information about their upcoming availability for work via different communication mechanisms. They could also create, and invite others to join, smaller networks of similarly mobile freelancers to generate work opportunities.

The importance of allowing mobile freelancers to connect to similarly mobile freelancers revealed in the findings may also indicate why booking agencies are not widely adopted by the majority of freelancers. The findings reveal that booking agencies connect producers to freelancers and equipment; they do not connect individual freelancers to other freelancers as the main source of their work. The findings also reveal that booking agencies do not make use of recommendation systems. They instead provide people's résumés, which may not generate the same level of confidence in ability as a word-of-mouth recommendation from respected colleagues.

6.3 Chapter Summary and Conclusions

This chapter has described the freelancers' experience of stability in terms of the micro stability of projects and the macro stability of a range of social bases. The freelancers' reliance on a range of longer-term stable social bases formed an integral part of their practices and technology use in order to manage the temporariness of their working lives.

A number of opportunities and implications for technology design have been identified, including the importance of:

- examining the practices of mobile people in terms of short- and long-term stability, to make visible a range of stabilising practices that form an integral part of managing mobility via technology use;
- examining the practices of mobile workers in terms of their reliances on social and informal stable bases, to make visible a range of stabilising practices beyond remote connection to offices alone; and
- optimising devices and services to support the creation, dissolution and maintenance of short and longer-term stability in mobile people's lives.

Examination of the HCI literature reveals little exploration of the role of social contexts, beyond remote offices alone, in enabling mobile practices. To understand and design technologies to support mobile practices, I argue that it is essential to examine the ways in which people maintain and rely on stable bases, in addition to managing change. This argument is further discussed in relation to technology use in the next chapter.

Chapter 7

Technology Use: Availability, Transitioning and Sustaining Practices

This chapter analyses the role of technologies and artefacts in supporting or inhibiting the temporariness experienced by the freelancers in their daily lives. Three key practices in the use of technology by the freelancers to manage change are outlined: availability, transitioning and sustaining. These three concepts structure the detailed findings provided in this chapter about the freelancers' technology use. To conclude I argue that, rather than attempting to define the concept of mobility itself, the concepts of availability, transitioning and sustaining may provide practical access to designing technologies to enhance people's management of mobility in practice.

The freelancers relied on a range of technologies, both mobile and fixed, to manage flux and stability in their lives. For example, the freelancers used their technologies for three key practices: *availability* practices, to manage the overlapping of remote concerns and local activities; *transitioning* practices, to manage and respond to uncertainty and flux in their lives; and *sustaining* practices, to keep relationships and social situations going over time, particularly during periods of absence. In this chapter, these three uses of technology are detailed in turn. The implications of these findings for technology design approaches are then discussed to conclude the chapter.

7.1 Availability Practices

Managing availability is an important concern for freelancers. The freelancers noted that they have to be 'extra available' or 'hyper-available' to others. Being even temporarily unavailable could result in the loss of potential work opportunities and future income. For example, producers often had to staff projects quickly, employing the first available freelancer for their upcoming project work:

> *Rachel: Say for instance that was the client ringing to say, "Quick, you've got to organise a shoot for tomorrow", I'd literally go through my list of cameramen, soundmen and makeup, whatever. And I would just keep ringing. If I got voicemail I'd just move onto the next one. I wouldn't leave a message.*
>
> (Interview)

Freelancers particularly relied on their mobile phones to provide them with immediate access to others. The opportunity to connect with others quickly was essential for allowing them to manage the demands of their social and work lives, in response to levels of variability they experienced in their day-to-day work.

Researchers have identified a tension between the desire for uninhibited access to contact others via mobile phones and wanting to restrict availability to others

(for example Sherry & Salvador 2001). This held true during non-working hours for the freelancers in this research. They described many moments in which they restricted their mobile phone use in social settings in response to social norms, personal preferences and the desire to ignore remote interruptions. For example, the freelancers discussed the need to establish strong boundaries on expectations of availability with clients to prevent the feeling of perpetually working. This also held true for the majority of social interactions with friends while at work, via calls or text messages. Purely social calls were viewed as serious interruptions to the local work flow, and were rarely acceptable except during lulls in work activities or from one or two key loved ones.

In contrast, while at work the freelancers described an essential need to answer any calls that might potentially lead to employment opportunities. In their need to secure future work, they answered calls from friends who also freelanced and from previous employers and work colleagues; they also answered calls with an unknown caller ID. These calls were not always about future work; for example, a freelancing friend might call up a fellow practitioner to ask a technical question about operating equipment. In this case, these types of calls were answered quickly or deferred until later. The majority of the calls, however, were potential job leads and were for the most part prioritised over local work activities.

The freelancers also noted the importance of being available to loved ones in case of emergency. However, often family and friends called for mundane purposes. This required management by the freelancer to minimise non-essential personal calls at work by postponing calls or dealing with the interaction as quickly as possible. This resulted in a blurring of time spent on non-essential calls with time spent on work. The freelancers noted that, without having any way to gauge the urgency of the incoming phone call, they almost always answered incoming calls from loved ones.

As such, the freelancers exhibited two availability needs. Firstly, they required availability to others based on more traditional distinctions between work and social contexts. For example, they prioritised the demands of the local work over social interactions with friends, restricting these types of incoming calls or text messages based on the constraints of the local situation. Secondly, they also required selective hyper-availability to particular people. They needed to be available to select incoming calls in order to manage their future project opportunities. In this case, the freelancers prioritised the demands of unrelated remote calls over the local work context. Rather than selecting who to be available to (as this was not always known in advance), the freelancers required the ability to select who not to be available to, such as further removed friends, family and acquaintances who did not freelance.

In response to this selective hyper-availability, a number of the freelancers described various socially constructed group norms on particular work projects to make the need for hyper-availability less disruptive. For example:

> *Kirsten: So when do you consider it rude for other people to use their phones?*
> *Deb: When I used to do this regular meeting with some people, we were just talking about starting up a kind of design company. And we used to have these meetings. All of the people were freelance people, so they were all people that heavily relied on their cell phones. And there were a couple of guys who would always take phone calls in the middle of the meeting, which would really piss me off. It's sort of like an allocated time. And in the end we made a decision that could people please not answer phone calls [in meetings].*
>
> (Interview)

Another participant, Rachel, described the establishment of times between takes when everyone on the shoot could check and respond to their phone messages together:

> *Rachel: It's a really common occurrence to hear people, in fact the guy who is like the cameraman said, when we cut a particular scene and when we do a reset or*

> *we're taking a five-minute break he actually says, "Alright. Check phones if you've got them". And all the freelancers, everyone on set, the soundo, the DOP, the lighting guy, everyone will check their phones because that's how they get jobs.*
>
> (Interview)

Rachel further noted that there were social rules in place to manage inappropriate use of mobile phones in work settings:

> *"The rule is, the joke is, that if your phone goes off on a shoot you buy the beers at the end of the day."*

As a result, the freelancers described an almost universal acceptance by the freelancing community that mobile phone calls would be prioritised over local action in work settings. This applied to most work situations except during any critical, uninterruptible work moments, such as filming raw footage, including audio. A collective recognition that mobile phones were essential for obtaining future employment led to the emergence of negotiated group practices by the freelancers to 'work around' and manage their need for hyper-availability. Individually, the freelancers managed their hyper-availability by walking away from the central focus of the work.

The freelancers also took advantage of the natural pauses in their workflow, such as changes in camera angles or the absence of key team members while collecting resources, to tend to their devices. Additional calls were placed during longer work breaks to check and respond to voicemail messages or to contact friends or family. This allowed them to attend to their phones when convenient without significantly disrupting the activities of colleagues. To attend to these personal concerns they physically removed themselves from the focus of the work, for privacy and out of consideration for others. For example:

> *Greg: I often don't know if the next phone call is for a different client to the one I'm sitting with, and so that conversation may have to stay confidential.*
>
> (Interview)

The freelancers predominantly managed the contextual demands of their availability to others using various social mechanisms. These included using caller ID, establishing the relative importance of calls to the local context and social protocols on the appropriateness of calls in certain situations (see Sadler, Robertson & Kan 2006b for a fuller description of these). Although freelancers described a range of different mechanisms, strategies and norms on mobile phone use among freelancing teams, few of these strategies involved using existing technological features of devices such as categorising phone contacts into groups with different ring tones for selective answering or silencing. Instead, selective hyper-availability was managed both through the negotiation of group norms in work settings and by informing remote others of these local norms.

The immediate availability provided by mobile phones was an essential enabler for the freelancers' management of their mobile practices. The freelancers also used other types of technologies to interact with others, such as the internet on the home computer. However, the urgency of interaction with others via fixed technology platforms tended to be less pressing. This is indicative of the different influences of flux and stability on the selection and use of available technologies. Dealing with flux in the micro, such as a new job opportunity arising for the next day, often required immediate action on behalf of the freelancers. In contrast, dealing with stability in the macro, such as contacting a friend to say 'hi', was integral to maintaining friendships yet did not often have the same time pressures or critical impacts on upcoming activities.

This section has focused on the ways in which the freelancers managed their availability to others, rather than the mediated interactions they engaged in using different technologies. The types of interactions that the freelancers have both initiated and received are discussed in sections 7.2 and 7.3.

7.2 Transitioning Practices

The freelancers engaged in transitioning practices in order to manage flux in their work and social lives. Two types of transitioning practices are presented in turn below: coordinating project transitions, and improvising in the moment.

7.2.1 Coordinating Project Transitions

One of the key uses of technology among freelancers was for securing future project work with others. The coordination work involved in setting up the transition between projects varied depending on how often flux was experienced by different freelancers. Two aspects arise here: managing flux through macro-coordinations, and the relationship between macro-coordinations and micro project flux.

Managing Flux through Macro-Coordinations

The freelancers engaged in, as I term it, 'macro-coordination' with others to make longer-term transitions between work and personal social situations. The freelancers' macro-coordinations consisted of a series of interactions during the process of renewal, reconfiguration or replacement of one established social situation, such as a work project, with another. For example:

> *Kirsten: Could you give me an example of, say, how you got your last job? Or the job you're working on tomorrow?*
> *Louisa: The job I'm working on tomorrow, I got a phone call on my mobile and it was a producer who I'd worked with on Big Brother. He's working on a pilot [show] currently so I think he probably got my number from a crew list. Crew lists never list home numbers. When he rang, you know this is also someone I like very much, so we ended up having kind of a twenty-minute conversation that ended in "would you like to do this job" … we got about five minutes in and he said "are you at home, can I call you on the landline?". So we changed phones to the landline. Then we organised for having coffee the next day and meeting the other producer that's*

> *working on the project. So I went in and had coffee. I got an email confirmation the next day that they wanted me definitely. Then we've just been both emailing and phoning, both on mobiles and the local phone, to organise whens and wheres and hows. And the whens and wheres and hows keep changing every couple of days so that's why there's been constant [communication] and it's been on both phones and on email.*
>
> (Interview)

Section 5.2.1 described the way in which the move between projects began long before the physical relocation between different project work sites. A significant part of the transition between projects consisted of a series of interactions prior to securing and starting a new project. For example, steps prior to starting a project could include informing others of upcoming availability for work, sending CVs to potential employers, meeting with prospective employers, negotiating pay rates, and coordinating shifting start and end dates. This was also evidenced in the freelancers' social lives. For example, a number of freelancers described themselves in the midst of less frequent macro-coordinations such as moving house, purchasing property, setting up a regular social event (such as an artists' collective) or beginning new relationships with others. The macro-coordination of both work and social situations formed a type of supra-activity that appeared often in the freelancers' descriptions of their daily practices, particularly as they managed the transition between projects on a regular basis.

Macro-coordinations with others took time to effect, occurring through multiple interactions over time. They also often involved a combination of technological mediums, including mobile phone conversations, landline calls (if available) and email exchanges. For some of the participants this also involved paper mediums as they recorded booking and meeting details in personal diaries. Others simply used the calendar function in their mobile phones for this. However, all of the freelancers described a particularly heavy reliance on their

mobile phones to conduct this type of macro-coordination work, in the management of both their careers and their social lives. This reliance occurred as a result of their often limited access to other more fixed resources during their working day. Also, when working long hours, it was often difficult for the freelancers to access their personal computers and landlines in the home during suitable contact hours.

Macro-coordinations and the Micro Flux of Projects

The time available to macro-coordinate upcoming projects with others decreased for freelancers who worked on very short-term contracts. In other words, as project durations decreased, the coordination work to obtain employment on projects also shortened. As a result, there was an increasing reliance on mobile phones and an increase in the intensity of their use by these freelancers. Their negotiations for upcoming work were more informal and could be achieved in a single phone call rather than through a longer preparatory period of interviews, contract exchanges and negotiations. For example:

> *Steve: All my business is saying yes or no to a day's work and turning up or not turning up. It's a simple phone call normally. There's not a great amount of paperwork involved or anything. It's all verbal over the phone. So you know you can be doing a shoot in Fiji and someone rings "can you work next week in Sydney?" It's like "yeah, that'd be great".*
>
> (Interview)

In order to secure upcoming work, the freelancers relied on the immediacy of their availability to others and on quick negotiations. Due to the immediacy they provide, mobile phones were essential for the management of the short-term unpredictability of work schedules.

For this type of freelancer, there was collective recognition within the freelancing community that mobile phones would be more heavily used on a

daily basis to manage future employment concerns. They received more calls and initiated more calls to secure upcoming work as compared to freelancers who experienced longer-term project transitions. For example:

> *I ask the director, Simon, during a lull in the work whether he would always have his phone on or off on a shoot. Simon says that as the director he always has his phone switched off, he can't be interrupted. He says that it is really only the producer who needs their phone on all the time. The producer has to deal with a lot of things on the set, such as organising couriers, returning equipment, possibly organising stuff for the next job. I ask Simon about the DOP, would he have his phone on? Simon says that no, the DOP would not. His work is definitely not interruptible. He said he and the DOP would switch their phones on at lunchtime, though. Simon says for example he might make a call to his wife, while the DOP might return any voice messages from agencies about times for the grade [on another project] or upcoming jobs.*
>
> (Field notes)

In this example, Simon highlights the fact that mobile phone use at work by the more stable workers tended to be predominantly and purely social. Freelancers who changed projects frequently instead primarily used their mobile phones to attend to the demands of coordinating upcoming and concurrent project work with others.

7.2.2 Managing Micro Flux through Improvisation

The final integral role of technologies that the freelancers described was their use of mobile phones for managing flux at the micro. As discussed in section 5.2.3, spontaneous social interactions were central to the freelancers' ability to manage their movements with others. The use of mobile phones on the spur of the moment resulted in a wide range of consequences for the freelancers' everyday practices. These consequences included those that are well documented within the literature, such as the increasing pace of life (Kakihara & Sorensen 2002), flexible plan-making with others (Ling & Yttri 2002) and

making the most of any unexpected free time between activities (Ito 2004; Perry et al. 2001). However, in contrast to the literature, the significant characteristic of the mobile phone use of the freelancers in this study was the personal and social nature of their interactions. Mobile phones were rarely used for purposes related to the immediate work situation. They were essential for their potential usefulness in a crisis in work settings, although these crises rarely occurred in the freelancers' day-to-day work. Instead, the majority of improvisations occurred as the freelancers exploited local opportunities or dealt with unexpected events that might impact upon upcoming social activities with others.

The freelancers responded to the unexpected in a number of ways: they kept others informed of changing schedules; they used their phones to capture spontaneous footage of immediate experiences; and mobile phones were essential for dealing with contingencies in their social lives.

Firstly, a key improvisation described by the freelancers was the use of mobile phones for informing others of changing time schedules, both during and outside work hours. The freelancers needed to shift and renegotiate upcoming activities with others as local contingencies shaped action. When coordinating outside-work activities with friends, this type of improvisation formed part of the ongoing series of interactions to negotiate and firm up tentative plans to meet. When contacting loved ones, this type of flexible time management kept them informed of last-minute delays and absences from usual established family routines. For example:

> *Ed: We have maybe five short phone calls a day.*
>
> *Kirsten: To your partner?*
>
> *Ed: Yeah. Often to see what's happening, to let her know what I'm doing, let Lorraine know what I'm doing because my days are always quite fluid really. Yeah,*

should be home by six or, you know, won't be able to pick up the kids. And often that's SMS-ing too because you might be doing something, [but you] can SMS.

(Interview)

Although this practice occurred both during and outside work contexts, the freelancers particularly noted that they had to manage outside-work activities as a result of the locally unfolding work context. This particular use translated into an important social and personal use of mobile phones in work settings.

Another essential use of mobile phones to manage improvisations was to deal with unexpected contingencies in their social lives. The freelancers managed and responded to events and activities that occurred in the short term. For example, they used their mobile phones to deal with the unexpected opportunities and contingencies they encountered while travelling:

Nina: When I was riding home from work and I was really [tired]. I'd been working six to seven months, fourteen-hour days. It was on the last week. I rode every day to work. I was riding home and it was about nine thirty at night. There was a sewerage spill on the road and I didn't know. My bike flipped up and I crashed, bleeding everywhere and there was no-one around. I was cold and I was crying. I rang my boyfriend to come and get me. And he got me and took me to the hospital and I had to get stitches …

Another time was when we were trying to go to a play and it was that night the ships were in town and the traffic was terrible. We were totally stuck in it. We'd gone about ten metres in about an hour and we knew there was the car park just up the road. So I thought, "I bet they're full". So we just called 123 whatever [directory assistance] and got the phone number for them and rang. We said, "Are you full?" and they said "No". And we said "Great". Because we thought if we'd pulled in and they were full, we'd never ever get anywhere. We just parked there and ran down to see the play.

(Interview)

Finally, a key improvisation that the freelancers described was the use of mobile phones for recording action in the moment. The freelancers noted that they

often had unexpected experiences that they exploited as the opportunity arose. In particular, the freelancers used their mobile phones to capture and comment on locally unfolding events both visually and textually. They took photos or sent text messages of both positive and negative experiences. These included funny events, family emergencies, experiences, thoughts and feelings, sharing both the mundane and the intimate with distant others. For example:

> *Kirsten: So what do you like about your phone?*
> *Katie: … I like the fact that it has a camera. I've never been a photo taker because it's too inconvenient and I couldn't be bothered. But it's kind of cool to have one there so if you do see something funny. Like we were in Timezone the other day, we saw these two people playing some horseracing game. From the back it was hilarious so I videotaped that on my phone. But yeah, that's all, that's the only thing that I like that for is just for funny stuff that you want to show people. You can just whip out your phone.*
>
> (Interview)

For the freelancers these recorded moments served two purposes. As noted by Okabe and Ito (2006) in relation to Japanese teens use of camera-phones, the freelancers' shared moments formed part of an ongoing ambient awareness that they developed with distant others. For the freelancers this was a feature of mobile phone use outside of working hours. It was rare to have the time or opportunity to initiate messages or take photos in the moment for purely social purposes when working long hours at a single location. Local and unexpected work events were often not socially relevant to friends and family. Secondly, the freelancers specifically noted that they used their mobile phones to record impromptu footage of loved ones, particularly their children. These spontaneously captured moments were especially important for access during periods of absence to allay feelings of distance from family. However, access to these types of photos served the purpose of sustaining the freelancers through

periods of long and variable workloads. This aspect of use is discussed in further detail in the next section.

7.3 Sustaining Practices

As discussed in section 6.1.2, the freelancers described their dependence on personal and social relationships to both sustain them through long, variable working hours and to obtain future work. They revealed a strong need to sustain two essential ongoing types of connections with others: an employment-centric network to secure future work, and social relationships with friends and family during non-traditional working hours. These are described in turn below.

7.3.1 Keeping Employment Opportunities Going

In section 6.1.2, I outlined the system of recommendations on which freelancing work opportunities were often based. I also outlined the importance to freelancers of informing other similarly mobile freelancers of upcoming availability for work. This section furthers this discussion by detailing the ways in which the freelancers used technologies to sustain their networks and keep employment opportunities going.

As noted in section 6.1.2, an important part of locating work for the freelancers was informing other freelancers of their availability for upcoming work and being aware of others' availability. The freelancers shared their availability with other freelancers predominantly by making mobile phone calls to key individuals in their networks. For example:

> *Katie: I generally just call a few people that I know and tell them that I'm looking for work. Then word gets around that if they hear of anyone looking for anyone they say, well Katie's not working.*
>
> (Interview)

Broadcasting their availability to groups of past employers and freelancing colleagues was also a useful way of sourcing potential work when initial phone calls did not produce any work leads. For example, freelancers at times sent group messages to past employers or colleagues by email or Facebook to indicate their availability for upcoming work. The broadcasting approach was particularly useful when trying to expand the spheres of their work to new production companies and new types of projects. It also allowed the freelancers to reconnect with people they hadn't worked with for a period of time, refreshing others' awareness of their presence in the industry.

The freelancers established long-term friendships with other freelancers as they moved from one project to another. They used available technologies to sustain the relationships they developed with other freelancers, keeping connected on a periodic basis – for example, by sending a text message to an old colleague about the debut of their new show on TV or ringing another freelancing friend to inform them about an upcoming job lead. Rather than being deliberate attempts to cultivate connections, these types of interactions melded into the ongoing patterns of relationship maintenance with friends and family. A large proportion of these interactions also resulted in an awareness of others' recent work status. Conversations and catch-ups became informal opportunities to keep abreast of upcoming employment opportunities.

In addition to freelancing friendships, relationships with non-freelancing friends and family also served to sustain the freelancers during unpredictable work hours in purely social ways. This is outlined in detail below.

7.3.2 Keeping Social Lives Going

The second type of ongoing connectivity for the freelancers was purely social. The freelancers utilised their mobile phones to develop a constant sense of connection to friends and family through regular contact and remote sharing of

experiences and local contexts. The use of technologies for sustaining a sense of persistent connectivity with intimates and family members is well documented in the literature (for example Ito & Okabe 2005; Okabe & Ito 2006). As a result, rather than outlining details of these everyday interactions by the freelancers in the following sections, I will instead consider the changes in social practices the freelancers described as a result of their variable workloads. Their daily reliance on and use of technology changed when their work resulted in intermittent absences from their homes, family and friends.

When working long hours, a potential and significant cost to their social lives was the temporary loss of contact with friends and family. Some of the freelancers described the dropping away of social lives due to heavy workloads, while others made a deliberate effort (if they were not too tired) to carve out personal spaces away from the demands of their work. They missed their loved ones, family and friends, and often did not see them for periods of time. For example:

> *Owen: I've been doing about fifteen- to sixteen-hour days in the last week all at work. From there I go straight home. I haven't had time to be social this week. Just because I've been so busy. I've been doing Australia's Next Top Model, it's a big job. I'm doing Episode Three today. Usually they take about fifteen hours and there's been one a week for the last three weeks. As well as doing a new series for Foxtel which has been taking up more time than I would like at the moment. It's a brand new, well it's actually three of a series. Yeah, so basically I've been spending the majority of the time at work unfortunately. My son misses me and so does my wife.*
>
> (Interview)

When they were not experiencing periods of heavy work, the freelancers followed everyday communication patterns with family, friends and partners. These consisted of frequent short interactions to micro-coordinate daily activities, to organise to meet up, to share experiences, to keep informed and to

chat, and the use of home computers to email and chat online with friends. In contrast, during periods of absence from the home, the freelancers predominantly relied on their mobile phones (often this was the only technology available and accessible to them) to keep in contact with family and friends. As Tina notes, mobile phones offer a way *"to keep your social life going while you're at work"*. Mobile phones also provided the freelancers with a flexible and immediate means of rekindling relationships during and after periods of social absence. For example:

> *Steve: You know people's lives move on, especially a few months like when you travel to different places. You go back to that and your friends have gotten married. And so the [mobile] phone can rekindle that friendship that you have. I don't know that you even need to see them in the flesh but I think it helps.*
>
> (Interview)

During periods of absence, the freelancers used their mobile phones to view stored media content of their family, and particularly their children. In addition, more frequent short interactions to coordinate everyday activities were replaced with longer conversations to engage with missed loved ones. These small reminders and longer chats enabled the freelancers to sustain their relationships during periods of absence and to minimise feelings of distance despite being away from loved ones. For example, Ed described his mobile phone use while away on work trips:

> *Ed: I've got photos of family in there so if you're away or someone goes "oh wow, what're your kids [like]", it's like a portable photo gallery, a bit like that. I don't have them in my wallet. I have them in my phone. I've got a whole gallery set up. You can do a slide show to people. I don't do that, someone else showed it to me the other day. And video too, you know, decent video, so "Hi Dad, yeeah". So if you're away and feeling really homesick, you know.*
>
> *Kirsten: Away for work?*
>
> *Ed: Away for work, yes.*

> *Kirsten: Did you notice that your mobile phone use changed when you went away?*
> *Ed: It was really erratic because sometimes you'd be out of range. Sometimes you'd be somewhere there was no signal. You'd make longer calls home. If you had service you'd probably make sure you had a good long chat, two a day normally if you possibly could. At least once a day. Whereas if I'm going home tonight I'm going to see them.*
> *Kirsten: You wouldn't do that?*
> *Ed: Nope. Like I might [normally] ring on the way home but I probably won't, I'll just go home. If you know you're not going to get there, phone and have a chat instead.*
>
> (Interview)

These changes in practices were not related to the actual physical distance between people. Working long hours at a location close to home, and leaving and returning to the home after family members were asleep, could have as much of an impact on personal relationships as travelling to remote locations for work. Instead, the changes in practice were about the duration of physical absence from loved ones. In these cases, interactions via mobile phones formed a temporary substitute for usual time spent together in person.

As indicated above, keeping connected to loved ones while working long hours was achieved in practice through a combination of different types of mediated interactions, such as text messages, phone calls and picture texts. The freelancers particularly appreciated a variety of personal communications while working non-traditional hours, so they could feel connected to outside social events. For example, in the 'day in the life of' cartoon provided in Figure 12 in chapter 4, Anita describes how her 'smile-ometer' is activated and increased with each social text she receives from her boyfriend and friends.

7.4 Discussion

These findings provide insights into the role of technology for managing mobile practices. This chapter has outlined a number of key findings of the research: the types of uses of technologies for *availability, transitioning* and *sustaining* practices; the use of mobile phones by freelancers for personal and social concerns at work; and enabling project transitions by connecting mobile freelancer to mobile freelancer. The significance of these findings for technology design is discussed in turn below.

7.4.1 Availability, Transitioning and Sustaining Practices

The findings in this chapter demonstrate the practical ways in which the freelancers used technologies to accomplish their mobility in practice. While managing availability was often a precursor to interaction, transitioning and sustaining practices formed the central means through which the freelancers used their technologies to manage unpredictability in their lives. Although the findings demonstrate that it is important to assist users in managing their movements with others, including any contingencies they encounter, it is also of equal importance to assist users in establishing and sustaining relationships over time to support mobile practices. Mobile devices and technologies have often been seen as tools for accessing information, rather than as tools for making different types of communication and sociability possible (Harper 2003). Design sensitivity to sustaining practices as well as transitioning practices can shift the emphasis from facilitating remote access to people and resources, to developing a range of stable technologically mediated bases that support people through periods of uncertainty and change.

The concepts of availability, transitioning and sustaining draw together three strands of the HCI literature that are not often explicitly addressed together. Firstly, a number of researchers have focused on the design of technology to

manage flux in relation to navigation, travel and the speeding up of human interaction over time (for example section 2.2.2). Secondly, other researchers have focused on the types of connectivity and social contexts that people sustain over distance using their technologies (for example section 2.3.5). Thirdly, as noted in section 2.4.1, the theme of availability is threaded throughout the literature yet is little discussed as the predominant focus of individual papers. My findings reveal that designers can identify opportunities for developing technologies to support mobile practices by examining the specific availability, transitioning and sustaining practices that are exhibited by different types of mobile people. The concepts also allow designers to consider ways in which people manage their mobile practices across physical, temporal and social dimensions.

7.4.2 Supporting Cross-Contextual and Cross-Platform Interactions

An important finding in this thesis is that the freelancers regularly used technologies to manage their mobile practices at different durations. By examining availability, transitioning and sustaining practices at different intervals it is possible to become sensitised to a range of design opportunities that cross technological mediums and contextual divides. For example, regular macro-coordinations formed a part of the freelancers' everyday technology use that was not always well supported by existing technologies. The findings in this thesis indicate that in order to support the management of mobile practices it is important to consider not only mobile devices, services and applications but also ways to support practices across fixed and mobile platforms over time.

One specific implication for designers is to consider ways of making a place for the management of mobile practices to occur across contextual divides. For example, the freelancers spent a significant amount of time maintaining and activating their connections with others freelancers to secure work. Initiating interactions with other freelancers was often relegated to outside-work hours

due to hectic work schedules. For example, the freelancers had to take the time to sit down at computers and compose emails or to make a number of individual phones calls to inform others of their upcoming availability for work. However, the freelancers were also observed making the most of small breaks in their work days, predominantly to quickly interact with loved ones. Design possibilities exist to develop services that allow freelancers to make the most of small breaks to quickly attend to freelancing, rather than domestic, concerns unrelated to the local work.

A design focus that facilitates the quick sharing of relevant information specifically within broader freelancing groups, including updates about availability for future work, could be useful for managing the variability of the freelancers' work (see section 7.4.3 for further design suggestions on this aspect). Technologies such as Facebook and Twitter support this kind of broadcast sharing of awareness, however a number of the freelancers involved in the studies still relied on email for this type of functionality, indicating that not everyone on their contact lists were accessible or participating in these mediums. Consideration of how best to support availability awareness across different technological mediums to meet the preferences of different freelancers presents a challenge for designers.

This leads into another specific implication for designers on how to better facilitate mobile practices that consist of a series of interactions across different technological platforms over time, such as macro-coordinations. Mobile technology designers have considered the issue of how to best meet immediate information needs by accessing remote documents or the internet on handheld devices (see section 2.4.1). However, few have considered how to best support longer-term practices that consist of series of related interactions over time and over different mediums. One particular design approach could be to consider ways of providing a centralised application, service or site that gathers people's

related interactions on different platforms and makes them easily accessible from other platforms. Another approach could be to consider ways of simplifying existing processes by making it possible to conduct them all on one device.

Both cross-contextual and cross-platform interactions raise the issue for designers of how to assist users in establishing their availability and interruptibility, and the prioritisation of local and remote contexts over each other. The issue of managing availability is discussed in further detail below.

7.4.3 Managing Contingent Availability

The availability provided to others via technologies required ongoing management by the freelancers. Rather than being a fixed entity that remained constant over time, the freelancers' availability was dynamic and variable. The freelancers' choices about their availability relied heavily on the contingencies arising out of the immediate task at hand, with these needs evolving over time. The freelancers also managed their availability to others at different durations: firstly, they managed their immediate availability to incoming messages and calls from others via technology; secondly, as an initial step in the coordination of their activities with others, they informed others of their future availability for work or social activities. A central issue for designing technologies to manage availability is, then, to determine appropriate ways of informing distant others of a person's availability for interaction, particularly as this changes over time.

The findings in this chapter and of the literature detailed in section 2.4.1 reveal that designers can encounter significant difficulties in developing solutions that assist people in managing their immediate availability to others. This is due to the contingent and emergent nature of availability as social situations evolve and develop from moment to moment. However, the findings do indicate

potential design opportunities for managing availability over the longer term. Technological systems that promote awareness of people's upcoming availability over longer timeframes are more likely to succeed than systems doing so at the moment-to-moment level of determining people's contingent availability for immediate interaction.

Freelancers like those in this study would particularly benefit from technological systems that allowed them and others to keep informed of people's upcoming availability for work. Social networking sites such as Facebook and Twitter provide status updates to wide networks. However, these status updates are immediate and can be frequent; they do not capture details of upcoming plans, schedules or future commitments over time. The freelancers in this study specifically need ways of informing others not only that they are available but when and for how long. They need the ability to configure this on the run as situations changed. They also need the ability to make their availability visible to different individuals and groups as their availability needs shift – for example, to let friends know that a long job has ended and that they may finally be available to catch up.

Design consideration could focus on ways of making availability visible, updateable and configurable to individuals and groups. Systems could be designed to support the management of social nuances of availability, such as how to display availability for certain types of activities or work while hiding availability for other less desirable projects. Designers could also determine ways of best sharing and updating availability across different technological platforms and communication mechanisms to different social groups (see section 6.2.3 for a discussion of these).

7.5 Chapter Summary and Conclusions

The analysis in this chapter has focused on the freelancers' management of temporariness in their lives through three key uses of technology: availability, transitioning and sustaining. These concepts encapsulate the ways in which, firstly, the freelancers managed the consequences of carrying mobile technologies through availability practices and, secondly, how they managed different durations of flux and stability through transitioning and sustaining practices. Together, the three concepts of availability, transitioning and sustaining provide designers with practical access to a better understanding of the ways in which people achieve mobility in practice using technologies.

To conclude, this chapter presents two specific design implications for technology designers:

- supporting cross-contextual and cross-platform interactions over time; and
- managing contingent availability.

Both design implications emphasise the importance of explicitly developing systems that allow people to adapt and manage their practices over time in relation to the blurring of contextual boundaries.

Chapter 8

Conclusion

This chapter provides an overview of the research process and its outcomes. It revisits the research questions that shaped the research design and summarises how these questions have been addressed. The core findings and contributions of the thesis are summarised. To conclude, opportunities for further research are considered, particularly in relation to future studies, conceptual work and domains for further exploration.

This thesis has explored the role that mobility takes in shaping the actions and interactions of film and television freelancers through studies of everyday practice and technology use. To do this, the research has examined the practices of a type of mobile worker little considered within the literature; mobile practices in terms of spatial, temporal and social dimensions; mobile practices and technology use across work and social boundaries; and the role of technologies, both mobile and fixed, in supporting mobile practices.

The research reveals that the freelancers skilfully managed the unpredictability of their working lives, including the impacts on their personal lives. The research makes visible some of the ways in which the freelancers experienced and embedded their management of temporariness, both in the short and long term, into work and personal time. Drawing on the findings of three field studies, the thesis provides practical insights to assist researchers and designers in both understanding mobile practices and developing technologies to better support the mobile practices of a wider range of mobile people. Further details of the key research findings, contributions and insights for HCI and CSCW researchers and designers are provided in this chapter.

8.1 Addressing the Research Questions

The first research question that was addressed by the research is:

> **Question One: How can the mobile practices of film and television freelancers, a very specific mobile group little examined within the literature, be described?**

To explore the mobile practices of the freelancers, I firstly needed to understand what was meant by 'mobile practices'. The literature review in chapter 2 reveals that efforts to understand mobile practices have centred on defining the foundational concepts of 'mobility', 'mobile work' and 'mobile context'. The review reveals that early definitions of mobility and mobile practices have

resulted in an emphasis within the literature on movement in terms of physical travel and on particular types of workers such as office or knowledge workers. Researchers have also found that existing understandings of mobile practices are often difficult to apply to the practical design of technologies to support mobile practices.

Rather than attempting to pre-define concepts, I focused instead on examining the day-to-day actions and interactions of freelancers. I aimed to allow a grounded understanding of the relevant aspects of mobile practices to emerge through qualitative research. Similarly to Perry (2007), the focus was on how the freelancers' activities were 'made mobile', rather than the work itself. A series of empirical studies was conducted to explore the ways in which freelancers are able to lead often unpredictable working and social lives. These studies and their evolution are described in chapter 3.

From the findings I developed a set of orienting concepts to provide researchers and designers with insights into ways of understanding mobile practices, rather than defining the concept of mobility itself. I identified *temporariness* as a central characteristic of the freelancers' work and social involvements. I categorised the freelancers' mobile practices along the two dimensions of *flux* and *stability* and the *micro* and the *macro*. These concepts are described in detail in chapter 4 and structure the discussion of findings in chapters 5, 6 and 7. The concepts encapsulate a range of mobile practices that people engage in at varying durations, from short to longer term.

The second research question that was addressed by the research is:

> **Question Two: How do film and television freelancers use existing technologies to support or inhibit their mobile practices in both work and social settings?**

The literature review also revealed that there were many studies of mobile phone use. However, few studies cast these findings in relation to understanding mobile practices. Rather than focusing on mobile phones alone, this thesis specifically explored the technology use, both mobile and fixed, of freelancers across work and social boundaries. This included an investigation of the role that personal interactions via technologies can play in the accomplishment of work. It also included the examination of the impacts of the freelancers' often unpredictable work conditions on their social lives. The studies specifically aimed to develop insights into the relationship between technology use and mobile practices. The ways in which the freelancers used technologies to enable or inhibit their often mobile practices became the central focus of the research for this question.

I investigated the role of technology in enabling the freelancers to manage temporariness in their everyday lives in relation to flux and stability at micro and macro durations. I found that the freelancers utilised their technologies, both fixed and mobile, to manage temporariness through three key practices: availability, transitioning and sustaining. These concepts are presented in chapters 4, 5, 6 and 7. The concepts encapsulate the integral role technologies play in both managing change and creating stability.

The third research question emphasises the design perspective that has shaped the research in this thesis:

> **Question Three: What practical design insights can be drawn from studies of freelancing practice to assist designers and researchers in delivering technological support to a broader range of mobile people?**

The conceptual tools developed to answer the first two research questions may provide designers and researchers with a way of becoming sensitised to the different rhythms of mobile practices that shape the actions and interactions of

a broad range of mobile people. The concepts may assist designers and researchers in sensitising to key technology use practices that people engage in to manage their mobility in practice. Designers can then develop technologies that support these types of activities in order to enhance people's management of their mobile practices.

In addition to the conceptual tools I also provide practical design implications, representations and descriptions in this thesis. Firstly, specific design implications were drawn from the findings in Chapters 5, 6 and 7. These design implications provide technology designers with insights into ways of enhancing the freelancers' management of temporariness through their collaboration and interaction with others.

Secondly, I also include a set of design representations in the form of Personas that encapsulate the different rhythms of freelancing practice exhibited in the field data. The three Personas reveal very different dependencies on location, technology, daily movement and frequencies of interactions with others. The Personas may be utilised by others to evaluate designs in a range of contexts. The Personas are included in Appendix B.

Finally, I have detailed the research design process followed in the self-reporting kit study in order to capture information about mobile and social practices. In my review of the literature I have found few detailed descriptions of how researchers address the practical challenges of exploring mobile practices. The research design process followed in study three of this thesis is provided in Appendix C. The detailed description may assist designers in thinking through the data collection and analysis of mobile practices for technology design.

8.2 Contributions of the Research

Endeavouring to understanding mobile practices presents both conceptual and methodological challenges to researchers. To explore the mobile practices of the freelancers, I was confronted with the challenge of what to examine (see chapter 2), how to examine it (see chapter 3) and how to express this in a way that is useful to others (see chapter 4 and appendix B). Developing understandings of the mobile practices and technology use of freelancers that may be useful to others has been a central focus of this research. This has been achieved in a number of ways in the thesis, and these contributions are outlined below. The contributions address and span the research questions detailed above. Together, they directly address the three research questions.

8.2.1 Studies of a Type of Mobile Worker Little Examined in the Literature

The first contribution is rich empirical data about a type of mobile user, and types of mobile practices and contexts, that have been little examined in the literature. This rich data contributes to three key areas identified in the literature review in chapter 2. Firstly, researchers have identified the need to expand our explorations of types of people to incorporate broader sections of society (for example Perry and Brodie 2005). Film and television freelancers exhibit a range of mobile practices that have been little examined to-date within the HCI literature. The literature review reveals that studies of different types of users can emphasise particular aspects of technology use that expand existing findings on the ways in which technologies can be designed to support a broader range of mobile people.

Secondly, researchers have identified the need to explore the social and temporal dimensions of mobility beyond travel between physical locations alone (for example Dourish, Andersen & Nafus 2007; Fallman 2005; Kakihara & Sorensen 2002). The film and television freelancers manage their movements

between work projects, resulting in longer-term patterns of mobile practices beyond the everyday alone. This provides insights into the important role of the freelancers' everyday technology use to manage both short and long-term uncertainty and change.

Finally, few studies within the literature explicitly explore the role of private and personal practices within work contexts. This includes the shaping of personal activities in response to unpredictable working lives. This research gathered data across the week in order to develop a contextual understanding of everyday life settings of technology use, rather than work or social practices alone.

As a result, this research broadens existing empirical understandings of mobile practices and technology use in the literature by examining freelancers, their everyday practices, their use of mobile and fixed technologies, and their longer-term transitions between projects, across work and social boundaries.

8.2.2 Orienting Conceptual Tools for Designers and Researchers

The second contribution of this research is the set of empirically grounded analytic concepts outlined in chapter 4 and section 8.1: temporariness; flux and stability; micro and macro; and availability, transitioning and sustaining. Together these concepts form a set of sensitising conceptual tools that may assist technology designers in:

- focusing design efforts on key practices that can be enhanced through technology design to facilitate people's ability to be mobile;
- identifying a range of mobile practices, at varying durations, that result in very different types of technology use;
- considering the temporal and social complexities of mobile practices;

- understanding the factors that shape how people rely on both remote physical locations and longer-term social situations to manage unpredictability in their lives; and
- identifying the range of stable bases and resources that people rely on in order to manage their mobile practices.

One of the premises of this thesis is that the concept of mobility is an elusive one. There are many definitions of the term in the literature that emphasise a particular aspect of mobility while at the same time obscuring others. Efforts to define unifying theories broaden the problem domain and have tended to result in understandings that are difficult to apply to the practical design of everyday technologies. This thesis presents an alternative approach to grappling with the concept of mobility.

A specific aim of this research has been to understand the role of technologies in enabling or inhibiting people's mobile practices. I have identified the use of technologies by freelancers to manage temporariness in daily life through availability, transitioning and sustaining practices. These three practices are the core ways in which the freelancers used technology in the practical achievement of their mobile practices, across work and social contexts. Rather than attempting to define the foundational concept of mobility, the findings instead indicate that a focus on availability, transitioning and sustaining practices can allow designers and researchers to support the management of mobility in practice.

Furthermore, the findings in this thesis reveal that the freelancers have developed particular approaches, methods and mechanisms that allow them to successfully manage frequent change in their working lives. These findings may have implications beyond freelancers alone. Over the last few decades, organisations and employers have increasingly made greater use of contingent workers and independent contractors (Barley & Kunda 2004). As organisations

have turned to downsizing, moving jobs offshore, outsourcing work and hiring contingent workers, the modern workforce has become increasingly mobilised (Barley & Kunda 2004). The film and television industry is a long established one; it can provide a useful case study through which to compare established practices with emerging ones in other industries.

As such, the findings in this thesis about the freelancers' practices can also contribute to other research domains, such as business and management. Identification of the mechanisms that the freelancers generate and rely on to manage change through daily practice can provide important insights to assist other types of modern workers experiencing flux. For example, in relation to downsizing, the freelancers' utilisation and maintenance of social connections to generate work opportunities may indicate ways to assist the transition of workers from full-time employment to less stable working conditions. Kalleberg (2009) argues that the shift in modern workforces from long-term to precarious employment stability has significant impacts on the economic, psychological and physical wellbeing of individuals. Kalleberg notes that, as a result of the growth of precarious work, it is important to develop insights that can assist people in dealing with the uncertainty and unpredictability of their work and resulting impacts on their daily lives.

8.2.3 Practical Design Representations and Implications

The third contribution of this thesis is to provide additional practical design tools and insights to assist designers and researchers in both understanding mobile practices and designing technological support for mobile people.

Firstly, specific design implications from the findings have been identified and discussed (see sections 5.3, 6.2 and 7.4). These implications centre on designing technological support for mobile people that increase their ability to:

- configure and adapt their technologies to meet their changing and emergent needs over time;
- interact with others across contextual divides and across different technological mediums; and
- create, manage and coordinate mobile, stable and temporary groups.

The specific design implications presented in this thesis suggest ways for designers to develop more flexible technological solutions to support the practices of mobile people. The design implications incorporate suggestions for both mobile and fixed computing platforms. The implications also present ways of supporting the practices of mobile people over short- and long-term durations. This contrasts with a predominant focus within the mobile HCI literature on designing technologies to assist people in managing mobile practices in terms of flux at the micro level (such as navigation, dealing with immediate contingencies and micro-coordination) on mobile devices.

Secondly, the analysis of the field data revealed different rhythms of change among the participants in the studies. The freelancers transitioned between work projects and work locations at different frequencies. These patterns have been encapsulated in the personas presented in the appendix B. These personas are design representations that designers and researchers may find useful when considering a range of mobile contexts beyond their specific problem domain. The personas can be applied and adapted to expand the consideration of mobile people beyond the context of a specific design project alone.

Thirdly, chapter 3 outlines the methodological challenges of exploring mobile practices. These challenges present difficulties to researchers in accessing the social, mobile and personal aspects of people's everyday experiences. In response to this, a description of the research design process and evolution has been included for Study Three, the self-reporting study, in appendix C. There

are few accounts of the choices, trials and developments that occur during the research design of self-reporting kits in the HCI literature. As such, a description of this process has been included with the aim of assisting others in their own journeys into understanding the mobile, social and personal aspects of people's everyday lives.

8.3 Recommendations for Future Work

This research has focused on the specific substantive domain of film and television freelancers. The findings indicate opportunities to extend the scope of the research presented here. Two areas that I have identified are exploring the applicability of findings to other types of highly mobile people and practices, and exploring evolutions in technology and impacts on use.

8.3.1 Applicability of Analytic Concepts to Other Substantive Domains

The analytic concepts developed in this thesis have been developed from empirically grounded insights into the factors that shaped the specific context of freelancers' mobile practices. As a result, the findings about freelancing practice in this thesis provide one example of the complex interplay of temporariness, flux and stability at micro and macro durations, and availability, transitioning and sustaining practices. Other types of mobile people are likely to exhibit different combinations and durations of change and permanence in their everyday lives. For example, the life rhythms of teenagers would vary considerably from the life rhythms of workers.

Examinations of how well the concepts developed in this thesis 'fit' the lives of a range of mobile people provide an opportunity to extend, improve and evaluate the quality of the concepts. On first examination, the concepts demonstrate a good fit to studies of other mobile people within the literature, particularly to transnational retiree (Williams, Anderson and Dourish 2008) and examination of the use of mobile technologies by transnational retirees, the

homeless (Le Dantec and Edwards 2008) and interstate residential moves (Shklovski 2006; Shklovski, Kraut & Cummings 2008; Shklovski & Mainwaring 2005).

Firstly, Williams, Anderson and Dourish' study of transnational retirees reveals a mobile group that experiences macro-flux as they moved continents once or twice a year. The houses they own in each country provide macro stability. Mobile phones are also described as essential for connecting with loved ones left behind, again providing another form of macro stability. Examining Williams, Anderson and Dourish's work in relation to micro and macro flux indicates, however, that further insights may be developed by also analysing the impacts of short term transitions on technology use within each country.

Secondly, in Le Dantec and Edwards' study of homeless people reveals a mobile group that manages an extreme level of micro-mobility. Without a home base, crucial macro stability is provided almost solely by their mobile phones, while shelters provide micro stability. Other stabilities include regular visits to addiction counselling and caseworkers. Thirdly, Shklovski and colleagues' studies of interstate residential moves demonstrate the fitness of the concept of macro-coordination. They describe the transitioning role that technologies perform in assisting people to manage the move prior to relocation, including the gathering of information about the new location and coordinating activities related to the move.

Further examinations of the generalisability of concepts to a wider range of mobile people could be conducted in two ways: firstly, by returning to studies in the literature; and, secondly, by engaging in further empirical studies in a series of substantive domains. By exploring the practices of mobile people, such as emergency response teams, substitute teachers, sales people and construction workers, it may be possible to identify key behaviours that are emphasised as a result of their different approaches to managing temporariness through daily

practice and technology use. This would broaden the applicability and usefulness of the concepts to other domains and design processes in HCI.

8.3.2 Evolutions in Technology Design

New technologies, applications and devices have continued to emerge since the collection of data for this thesis. For example, since the completion of my data collection, smart phones such as the iPhone have emerged as leading handsets of choice among consumers (Goggin 2009). Smart phones provide new forms of mobile consumption in the form of thousands of downloadable applications (Goggin 2009). At the same time, wireless network providers are continuing to improve data delivery speeds, resulting in the likely increased adoption of services, email, web-browsing and multimedia broadcasting on mobile handsets (Sasha et al. 2007). These evolutions in technology present an opportunity to continue the research in this thesis over time.

Further exploration of the changing use of technology (if any) by freelancers can provide important insights at the intersection of highly mobile practices and the adoption of emergent technologies in daily lives. For example, often with little free time on their hands, the freelancers involved in my research used their mobile and fixed technologies for predominantly quick communicative purposes rather than for more time-consuming information use and access. They cited a lack of time for doing anything more sophisticated than using their mobile phone to make or receive calls and text messages. However, the studies also revealed that, despite using their mobile phones for basic functions, the freelancers were technologically aware and were often early adopters of new technologies. By examining which technologies and applications can be successfully integrated into freelancing lives, it may be possible to identify why particular evolutions in technology succeed or fail to support mobile practices.

8.4 Concluding Remarks

This research has aimed to explore and understand the ways in which film and television freelancers use technologies in order to manage their mobile practices. The central finding from the research is that there is a complex interplay of flux and stability at different durations in the lives of mobile people. In order to manage this interplay and the uncertainty of their mobility in practice, the freelancers specifically need technologies that:

- provide them with the ability to create and sustain a range of stable bases to draw on in times of change;
- assist them with managing both daily practices and longer-term transitions between situations over time and across contexts and technological platforms; and
- are flexible and adaptable, and could help them to exploit the temporariness of their mobile practices.

These findings reveal a different starting point for the design of technologies to support mobile practices, one that prioritises an understanding of technology use beyond the immediate moment and changing locations encountered by moving people. This thesis identifies new opportunities for the design of technologies to support mobile people by considering how their needs and practices evolve over time. The thesis contributes conceptual tools for understanding the relationships between technology use and mobile practices in relation to the rhythms, durations and intensities of people's activities and involvements with others. It provides practical insights to assist technology designers in enhancing people's management of their mobility in practice.

Appendix A Description of Study Participants

This appendix provides information about the participants who were part of the three field studies. The format for each entry is:

Name (these are fictionalised to protect the identity of participants), job role (e.g. Editor, DOP), type of project transitioning (frequency) and work locations, portable technologies used, methods used to obtain future work, artefacts carried to work, transport mode, study and method.

These descriptions provide an overview of the type and frequency of the participants' movements and work patterns. Specific details of the participants' practices are not included here as these are described within the body of findings presented in chapters 5, 6 and 7.

STUDY ONE – INTERVIEWS

Paula, graphic designer, weekly project work at home and various locations, mobile phone, obtains work through networks, carries a stick drive and notepad to jobs in bag, public transport, Study One – interview 1.5 hrs.

Ryan, online editor, monthly project work at production companies, mobile phone/PDA convergent device, obtains work through networks, no artefacts carried to jobs, car, Study One – interview 1 hr.

Karen, producer, monthly project work at home and various locations, mobile phone and PDA, obtains work by bidding for projects with director friend, carries lighting, props, other to jobs in car, car, Study One – interview 1.5 hrs.

Jenny, editor, quarterly project work at production companies, mobile phone, obtains work through networks, carries pen and paper to jobs in small backpack, car and bike, Study One – interview 1.5 hrs.

Warwick, technical writer, quarterly project work at office, mobile phone, obtains work through recruitment agencies and hoping to build up networks, carries templates to jobs on stick drive, car and bike, Study One – interview 1.5 hrs.

Tom, software consultant, monthly project work at offices, mobile phone, obtains work through networks, car and public transport, no artefacts carried to jobs, Study One – interview 2 hrs.

Sam, tiler, quarterly project work on location, mobile phone, obtains work through established working relationship with a contractor, carries own equipment to jobs in car, car, Study One – interview 1.5 hrs.

Amy, editor, quarterly project work at production companies, mobile phone, obtains work through networks, no artefacts carried to jobs, car, Study One – interview 1.5 hrs.

STUDY TWO – OBSERVATION

Jason, director, quarterly project work at production company office and various locations, mobile phone, laptop, obtains work by bidding for projects with producer, ongoing work space provided by production company, carries small quantity of paperwork to shoot, car, Study Two – observation during pre-production, shoot and post-production.

Damian, producer, quarterly project work at production company office and various locations, mobile phone, laptop and landline phone, obtains work by bidding for projects with director, ongoing work space provided by production company, carries documents to shoot in small suitcase, car, Study Two – observation during pre-production, shoot and post-production.

Julie, artistic director, weekly project work at various locations (shoot and other), mobile phone, obtains work through networks, carries art props to shoot in car, car, Study Two – observation during shoot.

Remy, director of photography, daily/weekly project work at various locations (shoot), mobile phone and satellite navigation system in van, obtains work through booking agencies and networks, carries camera gear to shoot in van, van, Study Two – observation during shoot.

Amy, wardrobe assistant, weekly project work at various locations (pre-production offices, shoot and other), mobile phone, obtains work through networks, carries clothing for actors to shoot in bag/s, car, Study Two – observation during pre-production, shoot.

Tina, actor, daily/weekly project work at various locations (pre-production offices and shoot), also works as film and TV accountant to provide job security and regular income, mobile phone, obtains work through attending castings, no artefacts carried to shoot (all provided), car, Study Two – observation during pre-production, shoot.

Evan, make-up artist, daily/weekly project at various locations (shoot), also works in photography studio to provide job security and regular income, mobile phone, obtains work through networks, carries make-up to shoot in bag, car, Study Two – observation during shoot.

STUDY THREE – SELF-REPORTING KITS AND INTERVIEWS

Tia, editor, quarterly project work at production companies, mobile phone, obtains work through networks, carries paper and pen to/from work on first and last day of project, car, Study Three – fully completed kit contents, interview 1.5 hrs.

Eve, producer, monthly/quarterly project work at home and various locations, mobile phone, obtains work through networks, no artefacts carried to projects, car, Study Three – fully completed kit contents, interview 1.5 hrs.

Remy, director of photography, daily/weekly project work at various locations (shoot), mobile phone, satellite navigation system in car, obtains work through booking agencies and networks, carries camera gear to shoot in van, van, Study Three – partially completed kit contents, interview 1 hr, also in Study Two.

Evan, make-up artist, daily/weekly project at various locations (shoot), also works in photography studio to provide job security and regular income, mobile phone, obtains work through networks, carries make-up to shoot in bag, car, Study Three – no activities completed from kit contents (one activity adapted and self-initiated, taking and printing camera phone photos and writing descriptions of these for me), interview 1 hr, also in Study Two.

Grant, editor/director, monthly/quarterly project work at production companies and home, mobile phone, obtains work through networks, no artefacts carried to jobs, scooter, Study Three – fully completed kit contents, interview 1.5 hrs.

Tanya, assistant editor, monthly/quarterly project work at production companies, mobile phone, obtains work through networks, no artefacts carried to jobs, bike, Study Three – fully completed kit contents, interview 1.5 hrs.

Maya, documentary producer, quarterly project work at home and various locations, mobile phone, obtains work through networks and applying for funding, car, Study Three – fully completed kit contents, interview 1.5 hrs.

Pete, editor, monthly/quarterly project work at production companies, mobile phone, obtains work through networks, carries paper and pens to/from work on first and last day of project, car and public transport when convenient, Study Three – partially completed kit contents, interview 1 hr.

Appendix B Personas

This appendix provides a set of personas that were developed during the analysis of the field data. The personas represent the three different patterns of temporariness that were exhibited by participants in the studies: micro flux, intermittent flux and macro flux. These three patterns encapsulate the very different dependencies and intensities of technology use by the freelancers as they managed the unpredictability of their working lives. The Personas do not directly represent individual participants in the field studies; instead they combine characteristics from a number of research participants. They personas form a practical design tool that can be used by researchers and technology designers to consider the goals and mobile practices of freelancers in other design contexts.

As outlined in chapter 1, one of the commitments of the thesis is to provide practical tools to assist in the design of technologies to support mobile practices. Perry and Brodie (2005) argue that a wider range of mobile people need to be studied to develop more generally applicable findings to inform design processes. One way to characterise and make accessible different types of mobile people and their behaviours is to develop empirically derived representations such as personas. Personas provide 'thinking' tools for researchers and designers to utilise in their own design processes. This appendix presents a set of personas that encapsulate the patterns of mobile practices and technology use of the freelancers who participated in the research.

I identified three patterns of temporariness across the studies: frequent flux, intermittent flux and relative stability. (See chapter 5 for descriptions of these.) The three patterns are encapsulated respectively by the personas of Scott the director of photography, June the editor and Elliot the producer. The development of the personas was informed by a wide body of HCI literature on scenarios and personas (for example Bödker 2000; Carroll 2000; Nielsen 2002; Suchman 1994). In the following sections, a short overview of the freelancing characteristics that form the basis for each persona is presented, followed by the persona itself.

1. Scott the DOP

Freelancing Characteristics

Scott represents the freelancers who transitioned frequently between jobs, often on a daily basis. Their working lives consisted of a series of short trajectories, moving from one job to another at times on a half-daily or daily basis. They had little stability of location or schedules in their daily work. This persona is characterised by an experience of frequent flux.

Persona

Scott is a 38-year-old, happily married father of one young child. He has been freelancing as a DOP for almost 15 years now, long enough to live through the development from pager use to mobile phone use within the film and TV industry. As a relative veteran of the industry, he has been through it all: the highs and the lows, the financial risks of investing in his own camera gear, and the establishment of strong relationships to secure ongoing work.

Scott is a technology enthusiast. He has one of the latest convergent PDA phones, although he rarely uses the PDA part. He has downloaded some 'fun' applications, though, like the one that allows him to use his phone as a remote control for his TV and a GPS application which he used to find the restaurant when he got lost the other night. In practice, although he likes to download and try out new things on his phone, he rarely gets the time to use these. Mostly he uses his phone for conversations with others, particularly for securing work and for keeping his wife updated throughout the work day. For work, he hires out his skills and his fully packed van with his camera gear on a daily and half-daily basis. Often he is scheduling work only 24 hours in advance. A long-term job for him is having the certainty of a full week's work. He has registered himself with a booking agency to help with some of the overhead coordination work involved in securing the next job. Even so, he fields a lot of calls about work during weekdays and on the odd occasion a few calls on the weekends for the following Monday's work.

Because of both his frequent project changes and jobs in which he films in multiple locations, Scott spends hours in his car on a daily basis travelling between his home and various shoot locations. He hates the traffic, often getting caught in the thick of it both on the way to work and on the way home. This adds up, along with his working hours, to a very long working day. Plus he often has to write up and send invoices at the end of the working day from his

home computer. Occasionally he also travels out of the metro area to work in rural areas, with very early morning starts to offset the driving. With very little spare time, he is ready to jump in his van at any time, no matter where or when he will be working. He keeps his expensive camera gear in his highly secure and heavily insured van at all times, parking it on his front lawn when he is not working.

Scott has few opportunities to actually use his mobile phone during the work day. The demands of his work means that his phone is always switched off until official breaks for the team during the shoot. The only other time for calls is when he is driving to and from work. He makes the most of both of these times to line up the next day's work, to make short regular contact with his wife, and to make longer catch-up calls to his long-term friends while stuck in traffic. He values the time for calling his 'mates' in his van. His connection with his mates tends to get neglected the rest of the time due to the demands of his busy work schedule and his child. Although he and his friends promise to catch up in person, despite living quite close by to each other, this rarely happens in practice. He cannot remember the last time he went to the pub on a weeknight.

On weekends Scott tends to rely on his wife to organise the family's social plans and rarely uses technology to keep in touch with friends. He finds it difficult to find the time to make long social calls when he is with his son. He would rather be spending time with him. His mobile phone is often left forgotten and unused on the sideboard. His work van is locked up on the front lawn. He is often out and about in the family car for outings with the family to the park, the pool, barbecues and friends' places. He only checks his phone if he can be bothered or if he is expecting a call. The whole day often goes by without even looking at his phone. After his son is in bed, he sometimes jumps on the computer or checks the phone for any calls or emails. If there are any, he often does not

return calls until another day. Usually dinner and the TV are beckoning, along with some quality time with his wife, and he would rather unwind.

2. June the editor

Freelancing Characteristics

June represents freelancers who were intermittently mobile, whose working lives consisted of a series of transitions between projects followed by a period of temporary stability while they worked on a project for a period of time. This type of freelancer tended to temporarily base their work at a particular work location in which specialised computing equipment or desk-space was provided for them. Their mobile working lives were characterised by regular travel to a regular location for a certain period of time before moving on to the next project. This persona is characterised by an experience of, and the need to manage, intermittent flux.

Persona

June is a 32-year-old single female who is currently living in a dingy share house with three friends. She has been freelancing as an editor for quite a few years. She is always in demand for work, having built up a solid history of well-received documentaries, television commercials and short films. She is rarely unemployed but every now and then works very long hours as tight deadlines loom, particularly on what she calls 'love' projects – involving underpaid long hours with friends or well-respected filmmakers to develop her reputation.

She works on projects in blocks of weeks or months. She travels to new jobs by bike or by car with a fully packed bag. This bag includes blank paper, pens, a stick-drive or two (just in case) and an MP3 player with headphones. Very occasionally she will include a call-sheet in her bag. This sheet lists contact details for fellow team members and directions on how to get to her upcoming work location. However, she tends to rotate employment with six or seven

regular employers, interspersed with the occasional project for new employers, and often travels to locations she has visited before. With the necessary phone numbers already in her mobile phone she does not need the paper version for backup details. She never works anywhere except within her city. The shoot might happen in exotic locations but the editor only ever gets to sit at a computer in a dark room: "Exotic for an editor is when the editing suite has a window with a view". She leaves the contents of her bag in whichever editing suite is provided by the production company or post-production facility she is currently working for. With these contents she marks out a territory for the duration of her employment. At the end of her job she slips them back in her bag and she is ready for the next project.

She has a range of technologies at her disposal to keep in touch with her friends and family. She does not have a home phone. Instead she has a mobile phone that she could never be parted from. She carries it everywhere in her pocket. Where she goes, it goes. She despairs of her heavy dependence on it, especially as, despite having it with her, she has somehow managed to lose it three times in the past 12 months. Luckily in all three cases she has been able to borrow someone else's mobile phone and ring her own to locate the missing device. She is renowned among her friends for her ability to lose things. June also has an editing suite set up at home. Occasionally she will work from there if a small-budget project comes up. She also uses her editing suite for everyday internet access and email. On a lot of her work projects, the computers they work on do not have internet access. She uses her mobile phone, or sometimes slips in a phone call from the nearest landline phone instead. At nights and on weekends she gets the chance to do her invoices, send emails and use instant messaging applications to keep in touch with her interstate friends.

June uses her mobile phone to connect with her friends everywhere she goes: at work, at home, on her bike, in her car, at the shops, even at the movies.

However, while she is at work, she delineates between social calls that are inappropriate to deal with (unless she is alone and not too squeezed by deadlines) and calls from film and TV friends or unknown caller IDs that might be leads on upcoming work. In these cases she always answers the phone to find out what people want and will quickly veto those that are inappropriate in front of work colleagues. She feels lucky that she rarely has to make any calls to secure future work. She just waits (and never for long) for the calls to come in about the next job. Every now and then she will ring a couple of editing friends from her film school days or past employers for leads on more work. This leads to short hot-spots in mobile phone use as her current project comes to a conclusion.

June has a large social life, spending her free time with friends going to gigs, seeing movies and eating out. She also spends regular quality time with her close-knit family. She fits these social activities around her changing and unpredictable working hours. To do this she relies heavily on her mobile phone to organise spontaneous catch-ups with friends and on being able to leap in her car to quickly move about, when the opportunity arises. Her strong ties with family and friends exist in a correspondingly well-contained geographical area. Her life is spread (almost predictably in her mind, both in terms of locations visited and regular practices) across a number of closely located suburbs, scattered across the inner metropolitan area.

In addition to her heavy work schedule and busy social life, June is in the process of moving house. She has had enough of the lack of cleaning in her current share house. She cannot remember the last time she cooked at home, thanks to the condition the kitchen is in. Luckily her best friend recently returned from England. After a few months of looking at properties together, they are signing a lease and moving in to a neat and tidy flat next week. Thanks to a few fruitless journeys to properties, she is looking forward to not having to

deal with another real-estate agent, at least for the next few years. Hopefully she will not be getting calls on her mobile at work for the next few years about upcoming properties to let. It is one of the downsides of mobile phones for her – there is no other way to be contactable when who knows where the next job might be coming from.

3. Elliot the producer

Freelancing Characteristics

Elliot, like other types of office workers studied within the literature, tends to be based in one location over time. This location could be an office space provided by a production company, or a home office. In established locations such as this, freelancers have access to fixed infrastructure, such as computers and landline phones. They also use these established locations as a base from which to travel out of the 'office' to conduct various tasks before returning. Although they set up and changed projects regularly, their working lives are characterised by an established rhythm with very little change to mark the start of a new project beyond the work content alone. This persona represents an experience of relative stability.

Persona

Elliot is a 30-year-old male who lives on his own in a small flat he owns in the Northern Suburbs of Sydney. He has only been freelancing as a producer for almost one year now, although he has been a producer for a number of years. It is a new world for him and he is slowly getting used to the relative volatility of his new work style. Having been used to a nine-to-five job for the same employer for a few years, he is feeling a bit rundown with the sudden long hours, the stress of not knowing where the next job is coming from, and having to deal with the overlap of projects. He is also feeling a bit guilty about his

irregular contact with friends and wonders how he will manage to re-establish his social life if he continues working these hours.

Elliot's last job was a short one, only three weeks. He is hoping to secure a large one next time, though; three months would take the pressure off finding the next job. Elliot has a daily routine. He gets out of bed, gets his bowl of cereal and balances this on his knee as he turns on the computer in the next room. Work begins (specifically, emailing begins) approximately five minutes after he gets up in the morning in his pyjamas, though he of course gets dressed if he has to leave the house for any reason. On a project there are quite a few reasons why he might do this: screening potential actors, scouting locations, picking up equipment and client meetings, among others. Preparing in advance, he will take the time to shower and gather any relevant scraps of paper, props or equipment, shoving them into his bag or the boot of his car. He has learned the hard way that he needs to be prepared by taking whatever he might need with him to avoid time-costly trips back to his house. There is no one to ring at home to send through any paperwork he has forgotten. Most of the time, however, he works at home, only going out at lunch time for a change of scenery. He is a something of a workaholic so in this case he does not have the time to sit in a café. Instead he will collect a fully packed lunch to eat at home.

Elliot juggles a number of balls by combining his mobile phone, his landline and his home computer. He may be bidding for upcoming work, including interacting with potential clients and a director he has 'buddied up' with to win work; coordinating the resources, freelancers and locations for the project after winning the work; setting up and sending relevant project paperwork on his PC to email to others and occasionally to send to his mobile phone so he has an extra backup; or making attempts to resurrect his rapidly diminishing social life. He really only uses his mobile phone to get his work done if an unexpected emergency comes up (and the client needs to know about it), or occasionally to

rush through a new job while on the shoot. He particularly sees his mobile phone as his lifeline to his freelancer and client networks. He stores all his contacts in his phone and has a list of preferred freelancers for each project role. Then it is just a matter of ringing until he gets through and finds someone who can do the work.

Recently Elliot's work life has taken a busy turn and he has almost completely stopped using his mobile phone for his personal life. His friends know that they can reach him on the home phone most days. Or they have figured out that he is not available much for socialising with such a heavy work schedule. He has lately been feeling a little lonely and isolated thanks to his lack of spare time. He did manage to exchange mobile phone numbers with a friend of a friend, Mia, at the pub a few weeks ago. He is pleased that over the course of the week, with a heavy work schedule, he has managed a first, awkward phone call, a booking for a dinner date on the weekend and a newly developing flirtation by SMS. He is happy that his recently forlorn mobile phone use outside of working hours is starting to happen again. Hopefully this might lead to something, perhaps a little more work/life balance?

Even better for him, Mia is also from Brisbane, his home town. He is secretly pleased that their family ties are in the same place and they are both planning to eventually go back and settle down there. He gets to Brisbane pretty regularly these days, whenever he's got a break between projects. He's got a good feeling about their budding relationship and cannot wait to introduce her to his friends there. He has already told his two friends John and Lisa about her by text message. They always share latest events, make jokes and send photos to keep in touch via text. They do not talk on the mobile phone very often. But his mobile phone bill is large when he is in Brisbane, thanks to all the chatting and making plans to see them and other friends while he is in town. No matter how quiet his local social life is, he makes the time to keep in touch by email, by

instant messaging or by mobile phone. They are people he cares about, and one day he plans to return to his home town and pick up these close relationships again.

Appendix C The Research Design of Self-Reporting Kits

This appendix details the process of designing the self-reporting kits for use in the Study Three of this thesis. This is included here for two reasons. Firstly, there are very few accounts of the choices, trials and developments that occur during the research design process of self-reporting kits in the HCI literature. Secondly, these details provide transparency of method to verify the quality of the research. This appendix details the choices and influences that shaped the final kits provided to participants in the research.

A number of stages were conducted in the design and development of a self-reporting kit to explore the mobile practices and technology use of freelance workers:

- putting together a kit of possible materials;
- developing questions and tasks for an initial iteration of the prototype kit;
- trialling the kit on a colleague and myself;
- modifying the kit contents;
- trialling with two volunteers (both freelancers);
- a critical revisit of the types of data that were collected and the usefulness of this data in relation to the research questions;
- a third iteration of the items to include in the kit; and
- fine-tuning these items – visually developing items to present them to the study participants.

A number of people contributed to the self-reporting kit design: myself, my supervisors, a masters student studying interaction design, and two volunteers recruited to trial the kit and discuss their experiences with the probes.

Three key factors contributed to (and constrained) the development of the initial ideas for the probe contents: firstly, reading the HCI literature on cultural probes and self-reporting techniques; secondly, identifying the physical limitations of the types of materials that could be included in the kit within the financial budget for the kit contents; and, finally, shaping the questions, scope and aim of each item to specifically gather data to fill in the gaps identified in my earlier studies. Details of each of these elements are given below.

Initial ideas for what to include in the kit were generated by reading the literature. Other researchers' accounts of the contents they included in their

cultural probes, in relation to their research questions, provided a useful starting point for developing my own kits. A colleague and I brainstormed possible options after reading a number of papers written about cultural probes, including the use of cultural probes to gather inspirational material (Gaver et al. 2004; Gaver, Dunne and Pacenti 1999), ethnographically inspired probes to collect informational material (Crabtree et al. 2003a), an overview of the current probe literature (Mattelmaki 2005) and reflections on learner difficulties during probe design (Loi 2004). We thought about the types of activities other researchers had included and the types of data that the probes had then returned.

In conjunction with this process, a range of possible physical items were collected and purchased to include in the kit. These included pens, notepads, message notes, logbooks and free postcards. At this time the decision was made to develop a non-digital kit. Central to the research design was the goal of collecting details about people's experiences, rather than logs of their mobile phone use. I also wanted people to sit down and engage with the materials – this felt more achievable to me in a paper realm rather than in a technological realm. Time was also a limiting factor. There was not sufficient time, resources or experience to develop online or highly technical tools. As a result, items collected from the stationery shop provided the seed of ideas for the types and physicality, of items that might be included in the kit. These items were tangible and manipulable. They allowed an exploration of the practicalities of each item's use (to start to think about issues such as how long they would take to complete, where they would be completed, and what might be involved in completing them. The items could be held and their use envisaged.

Questions and items were also shaped by the earlier two studies. Data was specifically collected about practices outside of the work context (over the weekend) and also about personal technology-mediated interactions at work.

The theme of maintenance or stability had emerged in the earlier studies. The work of this study was to find out how the freelancers sustained stable structures and regular practices in their lives through their everyday practices and technology use. Ideas for items emerged at this stage. They included a 'guest book' that could be carried with the participant and filled in by people they met; postcards; a digital voice memo recorder for the recording of experiences that people have had with mobile technologies; and detailed maps of the world, Australia and inner Sydney suburbs downloaded from the internet with stickers provided to mark the places that people visit during the period of the probe use. Through discussion, these ideas firmed up to form the first kit contents. This iteration of the kit was put together with the specific aim of experimenting with content and form to explore the types of data that would be returned, and as such was deliberately broad and general. Thought was put into trying to ensure that the entire self-reporting kit did not need to be carried around at all times by the participant and that instead individual items could be removed and carried conveniently; probe contents were placed into a medium-sized pencil case to be more portable.

The kit was tested by a colleague and me over a period of five days, from early Friday through to Tuesday evening. Meeting together on the following Wednesday with our kits, we considered questions such as what we liked/disliked, what we completed or did not, what was uncomfortable, what was fun, what sort of data was collected and why. We had both completed the majority of the probe contents.

Findings from this session revealed that certain questions and activities were too specific. For example, the guest book task was either not attempted or resulted in feelings of discomfort for participants and/or guests. Furthermore, instructions to take a photograph at a particular time of the day resulted in two behaviours: firstly, one person forgot in both cases until later in the day and

then took the photographs; and secondly, the other person deliberately took her camera on a walk at the time requested in the instructions to provide more interesting footage, rather than repeat image capturing in the same 'boring' location more than once. Both of these incidents highlight the fact that self-reporting methods can shape participants' activities. People may conduct activities that they would not normally do to generate content for the study. Ironically in this case, while probing about mobility, the kit itself inspired and generated more movement. As a result of this discussion session, it was also clear that the returned data predominantly gave insight into the participant's personalities and movements, with little information about actual technology use during the life-time of the probe. The context of use was also seen as critical to the success of item completion. Making sure the participants felt comfortable completing the activities in the everyday locations they encountered emerged as an important part of the kit content design. This required careful consideration of the social appropriateness of recording information in each of the locations suggested in the kit contents.

This second iteration of the kit design evolved out of these findings. The focus was on including additional tasks and questions to explore mobile phone use specifically. Central to this was keeping the amount of information recording required of participants to a manageable level. Additional information would be collected during the interviews about patterns of interactions with friends, family, colleagues and potential employers via other technological mediums. A message book was included to record incoming mobile phone calls in the form of messages. Less successful items were also reshaped or dropped; these included items that were difficult to complete or that returned less relevant information about the freelancers' mobile practices.

Two volunteers were recruited and provided with the revised probe contents – one a freelance worker involved in mobile HCI research and the second

working part time in film and television and conducting a part-time Masters in Design. The volunteers were asked to use the probes over a period of five days, again from Friday morning to Tuesday evening.

Individual discussions were then held with each of the participants, wherein both raised a number of issues that they had experienced with the probes. Firstly, there were too many items in the self-reporting kits. Both participants did not complete parts of the kit that were deemed to be labour intensive or felt to be irrelevant. They did not have the time for these items in their busy work schedules. Secondly, certain questions regarding technology use were again too specific and caused discomfort, such as writing down details of specific text messages. The participants were happy to provide general details about what and why they used their phones, but wanted to protect the privacy of detailed specifics. For example, an SMS saying "last night was great" from a male friend was too personal, but letting me know they had received a text message from a male friend following up from the night before was OK. Finally, due to the bulky nature of the contents it was not possible to complete certain tasks in the moment. One participant had the kit in her bag and wanted to complete some activities while waiting for the bus. She could not open up maps to record her movements, or manage a range of elements to complete individual tasks (such as locating stickers, pens and instructions for each item without spreading them out). One participant also noted that completing probe contents occurred after the event as a result of these difficulties. She suggested that the same type of information could be gathered using interviews alone. If these occurred a few days after events, they would provide the same level of information without requiring extensive effort and/or time on behalf of participants.

This feedback resulted in extensive modifications and careful thinking about the self-reporting kit contents. Specifically, four conclusions for probe redesign were reached – that there was a need for:

- gathering data that it is not possible to collect from interviews, e.g. requesting snapshots in the moment that provide deeper insight into situated practice;
- modifying probe contents to provide details of technology use without requesting specific details of calls and text messages, i.e. emphasising the purpose of communication rather than the specific content;
- carefully selecting tasks to provide useful props for interviews to elicit further, more detailed information from participants; and
- including fewer tasks in the kit itself.

From these insights a third iteration of the kit was developed. As kit items were taken to the next stage of visually designing individual elements, tasks again evolved slightly before being included in the final kit used in the field study. Two specific developments occurred at this stage as the kit contents were worked on. It became clear that the maps were too geographically specific. The scale and detail on the maps made it difficult for the participants to locate and draw their movements without these being obscured by the map itself. Prior to distributing the maps I therefore had to ask very specific questions about participants' movements to provide the right combination of maps to cover these movements. This did not always allow for unplanned and spontaneous activities in unscheduled locations. Another influence was the growing desire to use the kits to elicit narratives about practices. These narratives provided concrete examples of the lived experience of the participants' movements. At the same time I worked on the kit items to make them as fun and easy to complete as possible. Each item was wrapped up as a gift, so that the participants would feel excitement and curiosity as they opened the items. The final instructions attached to each kit activity are provided below.

The kit itself required a long timeframe for development and design, and on average two to three hours to complete. The majority of participants noted and appreciated the effort put into the design and presentations of the kit contents, feeling that they wanted to sit down and spend time with the kit in response. Most of the participants sat down and provided extensive detail about their practices.

Through the kits, it was possible to gather precise information about people's daily routines and mobile phone use. The kit materials returned by participants incorporated a combination of more specific details about the use of technology and user experiences, and reflective, subjective interpretations of experiences. The kits provided access to rich reflective detail and narratives in various forms (including audio recordings and sketches) and allowed the participants to express themselves in creative ways (which everyone enjoyed, me included!). In conjunction with the interviews, this provided a level of information that is not accessible from interviews alone, as the contextual groundwork for discussion had already been done in the self-reporting kits. This allowed the interviews to home in on areas of significance and extract much greater detail. Particular side-benefits of the kit and interview combination included the following:

- Participants demonstrated an increased capacity to reflect on their own practices and report on these reflections, due to the timeframe of the data collection.
- Participants enjoyed the chance to be creative with kit contents. A number noted that there were fun bits and hard bits. The hard bits were the postcards, where they had to think about their beliefs rather than report on their practices. Participants were also creative with adapting and modifying aspects of the kits. As one participant noted, "I ran with the spirit of the method".

- The kit contents were malleable and were used copiously during the follow-up interviews with participants. They were spread across tables, shuffled through, picked up and used to illustrate key ideas during discussion. The contents provided concrete examples of instances of use or activity, grounding the discussion in real events.
- Some of the kit contents were not completed due to the participants' perception of their own creative talents. For example, some felt they could not draw so they did not complete the cartoons. Others did not like the sound of their voice when recorded and did not complete the voice recording activity. At the same time other participants were excited to have the opportunity to let their creative juices flow. The inclusion of a range of different mediums (visual, audio, textual) allowed the participants to select which activities they felt comfortable completing.

There were, however, some issues and limitations experienced by the participants and me while deploying this method. A small number of participants dropped out of the study in early stages due to workload, feeling that the kit, although fun, was difficult to squeeze in on top of hectic work schedules. The provision of kits to a few of the early participants a month before Christmas was bad timing: social lives at this time were hectic and there was little time to dedicate to the study. As a result, I gave participants a number of weeks to complete the kits. This was negotiated with them, with weekly check-in phone calls. Some participants simply took a while to get around to completing the kits, from three weeks to three months. Some completed all activities in a sudden burst just prior to the interview. Others completed some activities and then let a period of time passed before completing the remainder. A small proportion of participants had problems with recall, with the maps particularly, as occasionally too much time had passed between recording

movements and reporting on these in interviews. However, when talking through the maps during interviews, these participants often remembered additional activities and mobile phone usage that they then quickly added.

Final kit contents included:

- The kit instructions (see Figure 14)
- Activity 2 – the front of the postcards included in the kit (see Figure 15 and Figure 16)
- Activity 4 – the story box activity with heaven and hell imagery (see Figure 17)
- Activity 5 – the blank comic strip boxes provided to draw a 'day in the life of' narrative of technology use (see Figure 18).

Note: Other activities were not provided with additional detail beyond instructions (written and verbal) alone and did not have relevant content to detail here in this appendix. For example, the instructions for Activity 3 ('Say Cheese') were attached directly to a disposable camera. These instructions are shown in Figure 14.

Final Kit Contents

Thanks for participating!
Hello and thanks for participating in this study. This pack consists of a variety of materials, including postcards, maps, stickers, coloured pens, and sugar.

There are five activities enclosed in this pack. These are:
ACTIVITY 1 – Movers & Shakers Maps
ACTIVITY 2 – Postcard Central
ACTIVITY 3 – Say Cheese
ACTIVITY 4 – Story Box
ACTIVITY 5 – Australian Splendour

Instructions on what to do with each of the items in the pack are attached to each activity. Fill in as much or as little as you can or feel comfortable with. Activity 3 is designed to be carried with you as you go about your weekend. The rest of the activities are designed to be completed when you have a little dedicated time in the comfort of your home. When you have completed the activities, please hold onto them. I'll be in touch shortly to collect these. If you have any queries or concerns please contact me, Kirsten Sadler, on 0402765712, 95144533, or kirstens@it.uts.edu.au.

ACTIVITY 1 – Movers & Shakers Maps
For each day of the study – Friday, Saturday, Sunday - draw a map (sample enclosed) of where you went each day. Mark the following on the map:

- The places you went to
- Lines & arrows to indicate movement between places
- Your means of transport

Label each place on the map as to:
- What it is
- Why you went there and what you did there
- Why it was important for you to go there
- Who you were with or met, e.g. friend, brother, colleague
- Anything else you think is relevant

Draw a little mobile phone symbol at each place on the map in which you used your mobile phone through-out the day.

ACTIVITY 4 - Story Box
You have 10 minutes on the recording device to record stories about experiences you've had with your mobile phone. Follow the instructions on Bosch's Heaven/ Purgatory/Hell paintings enclosed. Stick the attached mobile phone pictures on the page to represent how you really feel about your mobile phone each day.

ACTIVITY 3 – Say Cheese
Take one or more photos of:
- Your home
- What you'll wear today
- How you get around town
- Your mobile technologies
- Things you would never leave the house without
- Something boring
- Something funny
- A place you visit today
- 12pm on a Saturday
- 4pm on a Sunday
- Anything you feel like

ACTIVITY 2 – Postcard Central
Each of the enclosed postcards lists a question. Completed Postcards can then be placed in the attached envelope. These are not intended to be mailed individually through the post.

ACTIVITY 5 – Australian Splendour
Like Harvey Pekar in American Splendour, you are the director and star of your own daily life in this activity. Dramatise and draw a "day in your life" with your mobile phone, including the locations and moments that shaped the very course of your day.
Note: drawing skills not required! A day in your life can be based on a specific day or a combination of recent dramatic events.

Figure 14: Instructions for kit contents.

<Removed for copyright purposes>

Figure 15: Activity 2, 'Postcard Central', pg 1.

<Removed for copyright purposes>

Figure 16: Activity 2, 'Postcard Central', pg 2.

<Removed for copyright purposes>

Figure 17: Activity 4, 'Story Box, Heaven and Hell'.

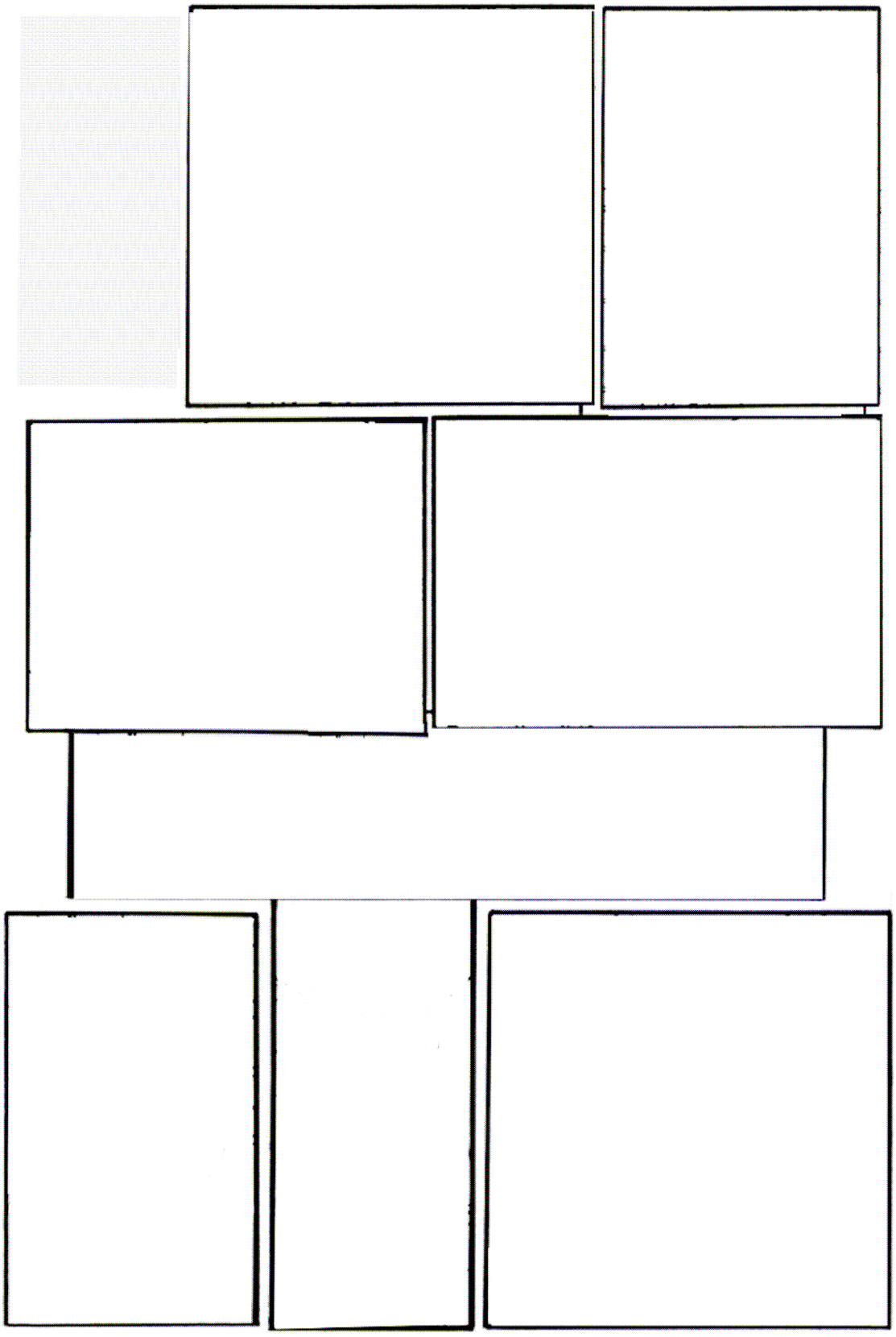


Figure 18: Activity 5, 'Australian Splendour', sample blank cartoon boxes for completion.

Appendix D Peer-Reviewed Publications

First author for refereed papers accepted, published and/or presented at conferences. These papers are included on the following pages.

- Sadler, K., Robertson, T. & Kan, M. 2005. 'Use scenarios: A useful design tool for MBusiness', ICMB 2005, the International Conference on Mobile Business 2005, Sydney, Australia.
- Sadler, K., Robertson, T. & Kan, M. 2006. '"It's always there, it's always on": A study of mobile technology use by Australian freelancers', MobileHCI'06, Espoo, Finland.
- Sadler, K., Robertson, T., Kan, M. & Hagen, P. 2006. 'Balancing work, life and other concerns: A study of mobile technology use by Australian freelancers', NordiCHI'06, Oslo, Norway.
- Sadler, K., Robertson, T. & Kan, M. 2009. 'Exploring the project transitions and everyday mobile practices of freelancers: Emergent concepts from empirical studies of practice', OzCHI'09, Melbourne, Australia.

Additional refereed papers, as co-author, not included in this thesis:

- Hagen, P., Robertson, T., Kan, M. & Sadler, K. 2005. 'Emerging research methods for understanding mobile technology use', OzCHI 05, Canberra, Australia.
- Kan, M., Robertson, T., Muller, L. & Sadler, K. 2005. 'Designing a movement-based interactive experience using empirically derived personas and scenarios', Approaches to Movement-Based Interaction Workshop, Critical Computing 2005.
- Robertson, T., Kan, M., Sadler, K. & Hagen, P. 2005. 'Uncovering traces of mobile practices: "the bag study"', OzCHI 05, Canberra, Australia.
- Hagen, P., Robertson, T., Kan, M. & Sadler, K. 2006. 'Accessing data: methods for understanding mobile technology use', *The Australasian Journal of Information Systems*, vol.13, no.2, pp.135-149.

References

Alony, I., Whymark, G. & Jones, M. 2007, 'Sharing Tacit Knowledge: A Case Study in the Australian Film Industry', *Informing Science Journal*, vol. 10, pp. 41-59.

Anderson, I., Borum, F., Kristensen, P.H. & Karnoe, P. 1995, *On the Art of Doing Field Studies: An Experience-based Research Methodology*, Handelshojskolens Forlag, Denmark.

Ankolekar, A., Szabo, G., Luon, Y., Huberman, B.A., Wilkinson, D. & Wu, F. 2009, 'Friendlee: a mobile application for your social life', *MobileHCI'09*, ACM, Bonn, Germany.

Applebaum, E. 1989, 'The growth in the U.S. contingent labour force', in R. Drago & R. Perlman (eds), *Microeconomic Issues in Labour Economics*, Harvester Wheatsheaf, Sussex, pp. 62-82.

Atkinson, P., Coffey, A., Delamont, S., Lofland, J. & Lofland, L. (eds) 2001, *Handbook of Ethnography*, SAGE Publications, London.

Axtell, C., Hislop, D. & Whittaker, S. 2008, 'Mobile technologies in mobile spaces: Findings from the context of train travel', *International Journal of Human Computer Studies*, vol. 66, no. 2008, pp. 902-915.

Axup, J. & Viller, S. 2005, 'Formative Research Methods For The Extremely Mobile: Supporting Community Interaction Amongst Backpackers', *OzCHI'05*, Canberra, Australia, pp. 1-5.

Axup, J., Viller, S. & Bidwell, N.J. 2005, 'Usability of a mobile, group communication prototype while rendezvousing', *Collaborative Technologies and Systems, 2005*, pp. 24-31.

Baines, S. 1999, 'Servicing the media: freelancing, teleworking and "enterprising" careers', *New Technology, Work and Employment*, vol. 14, no. 1, pp. 18-31.

Bannon, L.J. 1991, 'From Human Factors to Human Actors: The Role of Psychology and Human-Computer Interaction Studies in System Design', in J. Greenbaum & M. Kyng (eds), *Design at Work*, Lawrence Erlbaum Associates.

Bardram, J.E. 2000, 'Temporal Coordination: on time and coordination of collaborative activities at a surgical department', *Computer Supported Cooperative Work*, vol. 9, no. 2, pp. 157-187.

Bardram, J.E. & Bossen, C. 2003, 'Moving to get aHead: Local Mobility and Collaborative Work', *ECSCW'03*, Helsinki, Finland, pp. 355-375.

Bardram, J.E. & Bossen, C. 2005, 'Mobility Work: The Spatial Dimension of Collaboration at a Hospital', *Computer Supported Cooperative Work*, vol. 14, no. 2, pp. 131 - 160.

Barley, S.R. & Kunda, G. 2004, *Gurus, Hired Guns and Warm Bodies*, Princeton University Press, New Jersey.

Bellotti, V. & Bly, S. 1996, 'Walking Away from the Desktop Computer: Distributed Collaboration and Mobility in a Product Design Team', *CSCW'96*, Boston, Massachusetts, pp. 209-218.

Bergqvist, J., Dahlberg, P., Ljungberg, F. & Kristoffersen, S. 1999, 'Moving Out of the Meeting Room: Exploring support for mobile meetings', *ECSCW'99*, eds S. Bödker, M. Kyng & K. Schmidt, Copenhagen, Denmark, pp. 81-98.

Bernard, H.R. 1995, *Research Methods in Anthropology: Qualitative and Quantitative Approaches*, 2nd edn, AltaMira Press, Walnut Creek, CA.

Bertelsen, O.W. & Bödker, S. 2001, 'Cooperation in massively distributed information spaces', *ECSCW'01*, eds W. Prinz, Y. Jarke, K. Rogers, K. Schmidt & V. Wulf, Kluwer Academic Publishers, Bonn, Germany, pp. 1-17.

Blair, H., Grey, S. & Randle, K. 2001, 'Working in film - Employment in a project based industry', *Personnel Review*, vol. 30, no. 2, pp. 170-185.

Blythin, S., Rouncefield, M. & Hughes, J.A. 1997, 'Never mind the ethno' stuff, what does all this mean and what do we do now: ethnography in the commercial world', *Interactions*, vol. 4, no. 3, pp. 38-47.

Boase, J. 2008, 'Kei-Tying teens: Using mobile phone e-mail to bond, bridge and break with social ties - a study of Japanese adolescents', *International Journal of Human Computer Studies*, vol. 66, no. 2008, pp. 930-943.

Bödker, S. 2000, 'Scenarios in user-centred design – setting the stage for reflection and action', *Interacting with Computers*, vol. 13, no. 1, pp. 61-75.

Bödker, S. 2006, 'When Second Wave HCI Meets Third Wave Challenges', *NordiCHI'06*, Oslo, Norway, pp. 1-8.

Bradley, N. & Dunlop, M. 2002, 'Understanding Contextual Interactions to Design Navigational Context-Aware Applications', in, *Lecture Notes in Computer Science*, vol. 2411/2002, Springer-Verlag Heidelberg, pp. 349-353.

Brewer, J. & Dourish, P. 2008, 'Storied spaces: Cultural accounts of mobility, technology and environmental knowing', *International Journal of Human Computer Studies*, vol. 66, no. 2008, pp. 963-976.

Brodie, J. & Perry, M. 2001, 'Designing for Mobility, Collaboration and Information use by Blue-Collar Workers', *SIGGROUP Bulletin*, vol. 22, no. 3, pp. 22-27.

Brown, B., Chalmers, M., Bell, M., MacColl, I., Hall, M. & Rudman, P. 2005, 'Sharing the Square', *ECSCW'05*, Paris, France.

Brown, B. & O'Hara, K. 2003, 'Place as a practical concern of mobile workers', *Environment & Planning A*, vol. 35, no. 9, pp. 1565-1587.

Bryman, A. 2004a, *Handbook of Data Analysis*, Sage Publications, Thousand Oaks, CA.

Bryman, A. 2004b, *Social Research Methods*, Oxford University Press, Oxford.

Bryman, A. & Burgess, R.G. 1994, 'Reflections on qualitative data analysis', in A. Bryman & R.G. Burgess (eds), *Analyzing Qualitative Data*, Routledge Press, London, pp. 216-226.

Büscher, M. & Urry, J. 2009, 'Mobile Methods and the Empirical', *European Journal of Social Theory*, vol. 12, no. 1, pp. 99-116.

Button, G. 2000, 'The Ethnographic Tradition and Design', *Design Studies*, vol. 21, no. 319-332.

Campbell, S.W. 2007, 'Perceptions of Mobile Phone Use in Public Settings: A Cross-Cultural Comparison', *International Journal of Communication*, vol. 1, no. 2007, pp. 738-757.

Carroll, J.M. 2000, 'Five reasons for scenario-based design', *Interacting with Computers*, vol. 13, no. 1, pp. 43-60.

Carter, S. & Mankoff, J. 2005, 'When Participants Do the Capturing: The Role of Media in Diary Studies', *CHI'05*, Portland, Oregon, USA, pp. 899-908.

Chalmers, M. 2004, 'A Historical View of Context', *Computer Supported Cooperative Work*, vol. 13, no. 3-4, pp. 223 - 247.

Chen, Y. & Katz, J.E. 2008, 'Extending family to school life: College students' use of the mobile phone', *International Journal of Human Computer Studies*, vol. 67, no. 2, pp. 179-191.

Christensen, U. 2001, 'Conventions and articulation work in a mobile workplace', *SIGGROUP Bulletin*, vol. 22, no. 3, pp. 16-21.

Church, K. & Smyth, B. 2008, 'Understanding mobile information needs', *MobileHCI'08*, Amsterdam, The Netherlands.

Church, K. & Smyth, B. 2009, 'Understanding the intent behind mobile information needs', *IUI'09*, Sanibel Island, Florida, USA.

Churchill, E.F. & Munro, A.J. 2001, 'WORK/PLACE: Mobile technologies and arenas of activity', *SIGGROUP Bulletin*, vol. 22, no. 3, pp. 3-9.

Ciolfi, L., Bartolucci, I. & Murphy, D. 2005, 'Meaningful interactions for meaningful places: investigating the relationships between nomadic work, tangible artefacts and the physical environment', in, *EACE'05*, Chania, Greece, pp. 115-121.

Colbert, M. 2005, 'User experience of communication before and during rendezvous: interim results', *Personal and Ubiquitous Computing*, vol. 9, pp. 134-141.

Crabtree, A., Hemmings, T., Rodden, T., Cheverst, K., Clarke, K., Dewsbury, G., Hughes, J. & Rouncefield, M. 2003a, 'Designing with Care: Adapting cultural probes to inform design in sensitive settings', *OzCHI'03*, Brisbane, Australia, pp. 4-13.

Crabtree, A., Hemmings, T., Rodden, T., Clarke, K., Dewsbury, G., Hughes, J., Rouncefield, M. & Sommerville, I. 2002, 'Sore legs and naked bottoms: using cultural probes in dependability research', *Dependability of Computer-based Systems Workshop*, The Royal Statistical Society, London, pp. 1-10.

Crabtree, A., Nichols, D.M., O'Brien, J., Rouncefield, M. & Twidale, M.B. 2003b, 'Ethnomethodologically Informed Ethnography and Information System Design', *American Society for Information Science*, vol. 51, no. 7, pp. 666-682.

Crabtree, A. & Rodden, T. 2002, 'Ethnography and Design?' *The 1st International Workshop on "Interpretive" Approaches to Information Systems*, pp. 70-74.

Cresswell, T. 2006, *On the Move: mobility in the modern Western world*, Routledge, New York.

Crotty, M. 1998, *The Foundations of Social Research: Meaning and Perspective in the Research Process*, Allen & Unwin, Sydney.

Cui, Y. & Roto, V. 2008, 'How people use the web on mobile devices', *WWW'08*, Beijing, China, pp. 905-914.

Currie, G., Tempest, S. & Starkey, K. 2006, 'New careers for old? Organizational and individual responses to changing boundaries', *International Journal of Human Resource Management*, vol. 17, no. 4, pp. 755-774.

de Gourney, C. & Smoreda, Z. 2003, 'Communication Technology and Sociability: Between Local Ties and "Global Ghetto"?' in J. Katz (ed.), *Machines That Become Us: The Social Context of Personal Communication Technology*, Transaction Publishers, New Brunswick, London, pp. 57-70.

De Guzman, E.S., Sharmin, M. & Bailey, B.P. 2007, 'Should I call now? understanding what context is considered when deciding whether to initiate remote communication via mobile devices', *Graphics Interface '07*, Montreal, Canada, pp. 143-150.

de Oliveira, R. & Oliver, N. 2008, 'TripleBeat: enhancing exercise performance with persuasion', *MobileHCI'08*, ACM, Amsterdam, The Netherlands.

Dearman, D., Kellar, M. & Truong, K.N. 2008, 'An Examination of daily information needs and sharing opportunities', *CSCW'08*, San Diego, CA.

Delamont, S. & Atkinson, P. 2004, 'Qualitative Research and the Postmodern Turn', in M. Hardy & A. Bryman (eds), *Handbook of Data Analysis*, Sage Publications, London, pp. 667-681.

Denzin, N.K. & Lincoln, Y.S. 1998, *Strategies of Qualitative Inquiry*, Sage Publications ,Inc, Thousand Oaks, London, New Delhi.

Denzin, N.K. & Lincoln, Y.S. 2000, *Handbook of Qualitative Research*, 2 edn, Sage Publications, Thousand Oaks.

DeWalt, K.M. & DeWalt, B.R. 2002, *Participant Observation: a Guide for Fieldworkers*, AltaMira Press, New York.

Dey, A.K. 2001, 'Understanding and Using Context', *Personal and Ubiquitous Computing*, vol. 5, no. 1, pp. 4-7.

Diggins, T. & Tolmie, P. 2003, 'The "adequate" design of ethnographic outputs for practice: some explorations of the characteristics of design resources', *Personal and Ubiquitous Computing*, vol. 7, no. 3-4, pp. 147 - 158.

Dix, A., Rodden, T., Davies, N., Trevor, J., Friday, A. & Palfreyman, K. 2000, 'Exploiting space and location as a design framework for interactive mobile systems', *ACM Transactions on Computer-Human Interaction*, vol. 7, no. 3, pp. 285-321.

Dourish, P. 2001a, 'Seeking a Foundation for Context-Aware Computing', *Human-Computer Interaction*, vol. 16, no. 2-4, pp. 229-241.

Dourish, P. 2001b, *Where The Action Is: The Foundations of Embodied Interaction*, MIT Press, Cambridge, MA.

Dourish, P. 2004, 'What we talk about when we talk about context', *Personal and Ubiquitous Computing*, vol. 8, no. 1, pp. 19-30.

Dourish, P. 2006, 'Implications for Design', *CHI'06*, Montreal, CA, pp. 541-550.

Dourish, P. Andersen, K. & Nafus, D. 2007, 'Cultural Mobilities: Diversity and Agency in Urban Computing', in, *Human-Computer Interaction - INTERACT 2007*, vol. 4663/2009, Springer, Berlin/Heidelberg, pp. 100-113.

Dourish, P. & Bellotti, V. 1992, 'Awareness and Coordination in Shared Workspaces', *CSCW'92*, Toronto, Ontario, Canada, pp. 107-114.

Edwards, M.B., Fuller, D.K., Vortac, O.U. & Manning, C.A. 1995, 'The role of flight progress strips in en route air traffic control: A time-series analysis', *International Journal of Human Computer Studies*, vol. 43, no. 1, pp. 1-13.

Eisenhardt, K.M. 1989, 'Building Theories From Case Study Research', *The Academy of Management Review*, vol. 14, no. 4, pp. 532-550.

Emerson, R.M., Fretz, R.I. & Shaw, L.I. 1995, *Writing Ethnographic Fieldnotes*, The University of Chicago Press, Chicago, USA.

Esbjörnsson, M. & Weilenmann, A. 2005, 'Mobile Phone Talk in Context', *Context'05*, Paris, France, pp. 140-154.

Fallman, D. 2005, 'From Freedom to Involvement: On the Rhetoric of Mobility in HCI Research', *HICSS'05*, IEEE, Hawaii, USA, pp. 1-10.

Fetterman, D.M. 1998, *Ethnography: Step by Step*, Second edn, vol. 17, SAGE Publications, Thousand Oaks, London, New Delhi.

Fontana, A. & Frey, J.H. 2000, 'The Interview: From Structured Questions to Negotiated Text', in N.K. Denzin & Y.S. Lincoln (eds), *Handbook of Qualitative Research*, SAGE Publications, Thousand Oaks, California, pp. 645-672.

Fraser, D. 1999, *QSR NUD*IST Vivo: Reference guide*, Qualitative Solutions and Research Pty, Melbourne.

Gallagher, D.G. 2002, 'Contingent Work Contracts: Practice and Theory', in C.L. Cooper & R.J. Burke (eds), *The New World of Work: Challenges and Opportunities*, pp. 115-136.

Gant, D. & Kiesler, S. 2001, 'Blurring the Boundaries: Cell Phones, Mobility and the Line between Work and Personal Life', in B. Brown & N. Green (eds), *Wireless World: Social and Interactional Aspects of the Mobile Age*, pp. 121-131.

Garfinkel, H. 1967, *Studies in Ethnomethodology*, Prentice-Hall, Englewood Cliffs, N.J.

Gaver, B., Boucher, A., Pennington, S. & Walker, B. 2004, 'Cultural Probes and the Value of Uncertainty', *Interactions*, vol. XI, no. 53-56.

Gaver, B., Dunne, T. & Pacenti, E. 1999, 'Design: Cultural Probes', *Interactions*, vol. 6, no. 1, pp. 21-29.

Gergen, K. 2002, 'The challenge of the absent presence', in, *Perpetual contact: Mobile communication, private talk, public performance*, Cambridge University Press, Cambridge, pp. 227-241.

Geser, H. 2005, 'Is the cell phone undermining the social order? Understanding mobile technology from a sociological perspective', in P. Glotz, S. Bertxchi & C. Locke (eds), *Thumb Culture: the Meaning of Mobile Phones for Society*, Transaction Publishers, New Brunswick, NJ, pp. 11-19.

Glaser, B.G. 1992, *Basics of Grounded Theory Analysis*, Sociology Press, Mill Valley, California.

Goggin, G. 2009, 'Adapting the mobile phone: The iPhone and its consumption', *Journal of Media and Cultural Studies*, vol. 23, no. 2, pp. 231-244.

Grandhi, S.A., Schuler, D. & Jones, Q. 2009, 'To answer or not to answer: that is the question for cell phone users', *CHI'09*, Boston, MA, USA, pp. 4621-4626.

Green, N., Harper, R.H.R., Murtagh, G. & Cooper, G. 2001, 'Configuring the Mobile User: Sociological and Industry Views', *Personal and Ubiquitous Computing*, vol. 5, no. 2, pp. 146-156.

Grief, I. (ed.) 1988, *Computer-Supported Cooperative Work: A Book of Readings*, Morgan Kaufman, Los Altos, CA.

Grinter, R.E. & Eldridge, M. 2001, 'y do tngrs luv 2 txt msg?' *ECSCW'01*, Kluwer Academic Publishers, Bonn, Germany, pp. 219-238.

Grinter, R.E. & Eldridge, M. 2003, 'Wan2tlk?: everyday text messaging', *CHI'03*, ACM, Ft. Lauderdale, Florida, USA, pp. 441-448.

Grinter, R.E. & Palen, L. 2002, 'Instant messaging in teen life', *CSCW'02*, ACM, New Orleans, Louisiana, USA, pp. 21-30.

Grinter, R.E., Palen, L. & Eldridge, M. 2006, 'Chatting with Teenagers: Considering the Place of Chat Technologies in Teen Life', *ACM Transactions on Computer-Human Interaction*, vol. 13, no. 4, pp. 423-447.

Grudin, J. & Pruitt, J. 2002, 'Personas, Participatory Design and Product Development: An Infrastructure of Engagement', *PDC'02*, Malmo, Sweden, pp. 144-161.

Guba, E.G. 1990, *The Paradigm Dialogue*, Sage Publications, Newbury Park, CA.

Guba, E.G. & Lincoln, Y.S. 1981, *Effective Evaluation: Improving the Usefulness of Evaluation Results Through Responsive and Naturalistic Approaches*, Jossey-Bass Publishers, San Francisco.

Hagen, P., Robertson, T., Kan, M. & Sadler, K. 2005, 'Emerging Research Methods For Understanding Mobile Technology Use', *OzCHI'05*, Canberra, Australia.

Hagen, P., Robertson, T., Kan, M. & Sadler, K. 2006, 'Accessing Data: Methods for Understanding Mobile Technology Use', *Australasian Journal of Information Systems*, vol. 13, no. 2, pp. 1-16.

Harper, R. 2001, 'The Mobile Interface: Old Technologies and New Arguments', in B. Brown, N. Green & R. Harper (eds), *Wireless World: Social and Interactional Aspects of the Mobile Age*, Springer-Verlag, London, pp. 207-223.

Harper, R. 2003, 'People Versus Information: the evolution of mobile technology', *MobileHCI'03*, Udine, Italy, pp. 1-14.

Harrison, S., Tatar, D. & Sengers, P. 2007, 'The three paradigms of HCI', *CHI'07*, San Jose, CA, pp. 1-18.

Heath, C., Hindmarsh, J. & Luff, P. 1999, 'Interaction in Isolation: the dislocated world of the London Underground train driver', *Sociology*, vol. 33, no. 3, pp. 555-575.

Heath, C. & Luff, P. 1992, 'Collaboration and control. Crisis management and multimedia technology in London underground line control rooms', *Computer Supported Cooperative Work*, vol. 1, no. 1-2, pp. 69-94.

Hewett, T.T., Baeckier, R., Card, S., Carey, T., Gasen, J., Mantei, M., Perlman, G., Strong, G. & Verplank, W. 1992, *ACM SIGCHI Curricula for Human-Computer Interaction*, ACM Press, New York.

Heyer, C., Brereton, M. & Viller, S. 2008, 'Cross-channel mobile social software: an empirical study', *CHI'08*, Florence, Italy, pp. 1525-1534.

Ho, J. & Intille, S.S. 2009, 'Using context-aware computing to reduce the perceived burden of interruptions from mobile devices', *CHI'09*, Portland, Oregon, USA, pp. 909-918.

Hooker, R., Lewis, C., Smith, H., Wasko, M., Worrell, J. & Yoon, T. 2007, 'Governing E-Collaboration in E-Lance Networks', in N.F. Kock (ed.), *Encyclopedia of E-Collaboration*, pp. 324-329.

Howard, S., Kjeldskov, J., Skov, M.B., Garnoes, K. & Grünberger, O. 2006, 'Negotiating Presence-in-Absence: Contact, Content and Context', *CHI'06*, Montréal, Québec, Canada, pp. 909-912.

Hughes, J., King, V., Rodden, T. & Andersen, H. 1994, 'Moving Out from the Control Room: Ethnography in System Design', *CSCW'94*, Chapel Hill, NC, USA, pp. 429-440.

Hughes, J., King, V., Rodden, T. & Anderson, H. 1995, 'The Role of Ethnography in Interactive Systems Design', *Interactions*, pp. 59-66.

'Introducing iPhone 3Gs' 2010, *Introducing iPhone 3Gs*, viewed 10 Feb 2010 <http://www.apple.com/iphone/>.

Isomursu, M., Isomursu, P. & Still, K. 2003, 'Involving young girls in product concept design', *Universal Usability '03*, ACM, Vancouver, British Columbia, Canada, pp. 98-105.

Ito, M. 2004, 'Personal Portable Pedestrian: Lessons from Japanese Mobile Phone Use', *Mobile Communication*, Seoul, Korea.

Ito, M. 2005, 'Mobile Phones, Japanese Youth and the Re-placement of Social Contact', in R. Ling & P. Pedersen (eds), *Mobile Communication and the Renegotiation of the Social Sphere*, Springer.

Ito, M. & Okabe, D. 2005, 'Technosocial Situations: Emergent Structurings of Mobile Email Use', in, *Personal, Portable Intimate: Mobile Phones in Japanese Life*, MIT Press, pp. 1-16.

Janesick, V. 1998, 'The Dance of Qualitative Research Design: Metaphor, Methodolatory and Meaning', in N.K. Denzin & Y.S. Lincoln (eds), *Strategies of Qualitative Inquiry*, SAGE Publications, Thousand Oaks, California, pp. 35-55.

Jenkins, R. 2004, *Social Identity*, Routledge, London.

Jeong, H.Y. & Arriaga, R.I. 2009, 'Using an ecological framework to design mobile technologies for pediatric asthma management', *MobileHCI'09*, ACM, Bonn, Germany.

Johnson, C. 1998a, *Human Computer Interaction with Mobile Devices*, viewed 24th Jan 2010 <http://www.dcs.gla.ac.uk/~johnson/workshops_old/mobile.html>.

Johnson, P. 1998b, 'Usability and Mobility; Interactions on the move', *MobileHCI'98*, Glasgow, Scotland, pp. 2-4.

Jones, C. 1996, 'Careers in Project Networks: The Case of the Film Industry', in M.B. Arthur & D.M. Rousseau (eds), *The Boundaryless Career: A New Employment Principle for a New Organizational Era*, Oxford University Press, New York, pp. 58-75.

Jordan, B. 1994, *Ethnographic Workplace Studies and Computer Supported Cooperative Work*, Report Number IRL94-0026, IRL.

Kaasinen, E. 2002, 'User needs for location-aware mobile services', *Personal and Ubiquitous Computing*, vol. 7, pp. 70-79.

Kakihara, M. 2004, 'The Rise of the Fluid Organization?: Organizational Patterns of Mobile Professional Work', *IRIS 27*, Falkenberg, Sweden.

Kakihara, M. & Sorensen, C. 2002, 'Mobility: An Extended Perspective', *HICSS'02*, Hawaii, USA, pp. 1756-1766.

Kalleberg, A.L. 2009, 'Precarious Work, Insecure Workers: Employment Relations in Transition', *American Sociological Review*, vol. 74, no. 1, pp. 1-22.

Kane, B. & Luz, S. 2006, 'Multidisciplinary Medical Team Meetings: An Analysis of Collaborative Working with Special Attention to Timing and Teleconferencing', *Computer Supported Cooperative Work*, vol. 2006, no. 15, pp. 501-535.

Katz, J.E. (ed.) 2003, *Machines that become us: The social context of personal communication technology*, New Brunswick, Transaction Publishers., NJ.

Kendon, A. 1990, *Conducting Interaction: Patterns of behavior in focused encounters*, Cambridge University Press, New York.

Kim, S., Park, S., Lee, J., Jin, Y., Park, H., Chung, A., Choi, S. & Choi, W. 2004, 'Sensible appliances: applying context-awareness to appliance design', *Personal and Ubiquitous Computing*, vol. 8, pp. 184-191.

Kirk, J. & Miller, M.L. 1986, *Reliability and Validity in Qualitative Research*, vol. 1, SAGE Publications, Beverly Hills, California.

Kjeldskov, J., Gibbs, M.R., Vetere, F., Howard, S., Pedell, S., Mecoles, K. & Bunyan, M. 2004, 'Using Cultural Probes to Explore Mediated Intimacy', *OzCHI'04*, Wollongong, Australia, pp. 1-10.

Kjeldskov, J. & Graham, C. 2003, 'A Review of Mobile HCI Research Methods', *MobileHCI'03*, Udine, Italy, pp. 317-335.

Kjeldskov, J. & Stage, J. 2004, 'New Techniques for Usability Evaluation of Mobile Systems', *International Journal of Human Computer Studies*, vol. 60, pp. 599-620.

Kleinman, L. 2004, 'Connecting With the Absent Presence: Pervasive Technology Use and Effects on Community', *CHI'04*, Vienna, Austria, pp. 1037-1038.

Kurniawan, S. 2008, 'Older people and mobile phones: A multi-method investigation', *International Journal of Human Computer Studies*, vol. 66, no. 2008, pp. 889-901.

Lamming, M., Eldridge, M., Flynn, M., Jones, M. & Pendlebury, D. 2000, 'Satchel: Providing Access to Any Document, Any Time, Anywhere', *ACM Transactions on Computer-Human Interaction*, vol. 7, no. 3, pp. 322-352.

Lasen, A. 2006, 'How to Be in Two Places at The Same Time? Mobile Phone Use in Public Places', in J. Hoflich & M. Hartmann (eds), *Mobile Communication in Everyday Life: Ethnographic Views, Observation and Reflection*, Frank & Timme, Berlin, pp. 227-251.

Laubacher, R. & Malone, T.W. 2003, 'Retreat of the Firm and the Rise of the Guilds: The Employment Relationship in an Age of Virtual Business', in T.W. Malone, R. Laubacher & M.S. Scott (eds), *Inventing the Organizations of the 21st Century*, MIT Press, pp. 353-374.

Laurier, E. 2001, 'Why people say where they are during mobile phone calls', *Environment & Planning D: Society and Space*, vol. 19, no. 4, pp. 485-504.

Laurier, E. 2002, 'The Region as a Socio-technical Accomplishment of Mobile Workers', in B. Brown, N. Green & R. Harper (eds), *Wireless World: Social and Interactional Aspects of the Mobile Age*, pp. 46-61.

Le Dantec, C.A. & Edwards, W.K. 2008, 'Designs on Dignity: Perceptions of Technology Among the Homeless', *CHI'08*, Florence, Italy, pp. 627-636.

Leander, K.M. & McKim, K.K. 2003, 'Tracing the Everyday "Sitings" of Adolescents on the Internet: A Strategic Adaptation of Ethnography across Online and Offline Spaces', *Education, Communication and Information*, vol. 3, no. 2, pp. 211-240.

LeCompte, M.D. & Schensul, J.J. 1999a, *Analyzing & Interpreting Ethnographic Data*, vol. 5, AltaMira Press, Walnut Creek, California.

LeCompte, M.D. & Schensul, J.J. 1999b, *Designing & Conducting Ethnographic Research*, vol. 1, AltaMira Press, Walnut Creek, California.

Lehikoinen, J.T. & Kaikkonen, A. 2006, 'PePe field study: constructing meanings for locations in the context of mobile presence', *MobileHCI'06*, ACM, Helsinki, Finland, pp. 53-60.

Licoppe, C. & Heurtin, J.P. 2001, 'Managing One's Availability to Telephone Communication Through Mobile Phones: A French Case Study of the Development Dynamics of Mobile Phone Use', *Personal and Ubiquitous Computing*, vol. 5, no. 2, pp. 99 - 108.

Light, A. 2007, 'Transports of delight? What the experience of receiving (mobile) phone calls can tell us about design', *Personal and Ubiquitous Computing*, pp. 1-10.

Lincoln, Y.S. & Guba, E.G. 1985, *Naturalistic Inquiry*, Sage Publications, Newbury Park.

Ling, R. 2000, '"We Will Be Reached": the use of mobile telephony among Norwegian youth', *Information Technology & People*, vol. 13, pp. 102-120.

Ling, R. 2007, *New Tech, New Ties: How Mobile Communication is Reshaping Social Cohesion*, MIT Press.

Ling, R. & Haddon, L. 2003, 'Mobile Telephony, Mobility and the Coordination of Everyday Life', in J. Katz (ed.), *Machines That Become Us: The Social Context of Personal Communication Technology*, Transaction Publishers, New Brunswick, pp. 245-266.

Ling, R. & Yttri, B. 2002, 'Hyper-coordination via mobile phones in Norway', in J. Katz & M. Aakhus (eds), *Perpetual contact: Mobile communication, private talk, public performance*, Cambridge University Press, Cambridge.

Loi, D. 2004, '"Live like I do" - a field experience using Cultural Probes', *PDC'04*, Toronto, pp. 191-194.

Lorente, S. 2006, 'Another Kind of "Mobility": Mobiles in Terrorist Attacks', in J. Hoflich & M. Hartmann (eds), *Mobile Communication in Everyday Life: Ethnographic Views, Observations and Reflections*, Frank & Timme, Berlin, pp. 173-202.

Love, S. & Perry, M. 2004, 'Dealing with Mobile Conversations in Public Places: some implications for the design of socially intrusive technologies', *CHI'04 extended abstracts*, pp. 1195-1198.

Lueg, C. 2002, 'On the Gap between Vision and Feasibility', in, *Lecture Notes in Computer Science*, vol. 2414/2002, Springer-Verlag Heidelberg, p. 45.

Luff, P. & Heath, C. 1998, 'Mobility in Collaboration', *CSCW'98*, Seattle, pp. 305-314.

Macann, C. 1993, *Four Phenomenological Philosophers: Husserl, Heidegger, Sartre, Merleau-Ponty*, Routledge Press, London, New York.

Malone, T.W. & Laubacher, R. 1998, 'The Dawn of the E-Lance Economy', *Harvard Business Review*, vol. 76, no. 5, pp. 144-152.

Marcus, G.E. & Fischer, M.M.J. 1999, *Anthropology as Cultural Critique: An Experimental Moment in the Human Sciences*, 2 edn, The University of Chicago Press, Chicago and London.

Matsuda, M. 2005, 'Mobile communication and selective sociality', in M. Ito, D. Okabe & M. Matsuda (eds), *Personal, Portable, Pedestrian: Mobile Phones in Japanese Life*, MIT Press, Cambridge, M.A., pp. 123-142.

Mattelmaki, T. 2005, 'Applying probes - from inspirational notes to collaborative insights', *CoDesign*, vol. 1, no. 2, pp. 83-102.

Mattelmaki, T. & Battarbee, K. 2002, 'Empathy Probes', *PDC'02*, Malmo, Sweden, pp. 1-6.

McCarthy, J. & Wright, P. 2004, *Technology as Experience*, MIT Press, Cambridge, M.A.

McCarthy, J.C., Wright, P.C., Healey, P., Dearden, A. & Harrison, M.D. 1997, 'Locating the scene: The particular and the general in contexts for ambulance control', *Supporting Group Work '97*, ACM Press, Phoenix, Arizona, USA, pp. 101-110.

McKillop, R. 2008, *How to delete apps from your iPod touch or iPhone*, viewed 10 Feb 2010 <http://www.simplehelp.net/2008/07/12/how-to-delete-apps-from-your-ipod-touch-or-iphone/>.

Merleau-Ponty, M. 1962, *Phenomenology of Perception*, Routledge & Kegan Paul, London.

Messeter, J., Brandt, E., Halse, J. & Johansson, M. 2004, 'Contextualizing mobile IT', *Designing Interactive Systems*, Cambridge, MA, USA, pp. 27-36.

Miles, M.B. & Huberman, A.M. 1994, *Qualitative data analysis: an expanded sourcebook*, 2nd edn, Sage, Thousand Oaks, California.

Millen, R. 2000, 'Rapid Ethnography: Time Deepening Strategies for HCI Field Research', *DIS'00*, Brooklyn, New York, pp. 280-286.

Mitchell, V., May, A., Bowden, S. & Thorpe, T. 2006, 'Using mobility as a conceptual framework for informing the design of mobile ICT for construction professionals', *MobileHCI'06*, Helsinki, Finland, pp. 45-48.

Moran, D. 2000, *Introduction to Phenomenology*, Routledge, Florence, KY, USA.

Moran, T.P. & Anderson, R.J. 1990, 'The Workaday World As a Paradigm for CSCW Design', *CSCW'90*, pp. 1-13.

Moustakas, C. 1994, *Phenomenological Research Methods*, SAGE Publications, Thousand Oaks, California.

Nardi, B.A., Whittaker, S. & Schwarz, H. 2000, 'It's Not What You Know, It's Who You Know: Work in the Information Age', *First Monday*, vol. 5, no. 5.

Nardi, B.A., Whittaker, S. & Schwarz, H. 2002, 'NetWORKers and their activity in intensional networks', *Computer Supported Cooperative Work*, vol. 11, pp. 205-242.

Nielsen, L. 2002, 'From user to character - an investigation into user-descriptions in scenarios', *DIS'02*, London, England, pp. 99-104.

Nilsson, M. & Hertzum, M. 2005, 'Negotiated rhythms of mobile work: time, place and work schedules', *Supporting Group Work '05*, Sanibel Island, Florida, USA, pp. 148-157.

O'Hara, K., Perry, M., Sellen, A. & Brown, B. 2001, 'Exploring the relationship between mobile phone and document activity during business travel', in B. Brown & N. Green (eds), *Wireless world: social and interactional aspects of the mobile age*, Springer-Verlag, Inc., New York, pp. 180-194.

Okabe, D. & Ito, M. 2006, 'Everyday Contexts of Camera Phone Use: Steps Toward Technosocial Ethnographic Frameworks', in Höflich, Joachim, Hartmann & Maren (eds), *Mobile Communication in Everyday Life: An Ethnographic View*, Frank & Timme, Berlin, pp. 79-102.

Oksman, V. 2006, 'Mobile Visuality and Everyday Life in Finland: An Ethnographic Approach to Social Uses of Mobile Images', in J. Hoflich & M. Hartmann (eds), *Mobile Communication in Everyday Life: Ethnographic Views, Observations and Reflections*, Frank & Timme, Berlin, pp. 103-119.

Orr, J. 1996, *Talking About Machines: An Ethnography of a Modern Job*, Cornell University Press, New York.

Osborne, J.W. 1994, 'Some similarities and differences among phenomenological and other methods of psychological qualitative research', *Canadian Psychology*, vol. 35, no. 2, pp. 167-189.

Oulasvirta, A. & Brewster, S. 2008, 'Editorial: Mobile human-computer interaction', *International Journal of Human Computer Studies*, no. 66, pp. 833-837.

Oulasvirta, A., Petit, R., Raento, M. & Tiitta, S. 2007, 'Interpreting and acting on mobile awareness cues', *Human Computer Interaction*, vol. 22, no. 1, pp. 97-135.

Oulasvirta, A. & Sumari, L. 2007, 'Mobile Kits and Laptop Trays: Managing Multiple Devices in Mobile Information Work', *CHI'07*, San Jose, CA, USA, pp. 1127-1136.

Palen, L. 2002, 'Mobile Telephony In a Connected Life', *Communications of the ACM*, vol. 45, no. 3, pp. 78-82.

Palen, L. & Hughes, A. 2007, 'When home base is not a place: parents' use of mobile telephones', *Personal and Ubiquitous Computing*, vol. 11, no. 5, pp. 339-348.

Palen, L. & Salzman, M. 2002, 'Voice-mail diary studies for naturalistic data capture under mobile conditions', *CSCW'02*, pp. 87-95.

Palen, L., Salzman, M. & Youngs, E. 2000, 'Going wireless: behavior and practice of new mobile phone users', in, *CSCW'00*, ACM, Philadelphia, Pennsylvania, United States, pp. 201-210.

Palen, L., Salzman, M. & Youngs, E. 2001, 'Discovery and Integration of Mobile Communications in Everyday Life', *Personal and Ubiquitous Computing*, vol. 5, no. 2001, pp. 109-122.

Patton, M.Q. 1990, *Qualitative Evaluation and Research Methods*, 2nd edn, Sage, Newbury Park, CA.

Patton, M.Q. 2002, *Qualitative Research & Evaluation Methods*, 3rd edn, Sage Publications, Thousand Oaks, California.

Pekar, H. & Collier, D. 2003, *Harvey Pekar's American Splendour: unsung hero*, Dark Horse Comics, Milwaukie, Oregon.

Perry, M. 2007, 'Enabling nomadic work: developing the concept of "Mobilisation Work"', *CSCW'07*, Limerick, Ireland.

Perry, M. & Brodie, J. 2005, 'Virtually connected, practically mobile', in Andriesson & Vartiainen (eds), *Mobile Virtual Work: A New Paradigm*, Springer, Berlin, pp. 97-127.

Perry, M., O'Hara, K., Sellen, A., Brown, B. & Harper, R. 2001, 'Dealing with mobility: understanding access anytime, anywhere', *ACM Transactions on Computer-Human Interaction*, vol. 8, no. 4, pp. 323-347.

Pinelle, D. & Gutwin, C. 2003, 'Designing for Loose Coupling in Mobile Groups', *Supporting Group Work '03*, Sanibel Island, Florida, USA, pp. 75 - 84.

Plowman, L., Rogers, Y. & Ramage, M. 1995, 'What Are Workplace Studies For?' *ECSCW'95*, pp. 309-327.

Pollio, H.R., Henley, T.B. & Thompson, C.J. 1997, *The Phenomenology of Everyday Life*, Cambridge University Press, Cambridge, U.K.

Pooley, C., Turnbull, J. & Adams, M. 2006, 'The impact of new transport technologies on intra-urban mobility: a view from the past', *Environment & Planning A*, vol. 38, pp. 253-267.

Pringle, J.K. & Mallon, M. 2003, 'Challenges for the boundaryless career odyssey', *International Journal of Human Resource Management*, vol. 14, no. 5, pp. 839-853.

Rettie, R.M. 2005, 'Presence and Embodiment in Mobile Phone Communication', *PsychNology Journal*, vol. 3, no. 1, pp. 16-34.

Reynolds, J. 2006, *Understanding Existentialism*, Acumen Publishing Limited, Bucks, UK.

Robertson, T. 1996, 'Embodied Actions in Time and Place: The Cooperative Design of a Multimedia Educational Computer Game', *Computer Supported Cooperative Work*, vol. 5, no. 4, pp. 341-367.

Robertson, T. 1997, 'Designing Over Distance', Doctoral Dissertation thesis, University of Technology, Sydney (UTS), Sydney.

Robertson, T. 1998, 'Shoppers and Tailors: Participative Practices in Small Australian Design Companies', *Computer Supported Cooperative Work*, vol. 7, pp. 205-221.

Robertson, T. 2002, 'The public availability of actions and artefacts', *Computer Supported Cooperative Work*, vol. 11, no. 3, pp. 299-316.

Robertson, T., Kan, M., Sadler, K. & Hagen, P. 2005, 'Uncovering traces of mobile practices: the bag study', *OZCHI'05*, ACM, Canberra.

Robertson, T. & Loke, L. 2009, 'Designing Situations', *OzCHI'09*, Melbourne, Australia, pp. 1-8.

Robinson, S., Eslambolchilar, P. & Jones, M. 2009, 'Sweep-Shake: finding digital resources in physical environments', *MobileHCI'09*, ACM, Bonn, Germany.

Sadler, K., Robertson, T. & Kan, M. 2006a, 'Balancing Work, Life and Other Concerns: A Study of Mobile Technology Use by Australian Freelancers', *NordiCHI'06*, Oslo, Norway.

Sadler, K., Robertson, T. & Kan, M. 2006b, '"It's Always There, It's Always On": A Study of Mobile Technology Use by Australian Freelancers', *MobileHCI'06*, Espoo, Finland.

Sanjek, R. 1990, 'The Secret Life of Fieldnotes', in R. Sanjek (ed.), *Fieldnotes: The Makings of Anthropology*, pp. 187-272.

Sasha, D., Shim, J.P., Upkar, V. & Geoffrey, K. 2007, 'Evolution and emerging issues in mobile wireless networks', *Communications of the ACM*, vol. 50, no. 6, pp. 38-43.

Schensul, S., Schensul, J.J. & LeCompte, M.D. 1999, *Essential Ethnographic Methods: Observations, Interviews and Questionnaires*, vol. 2, AltaMira Press, Walnut Creek, California.

Schön, D. 1991, *The Reflective Practitioner: How Professionals Think In Action*, Ashgate Publishing Limited, Aldershot, England.

Schrott, G. & Glückler, J. 2004, 'What makes mobile computer supported cooperative work mobile? Towards a better understanding of cooperative mobile interactions', *International Journal of Human Computer Studies*, vol. 60, pp. 737-752.

Schuler, D. & Namioka, A. 1993, *Participatory Design: Principles and Practices*, Lawrence Erlbaum Associates, Hillsdale, N.J.

Schutz, A. 1970, *On Phenomenology and Social Relations: Selected Writings*, The University of Chicago Press, Chicago, London.

Schutz, A. & Luckmann, T. 1973, *The Structures of the Life-World*, Heinemann Educational Books Ltd, London, UK.

Sherry, J. & Salvador, T. 2001, 'Running and Grimacing: The Struggle for Balance in Mobile Work', in B. Brown, N. Green & R. Harper (eds), *Wireless World: Social and Interactional Aspects of the Mobile Age*, Springer-Verlag, London, pp. 108-120.

Shklovski, I. 2006, 'Residential mobility, technology and social ties', *CHI'06*, Montreal, Canada.

Shklovski, I., Kraut, R. & Cummings, J. 2008, 'Keeping in touch by technology: maintaining friendships after a residential move', *CHI'08*, ACM, Florence, Italy, pp. 807-816.

Shklovski, I.A. & Mainwaring, S.D. 2005, 'Exploring Technology Adoption and Use Through the Lens of Residential Mobility', *CHI'05*, Portland, Oregon, pp. 621-630.

Skov, B. & Høegh, T. 2006, 'Supporting information access in a hospital ward by a context-aware mobile electronic patient record', *Personal and Ubiquitous Computing*, vol. 10, no. 4, pp. 205-214.

Sohn, T., Li, K.A., Giswold, W.G. & Hollan, J.D. 2008, 'A diary study of mobile information needs', *CHI'08*, Florence, Italy, pp. 433-442.

Soloway, E., Guzdial, M. & Hay, K.E. 1994, 'Learner-centered design: the challenge for HCI in the 21st century', *Interactions*, vol. 1, no. 2, pp. 36-48.

Stanworth, C. & Stanworth, J. 1997, 'Managing an externalised workforce: freelance labour-use in the UK book publishing industry', *Industrial Relations Journal*, vol. 28, no. 1, pp. 43-55.

Strauss, A. 1985, 'Work and the Division of Labor', *The Sociological Quarterly*, vol. 26, no. 1, pp. 1-19.

Suchman, L. 1987, *Plans and Situated Actions: The Problem of Human Machine Communication*, Cambridge University Press, New York, NY, USA.

Suchman, L. 1994, 'Representations of Work', *Communications of the ACM*, vol. 38, no. 9, pp. 33-35.

Suchman, L. 1997, 'Centers of Coordination: A Case and Some Themes', in L. Resnick, R. Saljo, C. Pontecorvo & B. Burge (eds), *Discourse, Tools and Reasoning: Essays in Situated Cognition*, Springer-Verlag, Berlin, pp. 41-62.

Tamminen, S., Oulasvirta, A., Toiskallio, K. & Kankainen, A. 2004, 'Understanding mobile contexts', *Personal and Ubiquitous Computing*, vol. 8, no. 2, pp. 135-143.

Taylor, A.S. & Harper, R. 2003, 'The Gift of the *Gab*?: A Design Oriented Sociology of Young People's Use of Mobiles', *Computer Supported Cooperative Work*, vol. 12, pp. 267-296.

Taylor, C.A., Anicello, O., Somohano, S., Samuels, N., Whitaker, L. & Ramey, J.A. 2008, 'A framework for understanding mobile internet motivations and behaviours', *CHI'08*, ACM, Florence, Italy, pp. 2679-2684.

Taylor, T.L. 2006, *Play between Worlds: Exploring Online Game Culture*, MIT Press, Cambridge, M.A.

Tedlock, B. 2000, 'Ethnography and Ethnographic Representation', in N.K. Denzin & Y.S. Lincoln (eds), *Handbook of Qualitative Research*, 2nd edn, Sage Publications, Thousand Oaks, pp. 455-486.

Trevor, J. & Hilbert, D.M. 2007, 'AnySpot: Pervasive Document Access and Sharing', *IEEE Pervasive Computing*, vol. 6, no. 3, pp. 76-84.

Tuulos, V.H., Scheible, J. & Nyholm, H. 2007, 'Combining Web, Mobile Phones and Public Displays in Large-Scale: Manhattan Story Mashup', in, *Pervasive Computing*, vol. 4480/2007, Springer, Berlin/Heidelberg, pp. 37-54.

Urry, J. 2002, 'Mobility and Proximity', *Sociology*, vol. 36, no. 2, pp. 255-274.

Van Manen, M. 1990, *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*, State University of New York Press, Ontario.

Vetere, F., Gibbs, M.R., Kjeldskov, J., Howard, S., Mueller, F., Pedell, S., Mecoles, K. & Bunyan, M. 2005, 'Mediating intimacy: designing technologies to support strong-tie relationships', *CHI'05*, ACM Press, Portland, Oregon, USA, pp. 471-480.

Weilenmann, A. 2003a, 'Doing Mobility', Doctoral Dissertation thesis, Goteborg University, Goteborg.

Weilenmann, A. 2003b, '"I can't talk now, I'm in a fitting room": Availability and location in mobile phone conversations', *Environment & Planning A*, vol. 35, no. 9, pp. 1589-1605.

Weilenmann, A. & Holmquist, L.E. 1999, 'Hummingbirds Go Skiing: Using Wearable Computers to Support Social Interaction', *ISWC'99*.

Weilenmann, A. & Larsson, C. 2001, 'Local Use and Sharing of Mobile Phones', in B. Brown, N. Green & R. Harper (eds), *Wireless World: Social and Interactional Aspects of the Mobile Age*, Springer-Verlag, London, pp. 99-115.

Welch, A.J. 2001, 'Finding a Way through the Maze', in R. Barnacle (ed.), *Phenomenology*, RMIT University Press, Melbourne, pp. 58-73.

Whittaker, S., Frohlich, D. & Daly-Jones, O. 1994, 'Informal workplace communication: what is it like and how might we support it?' *CHI'94*, ACM Press, Boston, Massachusetts, United States, pp. 131-137.

Wiberg, M. & Ljungberg, F. 2001, 'Exploring the vision of "anytime, anywhere" in the context of mobile work', in, *Knowledge management and virtual organizations: Theories, practices, technologies and methods*, IGI Publishing, Hershey, PA, USA, pp. 153-165.

Wiberg, M. & Whittaker, S. 2005, 'Managing availability: Supporting lightweight negotiations to handle interruptions', *ACM Transactions on Computer-Human Interaction*, vol. 12, no. 4, pp. 356-387.

Williams, A. Anderson, K. & Dourish, P. 2008, 'Anchored Mobilities: Mobile Technology and Transnational Migration', *DIS 2008*, Cape Town, South Africa, pp. 323-332.

Wright, P., Blythe, M. & McCarthy, J. 2006, *User Experience and the Idea of Design in HCI*, vol. 3941/2006, Springer, Berlin/Heidelberg.

York, J. & Pendharkar, P.C. 2004, 'Human-computer interaction issues for mobile computing in a variable work context', *International Journal of Human Computer Studies*, vol. 60, pp. 771-797.

Zerubavel, E. 1985, *The Seven Day Circle: The History and Meaning of the Week*, The Free Press, A Division of Macmillan, Inc., New York.