

**A multi-level analysis of telework adoption  
and outcomes following a natural disaster:  
The experiences of two Christchurch  
organisations**

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## **Abstract**

The city of Christchurch, New Zealand and surrounding areas experienced a series of large earthquakes which began in 2010 and continued for more than 17 months. Many organisations were suddenly faced with having no place in which to work due to building damage, difficulties with access and the loss of other infrastructure. Adopting telework as an alternative work arrangement was one solution to this problem. Telework is using Information and Communication Technology (ICT) to support working at home or at a location that is removed from the physical location of the organisation. Telework is used by organisations for personal, organisational and environmental reasons. More recently the adoption of telework has been emphasised as a critical component of business continuity after disruption to normal operations. This qualitative study sought to explore the experiences of two case organisations in rapidly implementing telework following a disaster. This research adopted a socio-technical systems approach, using a multi-level teleworking framework, to examine the role of personnel, technical, task, environment and organisational factors and their interactions in telework implementation and outcomes in a post-disaster context. Findings indicated that teleworking was enabled by prior teleworking capabilities and experience, adequate information technology (IT) systems and management support. Telework adoption was hampered by IT infrastructure, hardware resources and lack of planning. Once implemented the barriers to effective telework were the limitations of communication and collaboration. Telework in a post-disaster environment supported the wellbeing of individuals and assisted with business continuity of the organisation while there was some loss of connectedness for groups. After returning to business as usual ongoing telework was enabled through technological improvements and teleworking experience though utilisation of telework was limited by management attitudes in some instances. This research contributes to the existing body of knowledge by applying socio-technical systems theory to telework and assessing a socio-technical system framework in a post-disaster context. In addition it uses the unique opportunity of a natural disaster setting to provide an understanding of how telework can enhance organisational resilience in disruptive situations and what organisations can do to realise this potential. This includes planning, developing personnel and technological capabilities and supporting and using telework regularly.

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## Attestation of Authorship

“I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgments), nor any material which to a substantial extent had been submitted for the award of any other degree or diploma of a university or other institution of higher learning.”

Signed:

A handwritten signature in black ink, appearing to be 'Nicola Green', is written over a horizontal dotted line. The signature is contained within a light yellow rectangular box.

Nicola Green

## Co-Authored Works

Green, N., Bentley, T., & Tappin, D. (2014). *A multi-level analysis of telework adoption and outcomes within organisations following a natural disaster*. Conference Paper presented at the 18<sup>th</sup> Human Factors and Ergonomics Society of New Zealand Conference 2014, 10-12 July 2014: Current issues in Human Factors /Ergonomics in New Zealand, Auckland, New Zealand

### Percentage contributions

Nicola Green	90%
Professor Bentley	5%
Dr Tappin	5%

### Qualitative statement

This paper was written by Nicola Green. It was reviewed and suggestions made for revisions by Professor Bentley and Dr Tappin which was done by Nicola Green. Nicola Green presented the paper at the conference.

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### Percentage contributions

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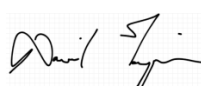
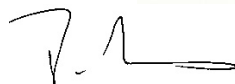
This paper was written by Nicola Green. It was reviewed and suggestions made for revision by Professor Bentley. Dr Tappin reviewed the paper and made revisions which were reviewed and commented on by Nicola Green. Dr Tappin is to present the paper at the conference.

### Signed:

Nicola Green

Professor Tim Bentley

Dr David Tappin





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## Chapter 1. Introduction

### 1.1 Background

On September 4<sup>th</sup>, 2010 at 4:35 am a magnitude 7.1 earthquake, at a depth of 11 km, struck 40 km west of Christchurch city, New Zealand. Following this event there was widespread damage and disruption to water, power and sewerage services but no loss of life (Christchurch City Libraries, 2013). On February 22<sup>nd</sup>, 2011 at 12:51 pm a magnitude 6.3 earthquake with an epicentre 10 km south-east of the central city at a depth of 5 km occurred. 185 people lost their lives and the city and surrounding areas experienced major damage to land, buildings and infrastructure (Christchurch City Libraries, 2013). Between September 4<sup>th</sup>, 2010 and September 3<sup>rd</sup>, 2012 the region experienced almost 4,500 earthquakes of magnitude 3.0 or larger (GNS Science, 2013).



**Photo 1** Scenes from the 22<sup>nd</sup> February, 2011 earthquake and resultant damage

The February 2011 earthquake alone resulted in disruption to over 6,000 businesses and 52,000 employees for sustained periods of time (Stevenson, Seville, Kachali, Vargo, & Whitman, 2011). Many organisations were left without office buildings from which to work while others could not access their workplace or the access was difficult. In addition there was loss of other infrastructure including water, sewerage, electricity and

roads. Organisations were faced with many problems including how they could continue to operate. Implementing telework as an alternative work arrangement was one solution to these challenges (Steeman, 2011).

The events surrounding the Christchurch earthquake series created havoc and heartbreak for many but they also presented a unique opportunity from which to learn. This qualitative research sought to examine the experiences of two case organisations who rapidly adopted telework following the earthquake events and the outcomes of utilising telework in this environment. Teleworking is using Information and Communication Technology (ICT) to support working at home or at a location that is removed from the physical location of the organisation (Offstein, Morwick, & Koskinen, 2010). A large body of literature exists about the adoption and outcomes of telework in a business as usual environment with less research currently available about the experiences of organisations who adopt telework as a response to a disruptive event.

The literature generally finds that telework is an organisational innovation. The successful adoption and implementation of telework requires a change process supported by management. The body of knowledge asserts that teleworking has fairly clear positive outcomes for individuals and organisations provided it is well supported and managed. There are gaps in the literature with respect to the antecedents, processes and outcomes of rapidly adopting telework in times of disruption. This research project sought to answer some of these questions including: what change processes were adopted to implement telework in response to a natural disaster? What were the barriers and facilitators of this implementation? What were the role of personnel, task, environment and organisational factors in implementation and outcomes? What were the perceptions of telework effectiveness and what were the on-going telework intentions for organisations? This thesis explains the process of this research and its outcomes.

## **1.2 Outline of thesis**

The narrative of this research begins with a review of the literature to help establish the current understanding about telework and its role in business continuity following a natural disaster. This leads to the research questions for the current study exploring the experiences of organisations who rapidly adopted telework after the earthquakes in

Christchurch. An explanation of the design of the research is provided in Chapter 3 and outlines the choice of research methodology and the processes used for participant selection, data collection, data analysis and ethical considerations. Chapter 4 details the findings of the study divided into phases of events culminating in a summary of findings using models. Key aspects of the findings are discussed further in Chapter 5 with respect to the research questions posed initially, the existing literature and the research framework. This chapter also includes a discussion of the contributions the research makes to the current knowledge base, implications for organisations along with the limitations of the study. The thesis concludes with a summary of the findings, a commentary addressing the extent the research has addressed the gaps in the literature and suggestions for future research.

## **Chapter 2. Literature review**

This literature review examined the body of knowledge regarding telework adoption within organisations, the factors that are considered in adopting this change in working arrangements, and the outcomes of adopting telework. The review also explored the literature that examines the adoption of telework as a means of business continuity in the face of a natural disaster and the outcomes associated with this adoption. The exploration of the literature assisted with identifying the conceptual content of the field, identifying any gaps or weaknesses, and informing the research questions of the current study.

This review begins by describing the literature search methods in section 2.1, discussing terminology commonly used when considering telework, and explaining definitions of telework, organisational change and business continuity. The ways in which telework can be examined are then discussed through the presentation of several theoretical frameworks (section 2.3). Firstly, a framework based on Neo-institutional theory is presented followed by a technology-organisation-environment model. A telework behavioural model is discussed next before a socio-technical systems framework is introduced. Using this multi-level socio-technical systems framework, the presentation of current literature pertaining to the adoption of telework is ordered at individual, technical and organisational levels in section 2.4. The literature regarding outcomes of telework is structured into individual, group and organisational parts (sections 2.5.1; 2.5.2; and 2.5.3 respectively). Finally, the sources that consider the wider context of societal implications of telework are reviewed before the focus of section 2.7 turns to the existing literature referring to adoption and outcomes of telework in a disaster context. This leads to a critical discussion of the literature presented and concludes with an assessment of the gaps in the existing knowledge base (section 2.9) and a presentation of research questions for this study.

### **2.1 Literature search methods**

Initially, an exploratory search was carried out to establish the scope of the literature and identify the keywords used in this area. This was done through the AUT library,

their electronic databases and open access databases available on the internet, for example PubPsych, Social Science Research Network and Google Scholar. A list of keywords that was developed from this exploration is shown in Table 1. To ensure a broad coverage of disciplines and subject areas five databases were used to search the literature: SCOPUS, Business Source Complete (EBSCO), Web of Knowledge, Academic Search Premier and Google Scholar. The searches used the keywords separately and in combination to identify their occurrence in any search fields. Only English language sources with abstracts were sought. Academic and grey literature was included and the year of publication was not restricted except for within Google Scholar which was limited to the year 2012 to the present. This decision was made as the volume of material returned was very large with less ability within the search engine to narrow the scope of the search.

**Table 1** List of keywords used in literature search

<b>Keywords</b>			<b>Limits</b>
telework telew* telecommute* “working from home”	AND	“disasters” “natural disaster” “change management” “business continuity” “outcome” “adoption” “New Zealand”	English language  All years to present <sup>1</sup>  With abstract

The abstract of the sourced document was read and full text sought for those that were considered to be relevant. A database of information found was compiled using EndNote X4<sup>2</sup>. A ‘snowball’ technique was used to gather further documents by identifying items that may be relevant from the reference lists of sourced publications. To capture any newly published work since the initial database search was done in June and July 2013, electronic alerts have been set-up for the keyword ‘telework’ in the SCOPUS, EBSCO and Google Scholar databases. General internet searches were also performed in an attempt to capture relevant information from websites and organisational reports. Terminology was found to vary within the field and these, along with theoretical definitions, are outlined in the next section.

<sup>1</sup> Google Scholar was limited to ‘2012 to present’

<sup>2</sup> [www.endnote.co.nz](http://www.endnote.co.nz)

## 2.2 Terminology and definitions

### 2.2.1 Telework

Jack Nilles is attributed to having first coined the term ‘telecommuting’ in 1975 as ‘the substitution of communications technology for travel to a central work location’ (Katz, 1987). The term ‘telecommuting’ tended to be used more in the United States where its focus was initially on environmental concerns. The term ‘telework’ was used more in Europe where the focus was on job creation (Bélanger, Watson-Manheim, & Swan, 2012). Currently both ‘telecommuting’ and ‘telework’ or ‘teleworking’ are used interchangeably and several other terms to describe similar concepts have also been used. The range of terms used is shown in Table 2.

**Table 2** The range of terms used to describe the concept of telework or telecommuting

<b>Term</b>	<b>Reference examples</b>
Anywhere working	Anywhere working (2013)
Distributed work arrangements	Bélanger & Collins (1998); Sia, Teo, Bernard, & Wei (2004)
E-work	Grant, Wallace & Spurgeon (2013); Kirk & Belovics (2006)
Flexible work (practice, arrangement, schedules)	Hayman (2010)
Home office, homeworking, work from home, home-based telecommuting (HBT)	Baker, Avery & Crawford (2006); Collins, Cartwright & Hislop (2013); Donnelly & Proctor-Thomson (2013); Hill, Ferris & Martinson (2003); Troup & Rose (2012)
Mobile work	Rickard (2011); Tremblay & Thomsin (2012)
Virtual work(place)	Bélanger (2005); Bélanger, Watson-Manheim & Jordan (2002); Heikes (2001)
Virtual office	Fritz, Narasimhan & Rhee (1997); Hill et al. (2003)

Some authors describe telework as a subset of flexible work arrangements (Siha & Monroe, 2006) while others differentiate between telework and virtual work, whereby telework is a part-time separation from a central office and virtual work is a permanent geographical separation from the office-base (Golden & Fromen, 2011). Mobile work is sometimes defined as a form of telework which includes working from home, at a client’s office, in satellite offices or at a telecentre or other location (Tremblay & Thomsin, 2012). Generally though telework can be defined as,

*‘Using Information and Communication Technology (ICT) to support working at home or at a location that is removed from the physical location of the organisation.’ - Offstein, Morwick & Koskinen (2010)*

Research on telework has reportedly been hampered by the lack of consistency in definition (Bailey & Kurland, 2002; McCloskey & Igbaria, 1998) and the loss of

specificity of the concepts surrounding it (Lindström, Moberg, & Rapp, 1997). Sullivan (2003) argues that as telework is a rapidly changing and varied phenomenon any definition will be necessarily broad and that definitions should be project-specific to operationalise the concepts under investigation. Other authors suggest that telework situations should be classified by using levels of analysis and dimensions (Daniels, Lamond, & Standen, 2001; Lindström et al., 1997; McCloskey & Igbaria, 1998). This may include aspects of travel, use of ICT, work location, amount of time that is spent working remotely, type of work, frequency and range of intra-organisational and extra-organisational contact and contractual arrangements (e.g. employed or self-employed, voluntary or non-voluntary telework).

### 2.2.2 Organisational change

Organisational change can be considered the adjustment or transformation of an organisation or parts of it from a current state to a 'new' or altered state (Senior & Fleming, 2006). Organisational change is a complex process that is the effect of various tensions and pressures faced by an organisation striving to succeed within its technological, socio-cultural, economic, political and internal environment (Senior & Fleming, 2006). Many factors within these environments can be triggers for change including technological developments, government policy, increased financial restraints, labour competition and unpredictable events, for example extreme weather, influenza epidemics or natural disasters.

### 2.2.3 Business continuity

Business continuity can be defined as

*'Capability of the organization to continue delivery of products or services at acceptable predefined levels following disruptive incident.'*  
-ISO 22301:2012, p2

Business continuity, risk management and emergency management are often viewed as closely related and have been linked together with the concept of resilience management (McManus, Seville, Brunsdon, & Vargo, 2007). Resilience has been defined as:

*'A function of an organisation's:*

- *situation awareness*
- *management of keystone vulnerabilities and*
- *adaptive capacity*

*in a complex, dynamic and interconnected environment.'*

-McManus et al. (2007) p ii



Business continuity planning is a way in which to improve an organisation's adaptive capacity (Battisi & Deakins, 2012) and an aspect of business continuity management. Speight (2011) defined business continuity management as:

*'a management process that identifies potential factors that threaten an organization and provides a framework for building resilience and the capability for an effective response.'* p 529

ISO 22301 (2012) is a management systems standard for business continuity management (Zawada & Marbais, 2012). It has requirements of establishing context of the organisation, leadership, strategic objectives, competence, operations, evaluation and improvement. The operations section defines business continuity requirements, determines how to address them and develops the procedures to manage a disruptive incident. In addition the standard includes the need to plan to a return to normal business (Tangen & Austin, 2012). In New Zealand guidance on determining how disruption can affect business continuity and the way in which the risk of disruption can be managed is provided in the Standards New Zealand and Standards Australia document AS/NZS 5050:2010.

## **2.3 Theoretical frameworks**

There are several frameworks suggested in the literature as a way in which telework can be examined. These are Neo-institutional, technology-organisation-environment, behavioural and socio-technical systems. These are described and critiqued in turn below.

### **2.3.1 Neo-institutional model**

Daniels et al. (2001) present a model informed by Neo-institutional theory to help explain why an organisation adopts telework. They conceptualise telework through five variables: location, ICT usage, knowledge intensity, intra-organisational contact and extra-organisational contact. They state that Neo-institutional theory is concerned with the spread of organisational practices within networks of organisations connected by things like industry membership, supplier relations and regulatory bodies and that organisations look for legitimacy for their organisation by adopting structures and processes that are socially approved by other stakeholders. Their telework adoption model is in Figure 1.

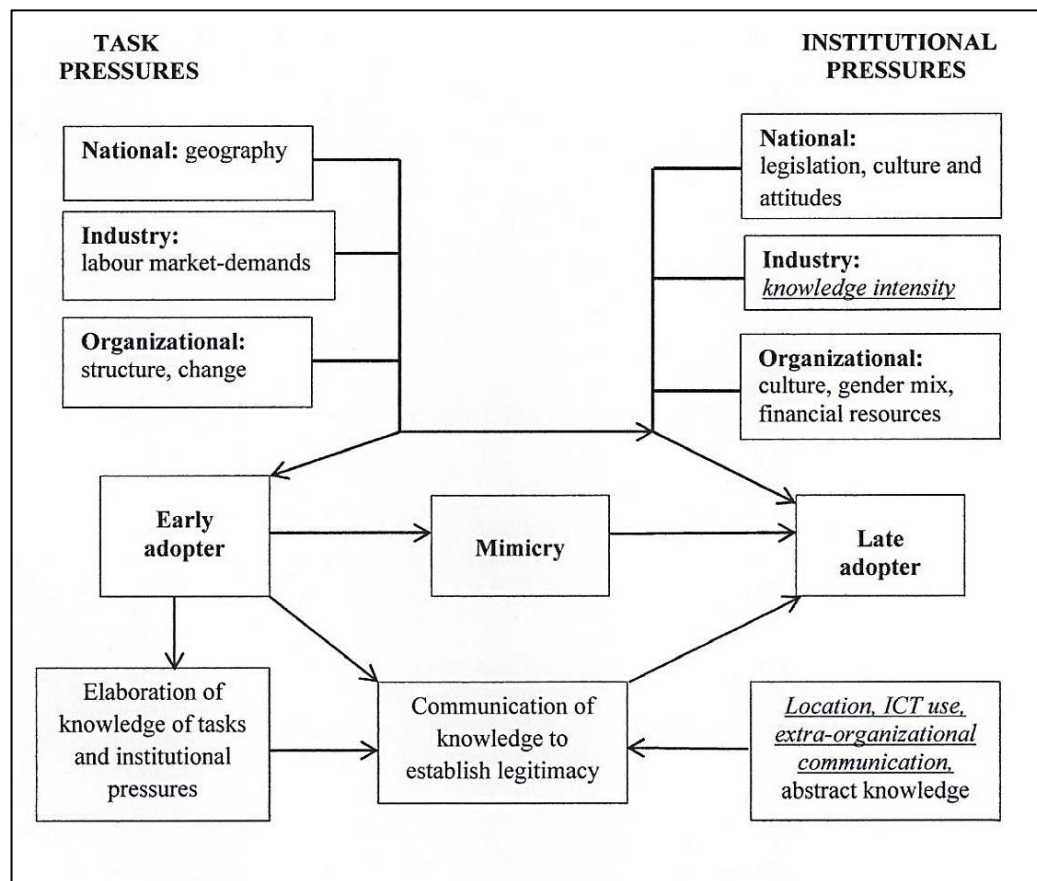


Figure 1 Factors influencing the incidence of teleworking activity. Factors underlined and in italics represent aspects of teleworking (Daniels, et al., 2001, p. 1160)

It is suggested that the adoption of telework is influenced by multiple embedded organisational networks including task and institutional pressures. It is considered more likely that telework will be adopted early if it enables greater efficiency in getting and using resources and meeting organisational goals. Their model differentiates between organisations who have adopted telework earlier than others and the influence they have on organisations that subsequently adopt telework. Daniels et al. (2001) make a series of propositions based on their model to predict the adoption of telework, including one which proposes that,

*'The threat of natural disaster will encourage early adoption of all forms of teleworking practices.'* p. 1166

This model is limited by the organisation unit of analysis and does not consider the influences of adoption of telework at the group or individual level and does not extend to a consideration of the outcomes of teleworking. While the model considers technological factors they are not the focus of the theory in contrast to the technology-organisation-environment framework.

### 2.3.2 Technology-organisation-environment framework

Neirotti, Paolucci and Raguseo (2013) employ a technology-organisation-environment (TOE) framework to view organisations' intention and ability to adopt telework shown in Figure 2. Firstly, they suggest that adoption of telework is influenced by the technological context in which the work takes place and if the information systems of the organisation can support telework.

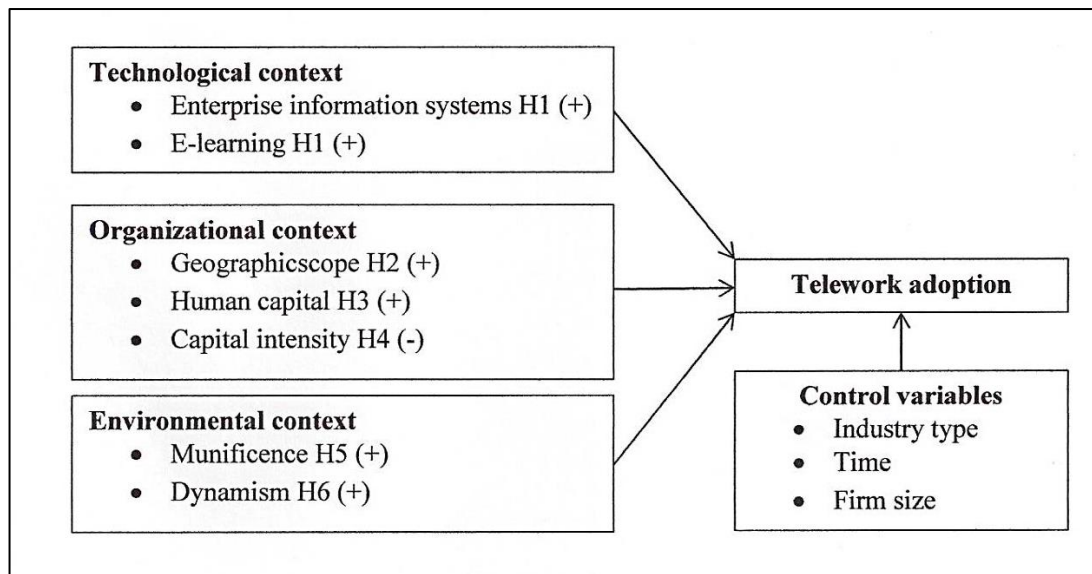


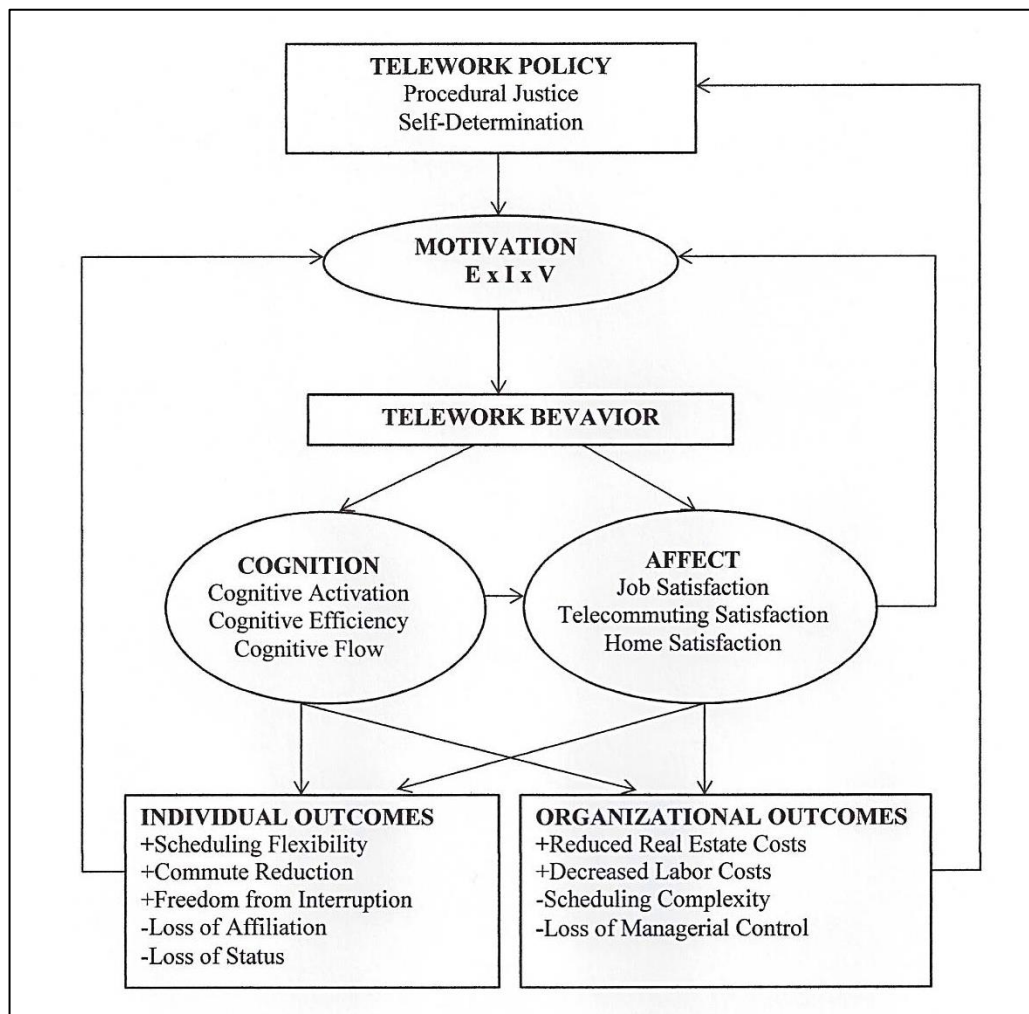
Figure 2 Technology-organisation-environment framework (TOE), (Neirotti et al., 2013, p.20)

Secondly, they propose organisational characteristics and its resources influence the adoption of telework. This includes geographical spread, human resources and plant capital. Finally, they consider the business environment influences the uptake of telework. They consider this in terms of munificence (the extent to which the environment can support continued market growth) and dynamism (the degree of instability in market demand and technological processes). Once again, this model does not consider work groups, individuals, wider environmental contexts or outcomes of adopting telework. Individuals, however, are considered in the telework behaviour model that follows.

### 2.3.3 Telework Behaviour Model

Motivation of individuals to adopt telework is addressed in the Telework Behaviour Model (TBM) proposed by Hunton and Harmon (2004). Their model is based in the expectancy theory whereby motivation depends on employee's expectancy (self-belief that they do what is needed to achieve an outcome), instrumentality (self-belief that

their actions will lead to results) and valence (the subjective value of the desired outcome). The model is also based on the premise that an organisation will have a telework policy outlining what telework options are allowed (Figure 3).



**Figure 3** Telework behaviour model (TBM) (Hunton & Harmon, 2004, p.422)

These authors suggest that depending on motivational factors, and the telework policy, an individual will make personal choices about telework. This may be to choose to telework or not, where they will work and how often they will telework. The employee's decision around telework will then influence their cognitive activation (mental alertness), efficiency (ease of concentration) and flow (ease of refocus after interruptions). It is proposed that effective self-management of telework will enhance individual and organisational outcomes. The nature of the telework behaviour will also influence individual and organisational outcomes through affects. Hunton and Harmon (2004) suggest that these are job, telework and home life satisfaction. There is a continuous cycle inferred in this model whereby individuals adjust their telework choices until they feel a balance between motivational factors. This model, while

addressing the individual neglected in the previous models, does not account for the influence of the group (co-workers and managers) nor the wider context in which the organisation operates. A framework for teleworking based on socio-technical systems theory proposes a multi-level approach to address the whole system. This is discussed below.

### 2.3.4 Socio-technical systems framework

Socio-technical systems (STS) theory was developed to help explain the human and organisational consequences of the introduction of mechanisation into coal mining and other industries (Eason, 2013). Trist (1981) explained why the theory was developed,

*'Work organizations exist to do work – which involves people using technological artifacts (whether hard or soft) to carry out sets of tasks related to specified overall purposes. Accordingly, a conceptual reframing was proposed in which work organizations were envisaged as socio-technical systems rather than simply as social systems. The social and technical systems were substantive factors – the people and the equipment. Economic performance and job satisfaction were outcomes, the level of which depended on the goodness of fit between substantive factors.'* p.10

STS theory recognises that the work system is open and subject to a wide range of environmental factors including market forces, financial changes, technical developments and physical disturbances (Eason, 2013). It provides a means of representing the input, throughput and output to a work system within a changing environment with which the system needs to cope (Eason, Harker, & Olphert, 1996).

Bélangier et al. (2012) have developed a STS theory framework to define and combine the different aspects of teleworking into the personnel, technical and organisational subsystems, this is shown in Figure 4. This model uses STS theory to theorise and analyse how multiple factors influence adoption and outcomes of teleworking at the individual, group and organisational level. The three subsystems are affected by other causal events in the work environment, termed joint causation. The principle of joint causation leads to the concept of joint optimisation or the potential of work systems to achieve their intended change process. These concepts emphasise feedback loops over time and over the different levels of analysis as the work system tries to reach a state of stability. The concept of 'fit' is used to represent these principles and the effects of time on adoption and outcomes of telework are shown by T1 and T2 in the figure below.

While this model is more comprehensive than the other models presented and includes individuals, groups and the organisation levels of analysis, it does not extend to consider the environmental context in which the organisation exists.

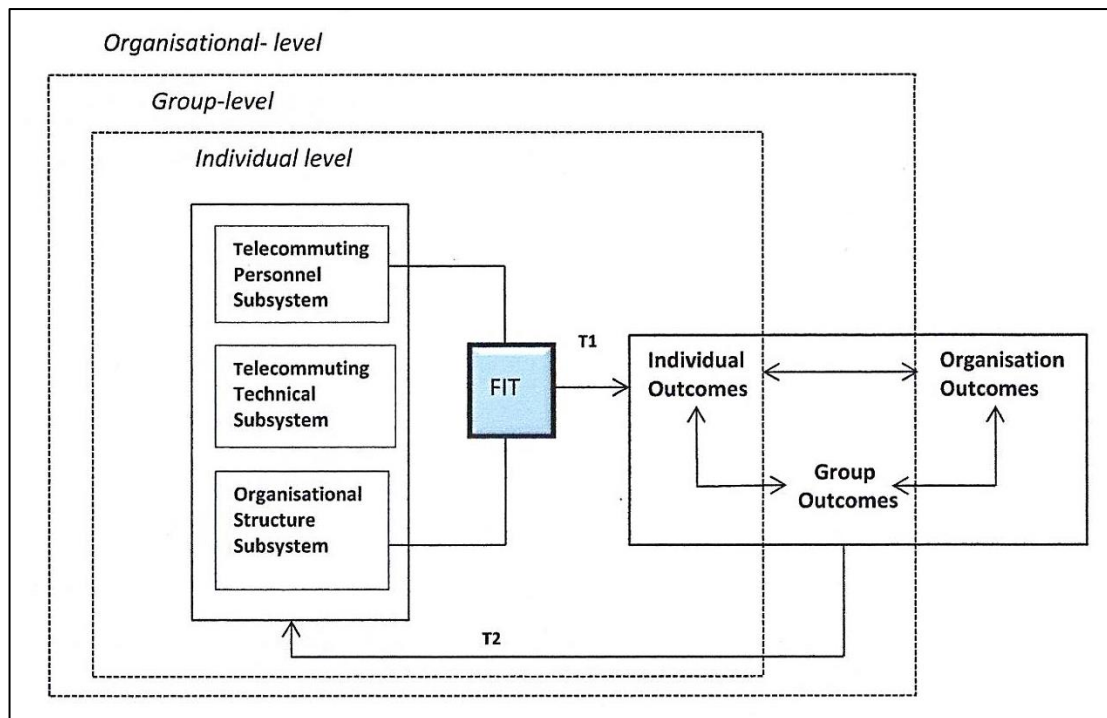


Figure 4 A multi-level telecommuting framework (Bélanger et al. 2012)

Bélanger et al.'s 2012 multi-level framework serves as a useful way for viewing the current body of literature as it considers multiple factors that are pertinent to telework. The following sections of this literature review will consider the *adoption* of telework from an individual, technical and organisational point of view and the *outcomes* of telework from an individual, group and organisational perspective. This will then be extended to the wider environment of the organisation to consider the existing literature which examines telework from a societal perspective and that which looks at telework adoption and outcomes in the context of a natural disaster.

## **2.4 Adoption of telework**

The literature reports on many antecedents for the adoption of telework and the factors that facilitate or create a barrier to its adoption. These can be divided generally into four areas: personnel or individual factors, task factors, technical factors and organisational factors. The summary of the research in each of these areas is outlined in turn below.

### **2.4.1 Individual factors**

If the option of telework is provided by an organisation some individuals choose to adopt it while others do not (Bélanger, 1999; Peters, Tijdens, & Wetzels, 2004). Generally, males are reported as teleworking more than females (Schweitzer & Duxbury, 2006; WorldatWork, 2011) though this is not the case in some countries, for example in Canada where the gender split for teleworkers is equal (Schweitzer & Duxbury, 2006). People who choose to telework are typically highly educated and working in computer supported job roles (Schweitzer & Duxbury, 2006; WorldatWork, 2011). Personal reasons for adopting telework have been reported as a way to reduce commuting (Maruyama & Tietze, 2012; Peters et al., 2004), to enable flexible scheduling (Bentley & Pak, 2000; Hilbrecht, Shaw, Johnson, & Andrey, 2013; Peters et al., 2004), to manage family commitments, to have more control over the working environment (Maruyama & Tietze, 2012), and to facilitate a quiet work environment and improve productivity (Peters et al., 2004; Wilton, Páez, & Scott, 2011). The personal reasons for not adopting telework include the need to share information with others (Bélanger, 1999; Bentley & Pak, 2000), being more productive at the office (Bélanger, 1999) and the need to socialise with colleagues (Bélanger, 1999; Wilton et al., 2011). Individuals may choose not to telework if they are not able to access their work through ICT as easily as they can at a traditional office (Bélanger, 1999; Bentley & Pak, 2000), though more recent studies report that technology is no longer a barrier to telework for individuals (Bentley et al., 2013; Gani & Toleman, 2006).

### **2.4.2 Task factors**

Adoption of telework is often dependent on the type of job and tasks involved being conducive to remote working. This typically includes work that mostly requires manipulation, interpretation or communication of data, for example, clerical, sales,

marketing, professional and managerial jobs (Daniels et al., 2001). Shin (2003) suggests that:

*'Tasks that are well defined and independent, regardless of complexity or routine nature, are better positioned for telework.'* - p.8

In addition, Bentley et al. (2013) found that managers determine if telework can be adopted in a role, for example, if it involves specialist infrastructure or if face-to-face team work is considered essential then telework is not considered to be feasible. The type of work performed tends to shape managers' attitudes toward telework (Peters, den Dulk, & de Ruijter, 2010).

### **2.4.3 Technical factors**

#### *2.4.3.1 Information and Communications Technology*

ICT has both been proposed as the facilitator and the barrier to the adoption of telework. ICT enables telework to occur in the first place but the limits of the technology are one reason for the uptake of telework to be slower than forecasted (Baker et al., 2006; Rasmussen & Corbett, 2008). The appropriateness of teleworking technology and having sufficient ICT support, along with being trusted by the manager, was found to be related to satisfaction and to spending more time teleworking (Baker et al., 2006). Technical support includes ICT infrastructure, security and access control, communication support and computer maintenance (Bayrak, 2012).

#### *2.4.3.2 Infrastructure*

ICT infrastructure for a teleworker combines the information technology of computers and applications, which is similar to what is available at the traditional office, with the communication technology to link the remote worker to the office (Bélanger, Collins, & Cheney, 2001). Currently high speed DSL and cable modems link the teleworker to the organisation and virtual private networks (VPNs) allow for protected communication over the internet (Bayrak, 2012). Wireless broadband is becoming increasingly important to support 'anywhere working' and to keep teleworkers connected to the physical office (Rickard, 2011). Rickard (2011) identified the largest group of mobile internet users as 'triple connectors' who connect to the internet using all three forms of wireless broadband: mobile broadband, mobile internet and Wi-Fi. He found that these users used a range of devices to perform a range of tasks productively in a variety of locations. Governmental agencies recognise the opportunities that broadband infrastructure offer in terms of productivity and innovation, including telework



(Alizadeh, 2013). Currently both the New Zealand and Australian Governments have ultra-fast broadband infrastructure roll-out programs in progress (Australian Government, 2013; Crown Fibre Holdings, 2013).

#### *2.4.3.3 Security and access control*

Concerns regarding security is often a barrier to the adoption of telework (Bayrak, 2012). Pyöriä (2011) considers access control, encryption, firewalls, anti-virus software and the reliability of data stream to be crucial in the adoption of telework. Whilst there is little research into security issues and telework some evidence suggests that small organisations may lack the expertise and resources to manage security issues (Pyöriä, 2011). Conversely, in the qualitative part of their research Bentley et al. (2013) note that significant security breaches involving teleworkers were not a concern for their cohort with most organisations reporting robust and well protected systems. The work practices of teleworkers present a risk to security and clear organisational policies are recommended (Bayrak, 2012; Pyöriä, 2011).

#### *2.4.3.4 Communication support*

The quality and richness of communication technologies has been found to impact on the productivity, performance and satisfaction of teleworkers (Bélanger et al., 2001; Tureken, Jain, Quesenberry, & Ngwenyama, 2011). In addition, the research carried out by Venkatesh and Johnson (2002) showed strong support for the notion that higher social richness (the ability of the medium to transmit social cues, change understanding, and resolve equivocality) and a higher telepresence (the experience of ‘presence’ in an environment through a communication medium) through the use of virtual-reality technology resulted in better motivation of teleworkers and an enduring use of telework. Ye (2012) and Bayrak (2012) suggest that communication can be improved with online collaboration tools, web-based presentation rooms, workflow management tools and desktop video conferencing. Bosua, Gloet, Kurnia, Mendoza and Yong’s (2013) results link improved communication tools with greater productivity. They found that organisations that offered high-level ICT support could work seamlessly from anywhere and were perceived as more productive than less well ICT-supported teleworkers.

#### *2.4.3.5 Computer maintenance*

To support telework an organisation needs to maintain computer hardware and software. This may include installation of equipment, configuration of settings and updating

(Bayrak, 2012; Ye, 2012). This may be done through an automated system that connects to the network server (Bayrak, 2012).

#### *2.4.3.6 Office equipment*

Whilst attention has been given in the literature to the ICT components of the technical system it seems that little research consideration has been given to the physical office or workstation set-up of teleworkers (Ng, 2010). Montreuil and Lippel (2003) reported that whilst furnishings were supplied to most teleworkers by their employer 60% were left to set up their own home-based workstations with no office ergonomics or technical advice provided. The recent Trans-Tasman Telework study (Bentley et al., 2013) found the physical working environment of teleworkers was considered less favourably than that of non-teleworkers. Significant differences were noted with the thermal environment, noise or vibration, workstation design or set-up (not including seating comfort and monitor). Harrington and Walker (2004) found that more than 85% of their sample had received no training in teleworking or office ergonomics. This is very similar to the New Zealand and Australian results which showed 84% had not received training in running a home office (Bentley et al., 2013). The equipment used by teleworkers is reported as variably being paid for by the employer, in the case of the involuntary teleworker, or partly by the teleworker and partly by the organisation (Bentley et al., 2013; Ng, 2010; Robèrt & Börjesson, 2006). In smaller organisations often the employee bears the cost while in larger organisations it may depend on position seniority or the need of the role (Bentley et al., 2013).

### **2.4.4 Organisational factors**

For many years there have been predictions that levels of telework would increase dramatically in response to the developments in ICT but adoption of telework by organisations has not been as widespread as predicted (Rasmussen & Corbett, 2008; Ruppel & Harrington, 1995). Whilst earlier literature focused on the individual (Bailey & Kurland, 2002) more recent literature has examined telework from an organisational perspective and offers several organisational reasons for the uptake of telework or the barriers to its adoption.

#### *2.4.4.1 Organisational type*

Research considering company size and the adoption of telework present mixed results: Larger organisations were found to be more likely to adopt telework in Italy (Neirotti et al., 2013) and small organisations in Spain (Mayo, Pastor, Gomez-Mejia, & Cruz, 2009)

whilst Ruppel and Harrington found no relationship with size (1995). Telework adoption is more likely in high-tech, information services industries and amongst professionals (Daniels et al., 2001; Neirotti et al., 2013; Ruppel & Harrington, 1995). Companies with a broader geographical market are generally more inclined to adopt telework (Neirotti et al., 2013; Pyöriä, 2011) as are those with a high proportion of international employees (Mayo et al., 2009).

#### 2.4.4.2 *Organisational change*

Telework is an organisational and human resource management innovation which has been enabled by recent advances in telecommunications (Lee, Chu, & Tseng, 2009; Ruppel & Harrington, 1995; Watad & Will, 2003). Its introduction involves adjustment of the organisation in terms of its governance structure, coordination and control mechanisms, relationships and reward systems (Daniels et al., 2001; Martínez-Sánchez, Pérez-Pérez, Vela-Jiménez, & De-Luis-Carnicer, 2008; Sia et al., 2004; Watad & Will, 2003). Conversely, adoption of telework can be triggered by organisational change and introduced when telework practices become more effective than existing practices (Daniels et al., 2001). Lee et al. (2009) found that a culture of innovation, market pressures (from buyers and competitors) and competitive intensity increased the likelihood of an organisation adopting a new ICT tool. With respect to telework this may refer to the organisation trying to provide a more flexible and innovative way of working for competitive advantage (Roitz & Jackson, 2006), responding to demands of employees (Ruppel & Harrington, 1995), servicing a global market around the clock (Sia et al., 2004) and trying to attract and retain high quality staff within a competitive employment market (Schweitzer & Duxbury, 2006; Watad & Will, 2003). In addition, telework has become emphasised in recent years as an innovation to protect organisations against unexpected events such as terrorist attack, severe weather and natural disasters that might threaten continuity of operation (Gill, 2005; Mello, 2007; Roitz & Jackson, 2006; Steinhardt, 2007; Walker, 2006).

#### 2.4.4.3 *Organisational culture*

There is growing evidence that organisational culture influences the adoption of telework. Organisations whose culture is based on traditional management systems of 'face to face' monitoring and supervision face difficulties in implementing telework (Gani & Toleman, 2006; Offstein et al., 2010; Peters et al., 2010; Watad & Will, 2003). A culture of trust and support at all levels of the organisation is considered a critical factor in the adoption and success of telework (Bentley et al., 2013; Bosua et al., 2013;

Daniels et al., 2001; Harrington & Ruppel, 1999; Kowalski & Swanson, 2005). A component of a trust based culture is a performance-based management system which is believed to support effective teleworking (Bosua et al., 2013; Harrington & Ruppel, 1999; Kowalski & Swanson, 2005; Mello, 2007; Offstein et al., 2010).

#### *2.4.4.4 Management*

The lack of middle management support is suggested as a large barrier to the adoption of telework (Peters et al., 2010; Ruppel & Harrington, 1995; Shin, Liu Sheng, & Higa, 2000; Siha & Monroe, 2006; Watad & Will, 2003). Voluntary telework is most often initiated in a bottom-up way by employees and decided on by managers in an informal way (Bentley et al., 2013; Ruppel & Harrington, 1995; Shin et al., 2000). A top-down initiation, with high level management support, is considered more likely to be effective for widespread adoption (Shin et al., 2000). The type of human resource management practices employed by a company may also affect adoption of telework. Martinez-Sanchez et al. (2008) noted greater access to human resource commitment practices (e.g. job design, career planning, training) and social benefits (e.g. compensation, profit sharing, health insurance) increased adoption of telework. Mayo et al. (2009) saw increased telework uptake in companies that emphasised a variable pay (incentive) compensation system and monetary compensation for teleworkers' home expenses is suggested by Robèrt and Börjesson (2006) to enhance uptake.

#### *2.4.4.5 Business environment*

Uncertainty in the business environment has been shown to affect organisational change and innovation (Sia et al., 2004). Sia et al. (2004) examined the perceived environmental complexity and environmental variability of organisations' along with their perceived innovation characteristics and their intention to adopt telework. They found that the more an organisation viewed their environment to be complex the more unwilling they were to adopt telework. This is in contrast to other studies which have found that environmental complexity did not affect telework adoption (Neirotti et al., 2013). Other commentators have noted that organisational innovation, market and labour pressures and competitive intensity positively affect the adoption of ICT (Lee et al., 2009; Offstein et al., 2010; Pyöriä, 2011).

#### *2.4.4.6 Business continuity*

The opportunity for business to continue when there is disruption to normal operations is one of the often purported benefits of telework and an incentive for its adoption

(Cavanaugh & Leick, 2013; Dinnocenzo, 2010; Gill, 2006; International Telework Association and Council, 2005; Maria & Hitoshi, 2012; McCloskey & Igbaria, 1998; Vivadelli, 2005). In the United States telework is seen as a critical element of business continuity and the Telework Enhancement Act of 2010 requires federal agencies to incorporate telework policies into their continuity of operations plans (GAO, 2011). Less than half of the organisations involved in the International Telework Association and Council (ITAC) research (2005) included telework in their business continuity plans with 21% reporting a high integration with their plans. 41% did not use telework as part of business continuity planning. Problems have been reported with incorporating telework into continuity of operations plans by organisations. The ICT networks are not considered robust enough and few agencies were able to provide information of employees' use of telework during an emergency (GAO, 2011). In addition, in 2009 less than 6% of federal employees teleworked at least one day per month, giving the impression there was a lack of personnel readiness to adopt telework as an emergency response (GAO, 2011) and a lack of top management will to integrate it into continuity plans (Gill, 2005).

## **2.5 Outcomes of telework**

Once teleworking has been implemented by individuals and their organisations the outcomes of this working practice become important to consider and has been an increasing focus of research conducted internationally. The reported outcomes of telework are considered below from an individual, group and organisational perspective.

### **2.5.1 Individual**

The main outcomes considered in the literature from the perspective of the teleworker are perceived autonomy or job flexibility, job satisfaction, work-life or work-family conflict, wellbeing and isolation. The outcomes are often interrelated, moderated and mediated by other factors.

#### *2.5.1.1 Teleworking intensity*

Teleworking intensity (the proportion of one's time spent teleworking as opposed to the traditional office) is a time-dependent construct so outcomes need to be considered from this perspective. High intensity telecommuting positively affected work-family conflict but not perceived autonomy (Gajendran & Harrison, 2007). High intensity teleworkers

(working away from the office more than 2.5 days per week) had even less role stress than low intensity teleworkers (Gajendran & Harrison, 2007). Fonner and Roloff (2010) found high intensity teleworkers were more satisfied than office-based employees which they propose is due to teleworkers being protected from interruptions and office politics. This is in contrast to Golden's (2006) results that suggested that if telework becomes too extensive (more than about two days per week) job satisfaction diminishes due to a deterioration of manager, co-worker and family relationships.

#### *2.5.1.2 Leadership style*

Leadership style may also influence the outcomes for teleworkers. Madlock (2012) found that a task orientated style was a greater predictor of job and communication satisfaction amongst teleworkers and was the style that supervisors adopted more than a relationship-orientated style. This is in contrast to theoretical assertions that a relationship-orientated leadership style, particularly communication, is more beneficial for outcomes of satisfaction (Dahlstrom, 2013).

#### *2.5.1.3 Job satisfaction, work-family conflict, wellbeing*

In a meta-analysis of 46 studies, Gajendran and Harrison (2007) found that teleworking generally has positive consequences for individuals and subsequent studies have supported these results. Telework is associated with increased perceptions of autonomy and flexibility (Bosua et al., 2013; Maruyama & Tietze, 2012) and less work-family conflict which seems to contribute to wellbeing and increased job satisfaction (Bentley et al., 2013; Bosua et al., 2013; Fonner & Roloff, 2010; Gajendran & Harrison, 2007).

#### *2.5.1.4 Type of telework arrangement*

Job satisfaction for women teleworkers was greater when there were formal as opposed to ad hoc arrangements in place (Troup & Rose, 2012). These authors also found that men were more satisfied with the distribution of childcare responsibility when they had formal telework arrangements; this was the opposite for women who had lower satisfaction with the distribution of child care with formal arrangements compared to informal arrangements.

#### *2.5.1.5 Isolation*

Social and professional isolation is often proposed as a negative consequence of teleworking (Baruch, 2001; Bélanger et al., 2012; Feldman & Gainey, 1997; Mello, 2007; Shin et al., 2000). Social isolation as a negative affect has been borne out in

recent studies (Bentley et al., 2013; Maruyama & Tietze, 2012) but this seems to be moderated by organisation, peer and technical support. Teleworkers can experience professional isolation and subsequent impediment in professional development (Cooper & Kurland, 2002; Kurland & Cooper, 2002). The value of professional development activities, such as networking, informal learning and mentoring, to the workplace and the employee may moderate the impact of professional isolation for teleworkers. This may vary between public and private sector employees (Cooper & Kurland, 2002). In addition, professional isolation can be negatively associated with job performance (Golden, Veiga, & Dino, 2008) and is greater for extensive teleworking and with less face to face interactions. Professional isolation may be moderated by management strategies and training (Golden et al., 2008; Kurland & Cooper, 2002). There were no negative effects on the perceived career prospects of teleworkers in Gajendran and Harrison's meta-analysis (2007) though reduced visibility and career development was a concern for some participants in Maruyama and Tietze's (2012) pre and post telework study. Women who telework more than half the time or who had dependent children, sales and marketing teleworkers and those with professional job roles more often reported career development disadvantages.

## **2.5.2 Group**

### *2.5.2.1 Relationships*

Gajendran and Harrison (2007) found no general negative effects were seen in the quality of relationships in the workplace but intensity was a moderating factor. High intensity telework negatively affected co-worker relationships, which was supported by Golden (2006). Intensity did not, however, affect an individual's relationship with their supervisor compared to Golden (2006) who found that relationships with managers were impacted by the extent the employee telecommuted.

### *2.5.2.2 Impacts for non-teleworkers*

When the impact of telework on non-teleworkers was examined (Golden, 2007) a high prevalence of teleworkers was negatively associated with satisfaction of non-teleworking colleagues. It is proposed that this is influenced by the nature of the interactions with others as the intensity of teleworking and extent of face-to-face contact had a moderating effect on co-worker satisfaction. Co-worker satisfaction was also decreased when there was less autonomy in the roles and a high prevalence of teleworkers. This possible inequity between teleworkers and non-teleworkers, termed

the ‘telework divide’, has been highlighted following the increase in teleworking in general in federal agencies in the United States of America, with employees who are not allowed to telework more than twice as likely to be dissatisfied with their job or their organisation (Mahler, 2012). Concerns of a telework divide were also found in the Trans-Tasman Telework Survey, with reports of resentment and reduced communication between those who can telework and those who can’t (Bentley et al., 2013). In addition, Lautsch & Kossek (2011) reported discontent when telework is seen as a privilege.

#### *2.5.2.3 Teleworking managers*

When the teleworker is the manager it has been found that the experiences and outcomes of employees differ compared to if the manager is in a traditional office. Those individuals with managers that teleworked were less positive regarding feedback, empowerment, professional development and workload and they tended to have less job satisfaction and higher turnover intentions. These effects do not necessarily apply if the employee is also teleworking (Golden & Fromen, 2011).

### **2.5.3 Organisation**

When considering the organisational outcomes of teleworking the literature tends to be clustered into areas of productivity, organisational commitment including turnover intention, cost savings and cost-benefit.

#### *2.5.3.1 Productivity*

Higher supervisor ratings or archival records of performance and perceived increased productivity and performance were associated with telework in two meta-analyses (Gajendran & Harrison, 2007; Martin & MacDonnell, 2012) and a systematic review found support for a positive impact on worker performance and remote working (de Menezes & Kelliher, 2011). Many others have also found that telework has a positive effect on productivity (Bentley et al., 2013; Butler, Aasheim, & Williams, 2007; Mello, 2007; Neirotti, Paolucci, & Raguseo, 2012) with some noting also that to reap productivity benefits there needs to be satisfactory IT and management support and trust (Bosua et al., 2013). In addition, Neufeld and Fang (2005) found that perceived productivity of teleworkers was determined by beliefs and attitudes about teleworking and the quality of their social interactions with their manager and family members.



### 2.5.3.2 *Organisational commitment*

Telework has, in the main, a positive effect on organisational commitment and turnover. Lower turnover intention of teleworkers has been found compared to non-teleworkers (Gajendran & Harrison, 2007), while no differences between the two groups has been also noted (Caillier, 2013). Improved outcomes of retention and organisational commitment were noted by Martin and MacDonnell (2012) and Caillier (2013) found that government workers were more likely to report an intention to leave if they were not allowed to telework. With a longitudinal field experimental Hunton and Strand Norman (2010) was able to show improved organisational commitment for teleworkers who worked some time at home and some time at the traditional office or a satellite office but not for those who worked exclusively at home. The results also showed that performance was positively associated with organisational commitment. In addition they found that organisational commitment was a mediator between telework and performance. Organisational commitment may be moderated in teleworkers by leadership style with Madlock (2012) finding that a task orientated leadership style was a greater predictor of organisational commitment compared to a relational orientated style.

### 2.5.3.3 *Cost savings*

When workers work away from the traditional office costs for the organisation can be reduced, including real estate, parking, heating, cooling and lighting. Microsoft UK report that they saved around NZ\$256 million the first year they implemented flexible working whilst others estimate costs savings of NZ\$200,000 to \$300,000 per year net benefit per 100 employees (Gifford, 2013). In general, telework is associated with reduced costs (Butler et al., 2007; de Menezes & Kelliher, 2011; Offstein et al., 2010) and the potential for cost savings also acts as a key organisational driver for the adoption of telework (Golden, 2009; Maruyama & Tietze, 2012).

### 2.5.3.4 *Cost benefit*

While cost benefit is often discussed as an advantage of telework and hypothetically estimated (Collins & Moschler, 2009; Rasmussen & Corbett, 2008), there is a scarcity of literature examining cost benefit as an organisational outcome perhaps due to the complicated nature of examining it (Shin et al., 2000). Bentley et al. (2013) found that most organisations participating in their trans-Tasman research failed to perform any

cost-benefit analysis on their telework programs. Those that have considered the cost-benefit find positive benefits for the organisation (Butler et al., 2007; Shin et al., 2000).

#### 2.5.3.5 *Business continuity*

Whilst telework is proposed as an advantage for organisations there appears to be little empirical data which examines if this is actually the case. Mello (2007) reported that following the New York City transit strike in 2005, the \$1 billion costs to the city related to the strike would have been much higher if knowledge workers did not have the ability to productively work from home throughout the strike. Roitz and Jackson (2006) discuss AT&T's positive experience of having a large telework capacity following Hurricane Katrina in 2005. They report that within 48 hours of the hurricane reaching land the AT&T network was fully restored, an achievement they link to their increased resilience due to having both a distributed workforce and the workforce flexibility enhanced by teleworking.

## 2.6 Societal aspects of telework adoption

### 2.6.1.1 *Environment*

One of the key initial drivers for the adoption of telework is environmental concerns and traffic congestion (Bélanger & Collins, 1998; Mello, 2007). Using telework as a mode of work can be a way in which an organisation can contribute to environmental responsibilities and save on capital costs associated with fixed office spaces (Atkyns, Blazek, & Roitz, 2002; Mello, 2007). Clean air regulations are the main reason some companies have adopted telework (Siha & Monroe, 2006) whilst the 'triple bottom line' has benefits for the organisation, employee and society. Telework adoption, which potentially changes where the population lives and works also has ramifications for infrastructure and urban planning (Alizadeh, 2013).

### 2.6.1.2 *Cultural differences*

Differences in the cultural context of the organisation may influence its uptake, implementation and outcomes (Masuda et al., 2012). Differences have been seen in French and Dutch telework processes (Peters, Bleijenbergh, & Oldenkamp, 2009) and are postulated to vary due to cultural influences of managers. In a multi-national company the French subsidiary supported telework with formal policies and top management but this was not supported by line managers and the opposite was seen in

the Netherlands with support from line managers without top management support resulting in unofficial telework. Using the framework of cultures of individualism and collectivism Masuda et al. (2012) studied flexible work practices of organisations across Latin America, Anglo and Asian countries. They found telework was more available in Anglo countries compared to Asian and Latino countries. Managers in Asian countries reported more work-family conflict if telework was available. Similar results were found by Gani and Toleman (2006), with participants in their Asian sample concerned about how teleworking would allow them enough time with their family. Cultural barriers to the adoption of teleworking have also been noted in Japan including preference for face-to-face communication, the importance of group, and the limitations of the home setting (Mokhtarian & Sato, 1994).

#### *2.6.1.3 New Zealand context*

Only around 15% of New Zealand organisations reported using telework significantly in 2007 (Rasmussen & Corbett, 2008). Two decades ago the lack of drive to introduce telework in New Zealand compared to international trends was attributed to; commuting not being a large problem; no labour shortage so attracting staff was not necessary; low rent office space in cities and high rates of unemployment (Schoeffel, Loveridge, & Davidson, 1993), all of which are likely to be issues today. More recently, scholars have suggested that the lack of organisational uptake for telework in New Zealand has been due to the prevalence of small businesses, insufficient technology investment, lack of governmental leadership, and reluctance of managers due to concerns about trust and control (Rasmussen & Corbett, 2008). In the last few years New Zealand governmental interest in teleworking seems to be increasing with the inaugural Telework Week launched in 2012, which purported to ‘highlight the social, economic and environmental benefits of working from home’ (New Zealand Government, 2012) in combination with the installation of ultra-fast broadband (Crown Fibre Holdings, 2013). A New Zealand case study amongst teleworking knowledge workers (Bentley & Pak, 2000) found that the teleworking was an adjunct to the work done during normal business hours, or to provide some family flexibility. Workers teleworked to perform work that was best done without disturbances so long as the ICT matched what was available at the office. Generally the workers considered that the nature of their work (information sharing, team work) meant that they needed to work primarily from the office. Whilst based on a very limited sample, Pham (2010), using an online survey, found that lack of top management support is the main constraint to telework implementation in New Zealand

businesses. Though the results are combined with Australian companies, the Trans-Tasman Telework study (2013) provides the most recent evidence of the benefits of telework for individuals and their organisations in terms of productivity and satisfaction. It also highlighted the role of managers in implementing and supporting telework. The survey results showed the growing popularity of telework with 38% of the sample teleworking one to three days per week, 16% more than three days per week and 35% less than eight hours per week.

## **2.7 Telework and natural disasters**

Most telework research, including debate around definitions, has occurred when telework has been adopted in ‘business as usual circumstances’ where there has been both the opportunity to plan and the time for the process of change to telework to occur. In the aftermath of a natural disaster the change in work circumstances is often rapid and without warning. Whilst the literature notes an increased interest in telework and its importance stemming from its potential for business continuity after unexpected events (Gill, 2005, 2006; Golden, 2009; Martin & MacDonnell, 2012; Vivadelli, 2005) there is limited information about organisations that adopt telework, the processes involved and the outcomes of implementing this practice following a disaster. Only one study has been identified that has specifically studied the processes and outcome of the adoption of telework following a natural disaster. This is Donnelly and Proctor-Thomson’s (2013) study on the experiences of one public sector organisation, the Inland Revenue Department (IRD), who adopted telework following the Christchurch earthquakes. Their results are included in the discussion (sections 2.7.1 and 2.7.2) which follows a sequence that looks at the adoption of telework in a disaster including planning, implementation and management and ICT and equipment before turning attention to outcomes.

### **2.7.1 Adoption**

#### *2.7.1.1 Planning*

Dinnocenzo (2010) and Mello, Goncalves and Lima (2011) suggest that preparation of workers is critical to implementing telework in an emergency situation. From organisational experience, Dinnocenzo (2010) suggests that this includes identifying available communication methods, ensuring that remote access is enabled by ICT, and

determining alternative locations for work such as home, cafes and libraries. They also suggest providing guidelines for teleworking, for example how to manage home boundaries, focussing on critical tasks and setting up systems that enable contact with managers and colleagues. Cavanaugh and Leick (2013) report that organisations that utilised telework already were advantaged when responding to an emergency in the case of Hurricane Sandy. They suggest that regular testing and practice of telework systems is essential for it to work in a disaster. Having existing experience in telework is also noted as a great advantage when disaster strikes (Mello et al., 2011; Roitz & Jackson, 2006). Whilst not specific to telework, Corey and Deitch (2011) studied business recovery following Hurricane Katrina and found that those organisations that had an emergency plan in place before the disaster carried out more preparatory activities to protect their business and continue operating. Preparation also facilitated significantly more communication with employees. Moreover, business continuity planning is one of the recommendations made from a report examining crisis management in the wake of the Canterbury earthquakes (Battisi & Deakins, 2012). Finally, uptake of telework may be enhanced following a disaster, leading to better future preparation. Maria and Hitoshi (2012) investigated attitudes to teleworking of employees who had experienced the Tōhoku earthquakes in Japan and found that attitudes to teleworking were particularly positive when framed in the context of disaster preparation.

#### *2.7.1.2 Implementation and management*

In Donnelly and Proctor-Thomson's study (2013) working from home was introduced as a means of ensuring business continuity. The change in work arrangements was facilitated by a Christchurch Recovery Team and working from home initiated for staff whose work was suitable for teleworking. Innovative communication such as Facebook and 0800 telephone numbers were considered a critical part of managing the adoption of new work arrangements as well as face-to-face meetings.

#### *2.7.1.3 ICT and equipment*

Loss of critical infrastructure including ICT is common following a natural disaster. Gilbert (2008) discusses the importance of computer file back-ups, portable computers, communication systems to contact workgroups, and charged batteries following their experience of Hurricane Ike. Working times may need to be altered to compensate for technical difficulties. These problems can be a source of frustration and in an unplanned change to teleworking securing and allocating computer equipment they can be a challenge (Donnelly & Proctor-Thomson, 2013).

### **2.7.2 Outcomes**

The outcomes of implementing telework in the aftermath of a disaster that are discussed in the current available literature are organisation commitment, wellbeing, work-life conflict, business continuity and productivity, and intention to continue telework arrangements. These factors are considered in turn in the sections below.

#### *2.7.2.1 Organisational commitment*

While not specific to telework but specific to the Canterbury earthquakes and involving case studies of four organisations Nilakant, Walker and Rochford (2013) found that human resource management had to adapt and three key principles emerged; those of organisational support, organisational justice and work engagement. They found that perceptions of organisational support influenced work engagement with perceived support being influenced by social and emotional awareness of middle managers. In addition they found that after the disaster the extent to which management addresses distributive, interactional and procedural justice impacts on work engagement. Work engagement has links to organisational commitment and turnover intention (Nilakant et al., 2013). Sanchez, Korbin and Viscarra (1995) found that basic, tangible help provided by organisations in the early stages after Hurricane Andrew, such as assistance with food, emergency supplies, housing, cleaning, child care and social support had a positive effect on organisational commitment in the months after the disaster.

#### *2.7.2.2 Wellbeing*

In addition to the positive effects on organisational outcomes Sanchez et al. (1995) considered the effects of corporate support on the wellbeing of employees. They found that tangible support, especially aimed at urgent post-disaster needs helped reduce health-related strains (e.g. stress, depression and anxiety). Roitz and Jackson (2006) also report benefits to employees from teleworking during and following a crisis. They believe that allowing staff to stay at home with their families helps them with anxieties and fears about travelling away to work. Conversely, changing work environments can also be a source of stress and some negative outcomes of isolation are noted (Donnelly & Proctor-Thomson, 2013).

#### *2.7.2.3 Work-life conflict*

Donnelly and Proctor-Thomson (2013) found that teleworking helped the majority of participants to balance their work and home commitments following the disaster,

though this was less so for middle managers than for general staff. Moreover, personal circumstances influenced if the telework experience was more positive or negative in terms of own property damage and loss of utilities.

#### *2.7.2.4 Business continuity and productivity*

AT & T report repeated benefits from having a distributed workforce that is able to telework seamlessly following a crisis (Roitz & Jackson, 2006). Donnelly and Proctor-Thomson (2013) report that some employees were ready to return to work but due to the lack of premises and telework facilities were not able to return. In addition, there were some difficulties with identifying work that could be successfully carried out at home. It was also noted that for those teleworking with little property and utilities damage productivity was high and was attributed to the benefits of less interruptions.

#### *2.7.2.5 Intention to continue telework arrangements*

After experiencing teleworking following the earthquakes many IRD staff in the Donnelly and Proctor-Thomson study (2013) indicated an interest in accessing a telework option in the future as a flexible work arrangement. This is with the proviso that there were improvements made in technical support, face-to-face contact scheduling, training and policies. In addition to potential employee benefits it was acknowledged that telework as an option in usual business operations can provide the organisation greater adaptive capabilities in a disaster situation.

## **2.8 Critique of literature**

The existing body of literature around telework is large and comes from diverse areas such as management, psychology, transportation and information systems. Despite the volume there has been contradictory results reported regarding the extent of telework, why people telework, and the resultant outcomes of teleworking. For example, individuals have been reported to choose to telework because it supports their productivity (Peters et al., 2004; Wilton et al., 2011) while others suggest that people have chosen not to telework since they are more productive at the office (Bélanger, 1999). As an organisational outcome productivity is reported to be generally improved by teleworking (e.g. Bentley et al., 2013; Butler et al., 2007), though this may depend on the type of tasks being performed, the IT and management support received and relationships with managers (Bosua et al., 2013; Dutcher, 2012; Tamrat & Smith, 2002).

Though there have been several studies looking at the impact of relationships between teleworker and non-teleworkers (Golden, 2007; Golden & Fromen, 2011) little recent research has reported on the impact of telework on the productivity of teams. With only scant evidence in this area, some high profile companies have recently asserted that teleworking impedes teamwork and collaboration and have restricted their employees ability to telework (Arthur, 2013; Shulman, 2013). One reason for the inconsistencies in the literature reporting outcomes may be the lack of power in the research. One way to improve result power is in the combination of findings across numerous studies. Accordingly, there has been an increase in conducting and reporting meta-analyses (Gajendran & Harrison, 2007; Martin & MacDonnell, 2012). This is a growing strength in the field as more confidence can be held in the veracity of results and therefore in optimally implementing telework in practice. Another reason for the inconsistencies may lie with the lack of agreement or consistent use of terminology. As telework has become more technologically enabled research interest has grown and an increasing number of terms for telework have emerged, such as mobile work, e-work and virtual work. These have created confusion about the similarities and differences between these terms and it is unclear if the differences in terms practically affect research results. The problem with terminology has occurred alongside a lack of definition about what constitutes a teleworker (e.g. how many hours or days a week away from the office makes a teleworker?) and the lack of clarity on the different types of teleworking, for example fulltime or 'hybrid'- a combination of time at the office and teleworking. This limitation has been addressed more comprehensively in the latest literature where the moderating factor of telework intensity has been considered in the analysis of results (e.g. Bentley et al., 2013; Fonner & Roloff, 2010).

A further criticism about the existing research regarding telework is that it lacks a conceptual framework around which it can be defined and the findings analysed. Development of frameworks has been attempted as exemplified in the models presented in section 2.3. The Neo-institutional model, NIM (Figure 1), the Technology-Organisation-Environment framework (TOE) (Figure 2) and the Telework Behaviour Model (TBM) (Figure 3) only consider telework adoption in terms of the organisation or the individual and the TBM assumes there is a telework policy and a choice to telework or not. This is limiting for a comprehensive conceptual framework when the scope of literature available acknowledges factors impacting the organisation, groups and individuals. In addition only the TBM incorporates the outcomes of telework, if



only at the individual and organisational levels. Organisational change is fairly constant and the practice of telework is also likely to change over time to reflect the changing organisational pressures, globalisation, technical developments and demands of employees. The NIM framework is based on the dispersion of organisational practices which does reflect the element of time though does not include a feedback loop to adjust practices based on time-dependent outcomes. This is also a criticism of the TOE. The TBM includes feedback over time but only in so far as an individual's behaviour and organisation's telework policy is modified. It is suggested that the multi-level telework framework shown in Figure 4 provides a superior way in which to conceptualise teleworking considering aspects that are embedded in this working practice from a personnel, technical and organisational structure perspective across all the levels of the organisation. It also allows the reflection on the outcomes at the organisation, group and individual level. Moreover, this framework has the capacity to consider the inter-relationship of the sub-systems and the outcomes and how they may change over time through the feedback loops presented. The shortcoming of the model, as the authors acknowledge, is that it is yet to be extensively tested in a variety of teleworking environments. In addition it does not include the external environment to explore other impacts of telework across multiple levels of organisations.

Given that this research project is concerned with telework in the aftermath of a disaster another limitation of the existing telework literature is that, in the main, it examines telework in a business as usual situation. While telework has been touted in recent years as a tool to assist with business continuity in times of disruption, the practice and outcomes of this have not been extensively reported on in the available literature. When it has been discussed it tends to be from an organisational perspective (Mello et al., 2011) with a lack of coverage considering of the change processes and the impacts on individuals and groups.

## **2.9 Gaps in knowledge**

Considering all the literature presented above, it is fairly well held that telework, using ICT to support working at home or at a location away from the physical location of the organisation, is an organisational innovation. Its adoption and implementation requires an organisational change process that is well supported by management to be successful. Telework has fairly clear positive outcomes for both individuals and

organisations if it is well managed and well supported. A commonly stated benefit is that the adoption of telework may assist in business continuity following a natural disaster or other unexpected event and may aid in the development of an organisation's adaptive capacity. There is, however, a scarcity of evidence concerning the antecedents, processes and outcomes of implementing telework following a disaster with respect to organisations, groups and individuals. Questions that remain unanswered or that are not fully explored include:

- To what extent do organisations adopt telework in a post-disaster environment?
- What types of organisations adopt telework in a post-disaster environment?
- Does prior use of telework support adoption after a disaster?
- Does business continuity planning affect adoption of telework?
- Does telework support business continuity?
- How does ICT enable telework after a disaster?
- How does telework affect wellbeing after a disaster?
- How does telework affect work-family conflict after a disaster?
- Does telework impact productivity after a disaster?
- Does telework influence organisational commitment after a disaster?
- How is telework managed after a disaster?
- What do organisations do if telework is not available?
- Are employees affected if telework is not available?
- How is the return to business as usual managed for those who telework after a disaster?
- Does adoption of telework after a disaster lead to long-term adoption of telework?

## **2.10 Research questions for this study**

Using the socio-technical systems framework for telework to consider the fit and interactions of sub-system variables in the adoption of telework this study seeks to address some of the more important gaps noted above. With the environmental context of the Christchurch earthquakes to extend the teleworking framework proposed by Bélanger et al. (2012) and building on the IRD case study that has examined telework

after the earthquakes (Donnelly & Proctor-Thomson, 2013), the research questions for this study are:

- i) What change processes did the case organisations adopt in implementing telework in response to a natural disaster?
- ii) What were the barriers and facilitators to rapid telework implementation in the case organisations?
- iii) What were the role of personnel, technical, task, environment and organisational factors and their interactions in teleworking implementation and outcomes?
- iv) What were worker and management perceptions of telework effectiveness and their intentions in relation to on-going teleworking arrangements in the case organisations?

The next chapter explains the research design used to explore these questions.

## **Chapter 3. Research Design**

The literature review in the preceding chapter has outlined the existing body of telework research and explored its strengths, weaknesses and limitations. This has led to identification of the gaps in the literature and helped to form the research questions for this study. This chapter explains the research approach of the study examining the rapid adoption of telework after the Christchurch earthquakes series. It discusses the considerations for the choice of research strategy, research framework and the use of pilot studies to further inform the research inquiry. This is followed by a description of the methods used to recruit participants and the characteristics of these participants. An account of the way in which the data were collected and analysed precedes a discussion of the limitations of the methods used. The chapter concludes with a consideration of ethics.

### **3.1 Research methodology**

This research follows a constructionism ontology and epistemology to recognise the social construction of organisations and people who experienced both the earthquake events and the changes to their way of working during these events. Using this constructivism paradigm as the lens of inquiry, and adopting an interpretivism theoretical perspective that seeks to understand the world through interpretation of individuals' subjective experiences (Creswell, 2003), a qualitative research strategy was chosen in a case study form. Data collection involved a combination of semi-structured interviews and archival analysis of organisational documentation relating to the implementation of telework following the earthquake events.

#### **3.1.1 Case study design**

The case study design allows for the detailed analysis of the experiences of individuals and their organisations within the context of a specific event (Bryman & Bell, 2007) and allows for use of multiple data sources so that a fuller picture can be developed. This research intends to understand the change process for the organisations in implementing telework, to identify barriers and facilitators to telework implementation and to explore the outcomes of telework adoption following a natural disaster. An in-depth inquiry

was therefore considered most appropriate, particularly given the complex nature of the working environment amid the aftermath of a disaster.

This study employs a multiple-case study design. Two case organisations were used in a literal replication where the cases were known to have implemented telework as an alternative work arrangement following the earthquakes and similar findings in terms of antecedents and outcomes were predicted (Yin, 2009). This was informed by the pilot studies discussed in section 3.2 below. Analytical conclusions are seen to be more powerful than those stemming from a single case and having two or more cases is recommended by Yin (2009). The design was limited to two case organisations for practical reasons of time, access and to ensure that the amount of data generated would be reasonable to analyse within the timeframes and scope of the study.

Additionally, analytic generalisation from case studies can be used to expand and generalise theories (Yin, 2009). The multi-level socio-technical system (STS) teleworking framework of Bélanger et al. (2012), discussed in section 2.3.4 and below, has been chosen as the theoretical framework for the research. The case study design of this research provides an opportunity to examine the validity of this framework as applied to teleworking in a situation where telework was adopted rapidly, in the context of a natural disaster.

### **3.1.2 Research framework**

This research adopts a STS approach to examine the role of personnel, technical, task, environment and organisational factors and their interactions in the implementation and outcomes of telework following a natural disaster. The multi-level STS teleworking framework (repeated in Figure 5) was chosen for this study as it addresses multiple features of the work system, at multiple levels and considers their interactions and outcomes. This is suitable for the complex events that unfolded in adopting telework after the earthquakes and the outcomes of this practice.

The personnel subsystem contains factors relating to personal, social and cultural aspects for teleworkers e.g. individual characteristics, home-life situation, group relationships, or organisational culture. Factors that describe how the work is done and the type and availability of other resources required to perform the work are included in the technical subsystem, e.g. ICT, task design. The organisational structure subsystem refers to aspects of the organisational structure and roles including management

structure, practices and policies. The dashed lines of the model represent the permeability of the components across the levels of analysis, the sub-systems are interconnected and the outcomes are shown at the three levels. The concept of ‘fit’ is used to represent the interaction of the subsystems across the multiple levels and is a useful way to examine what did or did not ‘work’ for telework deployed in a post-disaster environment. The model can also identify and explore the effects of time on the teleworking system which is especially relevant in the study context as the period of time post-earthquakes extended, the duration of telework continued and as the organisations returned to a business as usual situation.

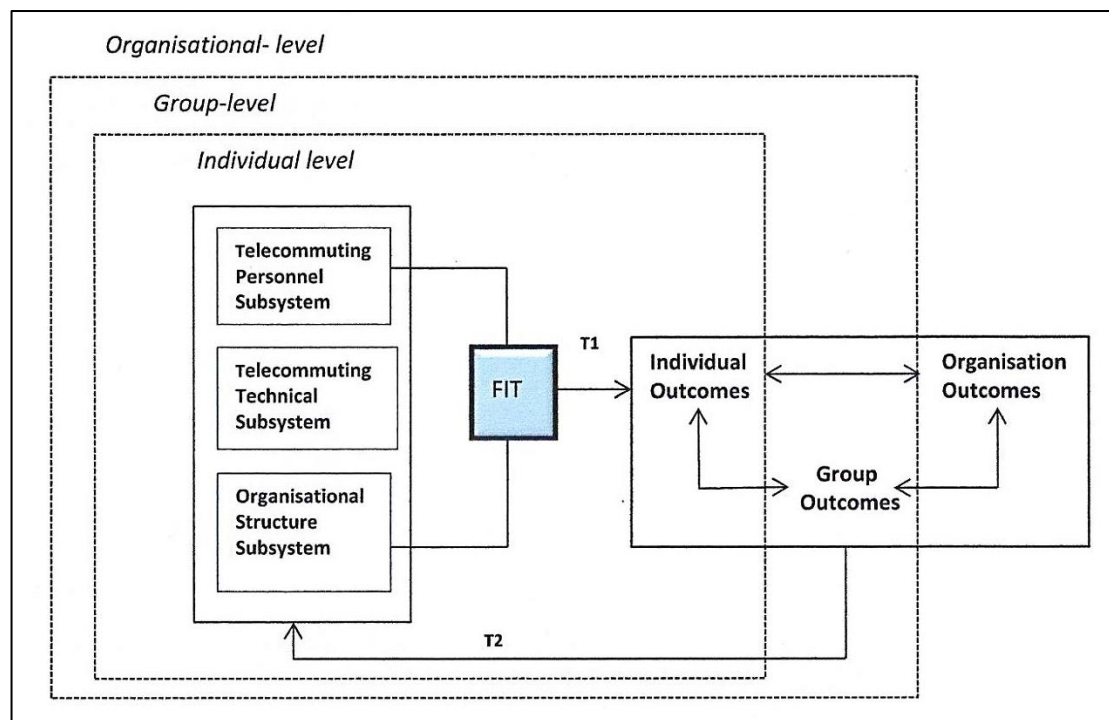


Figure 5 A multi-level teleworking framework from Bélanger et al. 2012, p 14

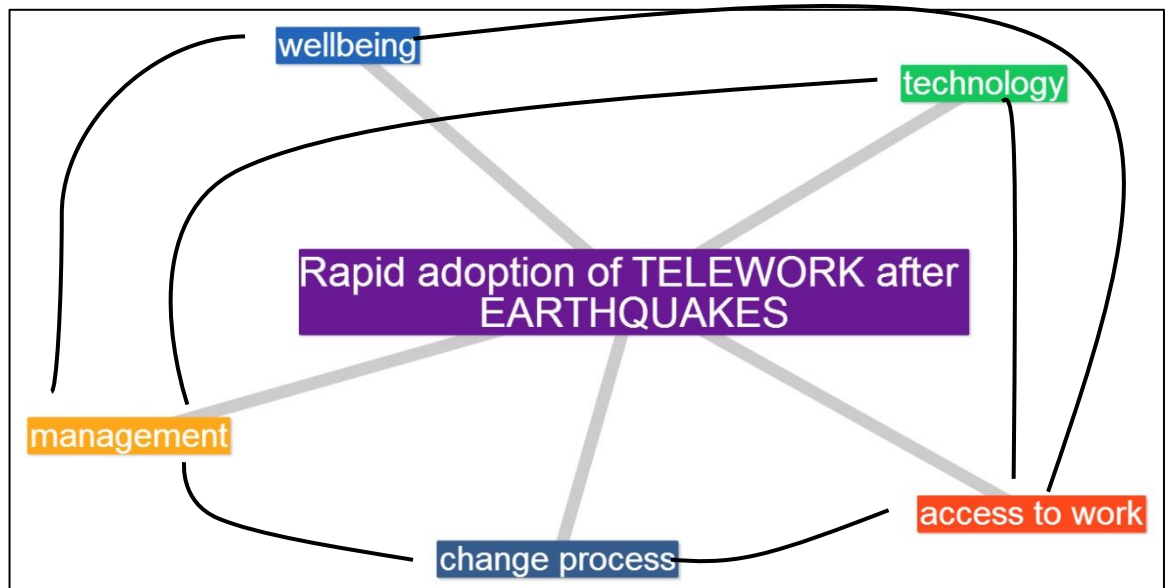
## 3.2 Pilot studies

Seven stakeholder interviews were conducted to further inform the research inquiry and to establish an initial understanding of the situation faced by various organisations following the earthquakes. The individuals from four different organisations were contacted through personal business contacts of the researcher and one through a cold call, details of the types of organisations and roles are shown in Table 3.

**Table 3** Role and organisation type from stakeholder interviews

Organisation type	Role
Large	Performance capability manager
Large	Strategic asset manager
Large	Call centre manager
Small	Financial services manager
Small	Facilities services manager
Large	General manager of human resources
Large	Enterprise risk manager

The interviews were either by telephone or face-to-face and followed a semi-structured format. The interview schedule and general findings from these interviews are shown in Appendix 1. With respect to the change in work arrangements the emphasis on wellbeing of staff and their families immediately following the events was a key theme that emerged from these interviews. Gaining access to work, technology factors, the change process and management required for this were all critical for moving to telework. In addition, a change to a teleworking arrangement, in varying degrees, was used as one of the alternative locations for work established by the organisations. They had all utilised remote access in some capacity before the earthquakes, typically in an ad hoc way. A sketch model of the key findings and their interrelationship was formed and is shown in Figure 6.

**Figure 6** Sketch of key points and connections gained from stakeholder interviews

These stakeholder interviews were useful for developing an appreciation of the circumstances faced by organisations in the aftermath of a disaster and established that telework was used as a way of working post-earthquake. These initial interviews also assisted with the identification of potential themes which in turn helped with the development of the interview schedules. The stakeholder interviews also played an important role in determining the suitability of cases for literal replication in a multiple-case study design, establishing contacts for and gaining cooperation from potential participant organisations.

### **3.3 Participant recruitment**

#### **3.3.1 Case organisations**

Two case organisations were selected through the business contacts of the researcher and agreement to participate was gained during the stakeholder interviews with high level managers. These organisations were chosen as they were based in central Christchurch, an area of the city that experienced significant damage to buildings and disruption to business in the February 2011 earthquake. Both organisations had little or no access to their usual office buildings, had been forced to find other locations for work, and had used telework in some capacity as an alternative work arrangement. Additionally, as the post-disaster situation returned to a business as usual situation both organisations relocated to a centralised office again. Telework was defined as using ICT to support working at home or at a location that is removed from the physical location of the organisation (Offstein et al., 2010). Both organisations were large (> 350 employees based in Christchurch) with one in the public sector and the other in the private sector. The case organisations were involved with service provision which includes roles and tasks that have significant levels of skill, knowledge, and interaction with information and computer systems. Participant case organisations were provided with an information sheet (Appendix 2) and an email invitation to participate (Appendix 3) to the high level manager contact.



### **3.3.2 Participant selection**

Participants were recruited through a ‘snowball’ technique with the high level managers asked to forward the ‘Invitation to Participate’ by email to people who they knew met the criteria or provide their contact details. The criteria for managerial participants were those who were either responsible for implementing telework arrangements or who supervised staff who teleworked, and non-managerial staff who teleworked at least one day per week. In the case of one organisation a high level manager provided a list of potential participants’ contact details and these people were then contacted directly by the researcher to invite their participation, ensuring that staff knew that permission had been given by senior managers for this participation. In addition, contacts for qualifying non-managerial participants were requested at the conclusion of the managerial interviews. Staff who were willing to participate and responded to the request were then contacted directly to arrange a meeting time. Recruitment of participants was stopped when 20 participants had been interviewed. This was due to the large amount of data which had been collected and time restraints. Additionally, it was at this point when it was felt that no more new information was resulting from the interviews.

### **3.3.3 Participant characteristics**

Efforts were made to seek participants who met the study inclusion criteria from a range of working groups, occupations and genders. Seven people were interviewed from case organisation one and 13 from case organisation two. This was due to the relative total size of the organisations, case two being a larger organisation than case one, and the number of people who teleworked after the earthquakes that were available for participation. Overall, seven managerial staff and 13 non-managerial staff were interviewed with a balanced number ( $n=10$ ) of male and female participants. The range of roles was varied and included accountants, engineers, analysts, administrators and managers. The characteristics of the sample are shown in Figure 7 and their work roles in Figure 8.

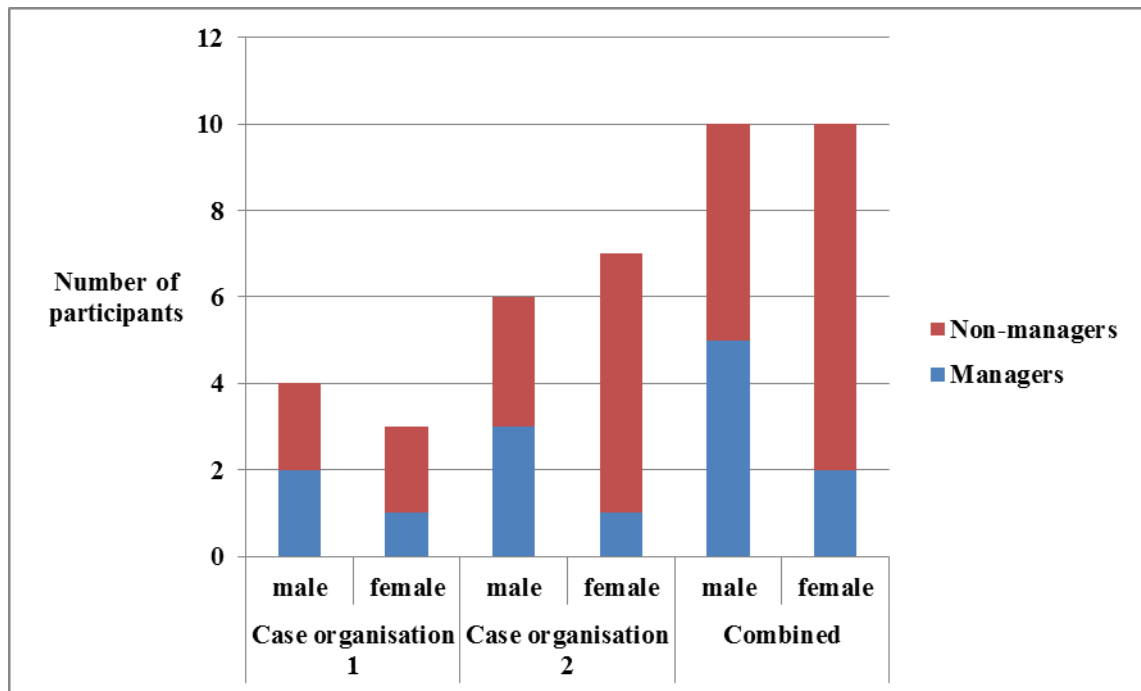


Figure 7 Case organisation participants

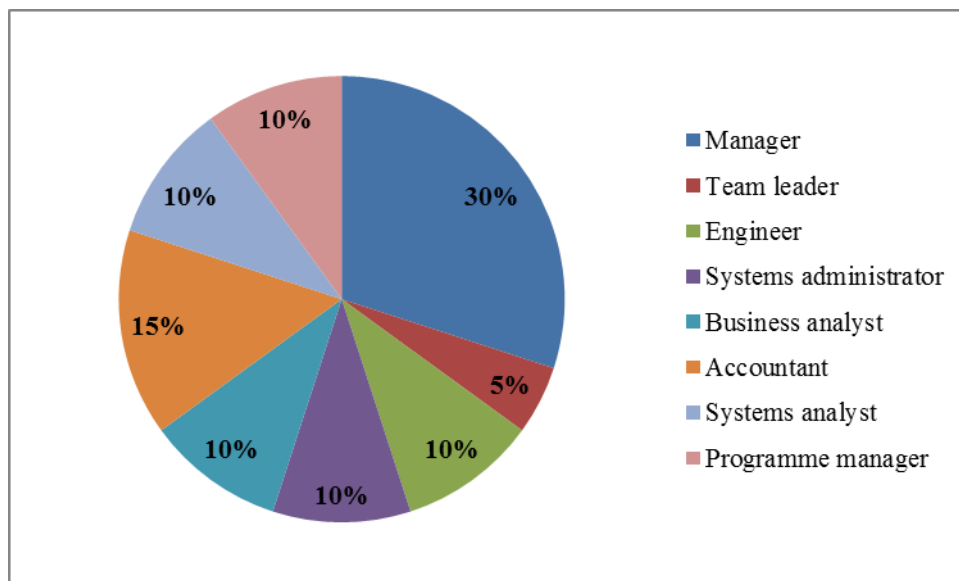


Figure 8 Work roles of participants

### 3.4 Data collection

#### 3.4.1 Semi-structured interviews

Data were gathered utilising semi-structured interviews with the interview schedules informed by the literature review and the key findings from seven stakeholder interviews conducted earlier in the research process. All interviews were conducted by

the researcher and the interview schedules for managerial and non-managerial staff are included in Appendix 4 and 5, respectively. The schedule for managers included questions about the:

- nature of the organisation, staff and primary activities
- organisations' policy and practice in regard to telework prior to the earthquake events, following the earthquake that led to the adoption of telework, and the nature of the change process including who should and should not telework
- barriers and facilitators to effective telework
- perceptions of effectiveness of fit between teleworking and people, tasks, technology, environment and organisation
- perceptions of outcomes e.g. productivity, wellbeing
- management of teleworkers
- future plans for telework

For non-managerial staff the schedule included enquiries about their:

- role and primary activities
- practice of telework prior to the earthquakes
- experience of events following the earthquake that led to teleworking and the change process
- experience of the barriers and facilitators to effective telework
- teleworking environment
- perceptions of effectiveness of fit between teleworking and people, tasks, technology, environment and organisation
- perceptions of manager's attitudes to teleworking
- perceptions of outcomes e.g. productivity, wellbeing, work-life balance
- experience of management system effectiveness for them as teleworkers
- future plans for telework

The interviews with each participant were conducted in a quiet place at the premises of the case organisation between 14 February and 11 April, 2014. One managerial interview was held at a café at the request of the participant. Preceding the interview the background and rationale for the research project was explained, any questions answered and a consent form (Appendix 6) completed. The interviews were recorded with an iPad application, iTalk Premium 4.6.7 from Griffin Technology.

The interviews followed the schedule, with the researcher controlling the process of the interview and the time spent on each key theme, but not the content within each theme. Interviews for managers (n=7) were an average of 44 minutes in duration with a range of 32 minutes to 59 minutes. The average length of interview for case organisation one and two was similar, 44 minutes and 45 minutes, respectively. For non-managerial staff (n=13) the interviews were an average of 28 minutes (range 22 to 42 minutes) with case organisation two's interviews slightly longer on average, 29 minutes, than case one's 27 minutes.

### **3.4.2 Documentation**

Any documentation relating to the introduction and outcome of telework arrangements was requested from all participants as part of the interview process. No documents were provided by case organisation two and thirteen items were received by email from case one. The documents were emails that were distributed to a staff mailing list updating staff on the status of the organisation and providing advice. It provided useful insight to the priorities of the organisations at the immediate post-disaster stage and the process of changing to alternative work environments and corroborated interview findings about these events. Also, in conjunction with the interview findings, the documents were useful in establishing a timeline of events.

## **3.5 Data analysis**

### **3.5.1 Transcription**

Transcription of the digital recordings of the interviews were completed by the researcher using Express Scribe Pro software (NCH Software) so that the informational content could be more easily accessed for review and analysis (Powers, 2005; Sandelowski, 1994). The recordings were transcribed following an 'intelligent verbatim' convention. This is a full and accurate transcription but one in which repeated or unnecessary words are omitted (Academic Consulting Ltd, 2013). The full transcription plan is included in Appendix 7.

### **3.5.2 Analysis**

Analysis of the interview data and documentation followed a qualitative thematic content analysis method using computer assisted qualitative data analysis (NVivo, QSR

International Pty). During the interview and transcription processes notes were made of themes, ideas and questions that occurred (Richards, 2005). A priori themes were established from the initial stakeholder interviews and the literature review and built upon by the interview and transcription process (Gibbs, 2007). The themes were defined, added to and refined as the coding process continued (Bazeley, 2009). Relationships between themes were considered and the way they may fit with the socio-technical telework framework. The tools available in NVivo were used to ask questions of the data and facilitate analysis of any differences and comparisons within the themes (Richards, 2005).

### **3.6 Limitations**

There are several limitations in the methods used for this research project. Firstly, the selection of case organisations, though selected for literal replication, was done in a convenient way and those for which access was granted. Secondly, the participants were not a random sample but staff that had been identified by the senior management who met the criteria and who were willing to participate. The voluntary nature of participation may indicate that they had a more positive experience or a personal interest in teleworking. However, since the invitation to participate came with the permission and cooperation of senior managers there was possibly an implied compulsion to cooperate regardless of their personal views. Thirdly, the number of participants (n=20) was small due to the amount of data generated by the interviews as well as time constraints. This relatively small sample size may mean that not all views have been explored. However, in both organisations telework was used as a second choice to alternative locations and relatively small numbers of staff teleworked. It was also felt that after 20 interviews no new information was being presented. The sample in this study therefore is thought to be representative of those who teleworked. Fourthly, the earthquake series began in September, 2010 and continued for more than 17 months, while the interviews for this research did not take place until February, 2014. The time lapse of events may mean that accurate recall of events by participants is difficult. However, the earthquake events were very significant and traumatic in the lives of most people in Christchurch and therefore the memories of the participants from this time are likely to be more salient. Lastly, the case study design does not allow statistical generalisability of findings to other organisations. Nonetheless, the event of a

natural disaster is a shared experience so there may be general lessons that can be learnt for other organisations from analytic generalisations.

### **3.7 Ethics**

Following the Auckland University of Technology Ethics Committee Guidelines, ethical approval was sought. The key ethical principles for this research are informed and voluntary consent and respect for rights of privacy and confidentiality for participants.

Since all participants have experienced the earthquakes consideration was given to potential psychological distress that might be evoked with recalling experiences. This was addressed by ensuring that participation was voluntary and that participants could discontinue their involvement in the research at any point. The participant organisations were asked if their staff had access to support and/or counselling services. In addition, a quake support and counselling helpline number was included on the invitation to participate and information sheet (Appendix 3).

Confidentiality was assured for both individual participants and case organisations. Consent for participation was sought and received from all participants after a full explanation of the research and interview processes with opportunities to ask questions and to withdraw participation (Appendix 6).

Ethics approval for this study was given by the Auckland University of Technology Ethics Committee on 22 August 2013, AUTEK Reference number 13/215.

### **3.8 Research design summary**

This research aims to explore the change process for organisations, identify the barriers and facilitators and examine the role of personnel, technical, task, environment and organisational factors and their interactions and outcomes in implementing telework in response to a natural disaster. In addition it seeks to investigate worker and management perceptions of telework effectiveness and their intentions in relation to on-going teleworking arrangements. In order to achieve these aims a multiple case study design was implemented with a socio-technical systems framework. Qualitative

methods via semi-structured interviews with managerial and non-managerial staff were employed and documentation relating to the implementation of telework sought. The data were analysed by methods of thematic content analysis assisted by a computer qualitative data analysis tool.

The following chapters explore the findings of the study, beginning with a description of findings then a discussion in Chapter 5 with respect to the research questions of the study, the existing literature and the theoretical framework used. It also includes a commentary about the contributions of the research to the existing body of knowledge and implications for organisations, concluding with a discussion of the limitations of the research.

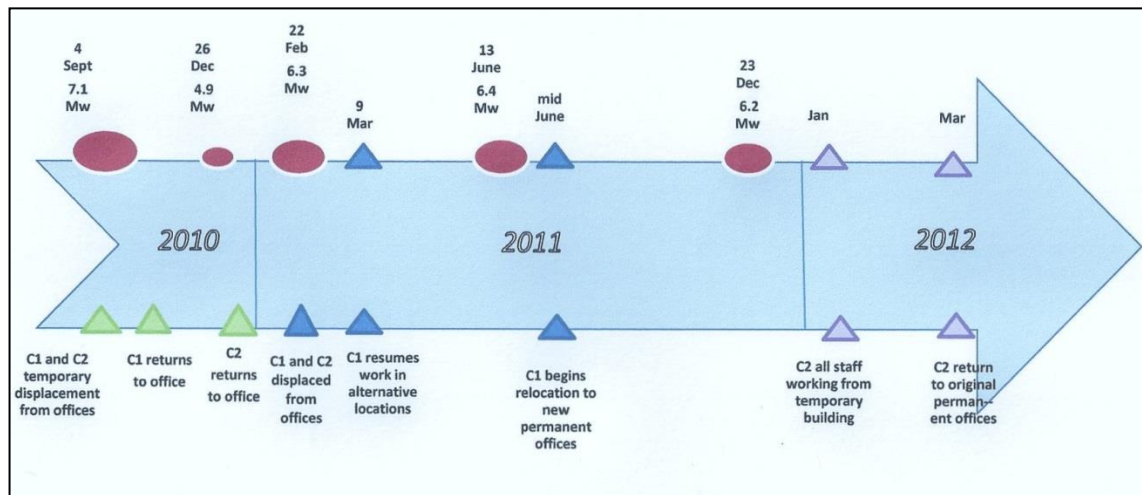
## **Chapter 4. Findings**

The findings of this study are presented in this chapter using the cross-case analysis approach (Yin, 2009). To begin, a timeline of the earthquake events and the significant features for the cases in their change in work arrangements is illustrated. To appreciate the time dependent aspects of the adoption of telework after a natural disaster, the presentation of the themes is ordered in a chronological way with the events divided into phases of pre-earthquake, disaster, recovery and return to business as usual themes. This is explained and a summary of the themes in each phase is described. Following this, each section is concerned with a theme that emerged from the data and information from both cases. Verbatim quotes are used throughout to illustrate key points. Consistent with the research framework, each cross-case issue is discussed with consideration of the socio-technical subsystems of personnel, technical and organisation and at levels of the organisation, group and individual. A socio-technical systems framework is then presented to summarise the findings for the adoption of telework following the earthquake series and the subsequent return to business as usual.

### **4.1 Timeline**

Figure 9, shown below, illustrates the timeline of significant earthquake events from September 2010 until March 2012, and the change in work arrangements forced upon the case organisations. The earthquakes noted are the events that recorded more than 6.0 on the moment magnitude scale. A 4.9 Mw event on 26 December, 2010 is also included as this event caused more building damage in the central business district and further power outages which disrupted businesses once again (Press Reporters, 2010). While these were the largest earthquakes experienced there were many large aftershocks before and after the main events which disrupted lives and businesses and created fear, anxiety and damage to property for staff and their families over a sustained period of time. Understanding the ongoing nature of the earthquake events is important in terms of the recurrent change and challenges faced by the case organisations and their people in continuing to work.





**Figure 9** A timeline of earthquake events and change in work locations of case organisation one (C1) and two (C2). Mw= moment magnitude.

Following the first event in September 2010, both case organisations temporarily moved out of their office buildings. For case one, this was only some staff for a short period of time while remedial repairs were done. During this time staff worked from home or relocated to other sites around the city or the country. For case two, the period of time out of their centralised office building was longer and they had recently returned before the more damaging earthquake struck in February 2011. They too, either worked from home or relocated to other organisational buildings around the city. Following the February event both organisations evacuated their office buildings immediately. Case one did not return to the same building while in case two all personnel had returned to its repaired building by March 2012. Prior to the move back to the original office, it was made compulsory for those teleworking to move into a centralised, alternative working space in about January 2012.

All the staff in case one either relocated to other cities or worked from home for about two weeks after the February earthquake. The amount of work able to be performed was limited due to the damage to their IT infrastructure. After this period they either worked at alternative, temporary locations such as hotels and churches, teleworked from home, or a combination of both before returning to a refurbished office building from about mid-June 2011. This meant that the case one participants in this study teleworked either full-time or part time for between approximately four to sixteen weeks. For case two, some staff performed roles in the Civil Defence emergency management centre for the first few weeks after the February quake or they began to work at home soon after the disaster. For this case, the duration of teleworking was between four weeks and one

year and this was primarily full-time. The experiences of the participants are drawn from the earthquake period in general though mostly refer to the events following the most destructive event in February 2011.

## **4.2 Summary of themes**

While many themes are inter-related and overlap, a chronology of events, separated into phases, is used to help analyse the key themes of the project. The pre-earthquake phase is concerned with themes that refer to the situation of the organisations prior to the earthquakes with respect to telework. The disaster phase analyses the situation of the cases immediately following the disruption, and the process of change to a teleworking situation. Following this there was a period of relative recovery where the teleworking situation was established. Themes in this phase are divided into operational aspects and outcomes of teleworking. As time progressed, the cases moved back into a centralised working arrangement in office buildings and the themes that emerged in this phase will be considered.

Table 4 shows the themes and a description of each theme, ordered into the phases of the event. These are discussed in turn in the following sections. An alphabetical list of themes, sub-themes and their descriptions are included in Appendix 8 as a node classification sheet from NVivo.

**Table 4** Themes and descriptions related to phase of events

	<b>Theme</b>	<b>Description</b>
<b>Pre-earthquake phase</b>	Capabilities for telework	Capability of organisation and individuals to telework prior to the earthquakes
	Prior telework policies and practices	Teleworking policies and practices prior to the earthquakes
	Preparedness	Organisation preparedness for disaster and business interruption
<b>Disaster phase</b>	Access to work	Gaining access to work or workplaces after the earthquake
	Disaster IT	Information and communication technology aspects in the disaster phase
	Change to telework	Change associated with moving from a 'business as usual' context to a telework situation post- EQ
<b>Recovery phase - operational</b>	IT for telework	Information and communication technology used to do work tasks
	Equipment for telework	Hardware used for telework e.g. telephones, monitors
	Working environment	The working environment in which telework took place.
	Management of telework	Managing staff to perform their tasks while teleworking.
	Distractions	Distractions when working
	Communication	Conveying information whilst teleworking.
	Collaboration	Working together to achieve shared goals whilst teleworking
<b>Recovery phase – outcomes</b>	Flexibility	Flexibility for individuals to manage other commitments
	Wellbeing	Effects of telework on wellbeing
	Socialisation	Impact on social needs of teleworkers
	Work life boundary blur	Merging of home and work life associated with telework
	Productivity	Perceptions of productivity and performance when teleworking
	Financial impacts	Financial impacts of teleworking
	Business continuity	Continuation of business activities after the earthquakes through teleworking
	Adaptivity	Organisations ability to be flexible and responsive
<b>Return to business as usual (BAU) phase</b>	Returning to business as usual	Experiences when returning to BAU in a centralised location
	Ongoing telework	Telework policies and practices following a return to BAU

### 4.3 Pre-earthquake phase

The data collected referring to the teleworking position of the organisations before the earthquakes were centred on capabilities for teleworking, telework policies and practices and preparedness for business interruption. These are addressed in turn below.

#### 4.3.1 Capabilities for telework

Prior to the earthquakes both organisations had the technical capability for some staff to connect to work remotely using organisational laptop computers. This was available for personnel who had previously requested and been granted access to the systems, although it was not overtly offered for use in an emergency as indicated by one manager,

*'We've had that capability from a technology perspective for some time it wasn't necessarily specifically called out in an event of an emergency' – M2*

The capability of this was, however, limited with case two only able to accommodate 50 remote users at once. In addition, it was used in varying degrees, on an ad hoc basis by the people who did have the capacity and knew how to access the systems. The ability to connect remotely and have the skills to do this assisted in the initiation of telework when it was required.

#### 4.3.2 Prior telework policies and practices

There were no organisational policies around teleworking prior to the earthquakes. Teleworking was allowed, typically, in an informal way through the permission of an individual's manager on a case by case basis, as one manager put it,

*'It was at team leaders' discretion so it needed team leaders' approval to be able to do that. It was ad hoc.' – M6*

This was usually initiated by the employee who wanted flexibility in their working hours to balance other life commitments and the ability to extend their working hours. This is exemplified by one interviewee,

*'Because of childcare responsibilities I have certain days I leave early, and in the evenings of those days I would work from home, to play catch up' –S9*

Previous teleworking by individuals meant that the change to telework following the events was simple and required no upskilling.

### 4.3.3 Preparedness

There were underdeveloped plans for business continuity in the face of major disruptions from an organisational perspective. The disruptions emanating from the February 2011 earthquake was more than the organisations had imagined, particularly the ongoing nature of the earthquake series which rendered more buildings around the city unusable for case two after each major event. As one manager described,

*‘...the volume of moves, relocations, of moving people from one place to another and changing the set-up for those people on a day to day basis and I don’t think anybody pre-earthquake could have imagined.’ –M6*

As far as the participants were aware teleworking or remote access for work was not included explicitly in any business continuity planning or disaster management for the organisations. One group, in case two, was more prepared by their manager encouraging them to always take their laptops home with them. As she explains,

*‘That was my contingency plan for disaster recovery in my area, if you’ve got your laptop, you can still work, you can still login, you can still support the system.’ –M7*

## 4.4 Disaster phase

This phase examines the period immediately following the most destructive earthquakes. The critical factors that emerged in this phase are discussed below in succession. They are access to work, IT and the change process from a business as usual situation to a teleworking arrangement.

### 4.4.1 Access to work

After the February 22, 2011 earthquake both case organisations could no longer access their office buildings without the assistance of Police and safety specialists. This created one of the biggest challenges in finding new places for staff to work. Alternative locations were sought around the city in any available space, which was at a premium given that many other organisations were in the same situation. Teleworking was used as an alternative work location but the preference of the organisations was to have staff working at their temporary locations. The reasons for this included that many roles were deemed to need physically locating with others, personal circumstances (for example, ‘red stickered’ house, no water or sewerage) precluded working from home

and the limitations of the IT infrastructure to support remote access for too many people. The fact that there was no prior planning for teleworking and the organisations did not know how to respond, is also likely to have been a contributor to this decision.

The limit placed on what work could or should be done during this period was expressed as lost opportunities by some case one's participants. Despite the widespread damage there remained many people who were relatively unaffected both from damage to property and psychological perspectives who, it was felt, could have contributed if they had been able to access work. As one manager said,

*'I think we tended to coat everybody with the same brush, so everybody was 'you don't need to come back to work' – MI*

Whilst it was accepted that the organisation was concerned with their wellbeing it created some immediate frustration for some and decisions around what work should be done had ramifications that extended past the disaster period, as expressed by one employee,

*'I was ready to do month end, that was fine we could have done it. In retrospect it would have been a lot easier because then we had all sorts of issues in terms of not having done it, would have been easier, much better to do it but...' –S3*

#### **4.4.2 Disaster IT**

IT shortcomings were widely exposed in the period of time immediately following the large February event, both in infrastructure and hardware resources. Case organisation one had their main server, with no backup, in the building that became inaccessible. When they were able to gain access they discovered the server was damaged and they were left for several weeks without company email or systems access until the server could be relocated to Wellington and repaired. Once again the paucity of business continuity planning for disruption was a lesson to be learnt, as one manager put it,

*'...the fact that we didn't, the server was at our office was a bloody big lesson for our IT team' –M4*

In contrast, case two had robust IT infrastructure with their servers in a purpose built data centre but their ability to remotely connect for telework was limited to a small number of users who needed to connect using the organisation's laptop computers. The February earthquake struck at 12:51 pm and many staff were out during the lunch break. Unless an individual had been away with their laptops on the day, or were in the

building and had the speed of thought and action to take their laptop with them, retrieving laptops that had been left in what became inaccessible buildings was a huge challenge in setting up to telework. As one manager recalled,

*'I can still see it now, sitting out in an office full of laptops piled up high, trying to marry them back up to people' –M3*

In addition, case two's role in the civil defence operations meant that many of their laptops were deployed to other users leaving their own staff without computers. They were forced then to reclaim laptops from other parts of the organisation and source loan computers.

#### 4.4.2.1 Security

The lack of email access in case one left them forced to rely on home email address and or setting up Gmail accounts for work for several weeks. This exposed them to potential security issues as personal emails were used to send files and information. It also may have had ramifications for customer relations, as one staff member expressed concern,

*'I was worried about the security, yeah and it just felt really wrong doing it that way, contacting customers from like Google mail accounts, this just looks a like a big phishing scam' –S4*

Whilst case two had no email issues their IT security was relaxed in some cases to allow more people to connect remotely. The increased risks the organisations took with internet security were not naïve, it was more that the circumstances were extraordinary and ways had to be found rapidly to solve the problems that were encountered. This was summed up by one manager,

*'I guess one would argue that was kinda like a force majeure event so we did what we needed to do to ensure continuity of business operations' – M4*

#### 4.4.3 Change to telework

In the initial stages after the disaster staff were contacted by their chain of management, usually by telephone, to check on their personal circumstances and their availability for work. Case one set up an 0800 number which staff could ring for updates on the situation. If they were able, they were encouraged to do what they could from home. For some of case two who had their laptops with them this meant that they could resume work almost immediately once power had been restored. For case one even if

they had their laptops they were unable to connect to the system so work was severely limited.

As time after the major event passed the crisis management teams began to allocate staff to the various alternative locations that had been secured. Allocation to these sites was based on priority of tasks, criticality to the organisation and the need to be co-located with others for support. If an individual's personal circumstances were challenging, for example, damaged property with no sewerage, young children at home or compromised well-being, a desk space would be found for them regardless of their role. For employees whose role did not require that they work from an alternative location and they were the 'right person' they were asked or they volunteered to telework, the main driver being the lack of office space. A person suitable for teleworking was deemed to be someone who required a minimum of supervision and was trusted. This was typically those staff that had prior authorisation to and experience with teleworking. Once computer equipment had been returned to them the change to telework was simple for these people.

Allocation to telework was not a static situation as many people's situations changed as the earthquake series progressed. Their property may have become more damaged or they had to relocate for repairs to be commenced. In addition, over time it was realised either by the individual or their manager, that they were not suited to teleworking. Some found it difficult to avoid the distractions of home and their productivity was poor. Others realised that they preferred the company of others at the alternative locations, feeling that it provided a sense of normality in what was a very tumultuous time. Also the earthquakes impacted on the work tasks of many roles requiring reprioritisation and cancelling of projects and the commencing of new ones. In these circumstances if a staff members work was now more critically focussed on support or collaboration with others they were relocated from teleworking to work at a temporary location.

#### **4.5 Recovery phase – operational**

Once the immediate disaster period subsided, though aftershocks continued, organisations were able to settle somewhat into the 'new normal' way of working. The key themes for functioning as teleworkers developed as IT for telework, equipment,



working environment, management, distractions, communication and collaboration. These are considered one after the other in the following sections.

#### **4.5.1 IT for telework**

Once staff had computers, and in the instance of case one the systems restored, the IT for teleworking was on the whole satisfactory. Participants noted some minor difficulties at times with internet connections, speed and minor bugs in systems when working remotely. They felt well supported by their IT department by telephone and by home visits when needed to help set-up the systems and solve any issues. Case one had soft phone software which they found useful but there were no other technological tools (e.g. Skype, IM, enterprise social network) for communication. The main limitation seen was the inability, due to incompatibility, to use their home computer equipment including more advanced software that they may have on their home computer.

#### **4.5.2 Equipment for telework**

Only organisation issued laptop computers were used for teleworking as this was the only way users could connect to the network and access work systems. The key issue expressed about this was the limitation in screen size, and not having dual monitors, affecting the ease with which staff could do their work. Some staff from case two were able to pick up an organisation monitor to use at home or had one delivered to them on request. As there was no compatibility with the organisations' computers and home equipment staff were unable to use their own personal computers, laptops, monitors or printers. If they specifically required printing or scanning staff would have to visit an alternative location or send information to their own personal email to download onto their own computers which created a security risk. Inability to use home equipment was seen as a restriction to work ability particular during a time when there was a shortage of equipment. Case two identified incompatibility as a key problem after a large aftershock in December 2011 necessitated closing of more alternative office spaces. To facilitate access to the organisations systems they stood up a virtual desktop which allowed users to login to their network from any device.

Along with email, telephones were used for communication. These were personal landlines, organisation or personal mobile phones. As per policies not all staff were

issued with mobile phones and this was a barrier to communication and resuming business, as one manager described,

*'They're always talking to customers so, I went to IT and said I need five cell phones... usually you'd have to sign all this paper work, and I was like 'just give me the damn phones''—M4*

Not having company mobile phones also meant they relied on individuals using their own devices and giving out their personal numbers. While this was acceptable for some, others were reluctant to share personal details with work colleagues which created further communication barriers. Text messaging was one of the most reliable forms of communication during the earthquake series and some teams used it for a lot of communication but this, again, relied on their willingness to use their own devices.

### 4.5.3 Working environment

The teleworkers' working environment was generally left entirely up to the individual to determine and use what they had available at home. While some had home offices most used a common living space as their work area typically using a dining table as their desk. Few had adjustable chairs and, if they did, they were typically described as not as 'luxurious' as the ones at work. Recalls of discomfort were common but this was mitigated by the ability to change positions and working locations more while at home. Being able to control the working temperature and noise (e.g. listening to music) for personal preference was seen as an advantage and more comfortable than being in an office environment. Teleworkers generally saw their working environment as vastly superior to that offered by the alternative locations. A typical comment was,

*'Teleworking gave you a better environment to work than in a freezing, under an air-conditioning duct where the trellis table is shared and every one is taken, or whatever, and it was dark.'—S8*

#### 4.5.3.1 Health and safety

There were no formal considerations given for health and safety of the teleworking environment. An email update to all staff from case one explains,

*'Can I ask people managers to emphasis to their people that these are extraordinary circumstances and they will need make do with what they have.'—Relocation update, 7 March 2011*

There was, however, assistance available if requested, for example, a case two participant with back discomfort was delivered an adjustable office chair. In addition,

team leaders and managers were responsible for checking that teleworking staff were managing satisfactorily.

#### 4.5.4 Management of telework

Teleworkers were managed by their team leaders and managers in their own style. Some placed an emphasis on face-to-face meetings visiting their team at home or arranging frequent gatherings while others had set times for telephone contact. Since the roles that were allocated to telework were those that could be done fairly independently and by people with telework experience or with an established level of trust, the way in which they were managed did not differ substantially from when they were working at a centralised location. For case one, in some roles (e.g. customer service) where productivity was electronically recorded there was an increased focus on monitoring for input and output for teleworkers, as put by a manager,

*'You could see the numbers not the people, you see, so it was the thing that we became almost manic about it' – M4*

For other roles, for example analytical tasks, where it is more difficult to monitor work progress, the management of teleworkers did not differ from the way it was done in a centralised office environment. Managers expressed difficulties with knowing what teleworkers were doing resulting in reliance on trust and outcomes. Non-managerial staff expressed satisfaction in the management support received and especially in the fact that they felt trusted to get on and do their jobs with increased autonomy, commonly expressed for example as,

*'It was really good, people trusted you to do the job.' –S11*

*'..knowing that your employers trust you to carry on and work from home and not take the mickey.' –S2*

Case two described a management shift for teleworkers to emphasise the key priorities of the organisation to help allocate work and enable teleworkers to focus and self-manage their day to day activities. This was a successful strategy therefore when the organisation returned to business as usual they tried to continue this way of working. This was unsuccessful and its demise was attributed to the ballooning volume of work priorities and the return of the 'red tape'. In addition, non-managerial staff reported being more satisfied with having the key work priorities identified and dissatisfaction upon return to a centralised office area with more 'micro-management'.

#### 4.5.5 Distractions

Distractions from the home environment while teleworking were disabling for focus and productivity and the lack of distractions from the usual work environment were enabling for effective telework. The home environment presented distractions such as household tasks and food with general agreement that a strong self-discipline was required to telework effectively. More often, however, the lack of interruptions often experienced in the office environment was considered a positive to teleworking and a factor that supported increased productivity for tasks which require concentration and unbroken periods of time. The potential downside for individual's wellbeing was that there was a tendency to work longer without taking breaks.

#### 4.5.6 Communication

One of the largest challenges for the operation of telework was effective communication. Communicating was primarily through email and telephone and there were significant limitations seen with this directed at the lack of face-to-face communication and proximity. The two way aspect of communication, non-verbal cues, and social aspect of face-to-face was missed when communicating remotely. It was difficult to get hold of people at times which created road blocks in work progress. In addition, the flow of information could be disordered creating conflict or not flowing at all so that work was conducted in silos. Not having team members close by eliminated the casual conversations that often happen in an office setting which enhances flow of information and the feeling of connectedness in a team, evidenced by this manager's comment,

*'It's the informal chatter that goes on, you pick up things or 'I've got this problem, what do you think', help you to solve problems, so all those strengths that come from being in team and being physically located with each other, were really negatively impacted. –M5*

Efforts were made to increase the ease of communication through the use of social media which was one of the most stable channels of communication during telecommunication and power disruptions. Facebook pages were set up by both organisations in the aftermath of the disaster but this was a new initiative and not planned for and had mixed uptake. Generally staff regarded their Facebook, if they had it, as being personal and they were reluctant to be connected to work colleagues through this medium. It could not be relied on as a sole source of communication and was not used for collaboration and its use dwindled and disappeared as time progressed.

#### 4.5.7 Collaboration

Linked to communication, collaboration was also considered much more difficult when teleworking. Efforts were made to mitigate this by meeting at other locations. This was a challenge as meeting spaces were in high demand and convening a suitable time for all was often problematic. In addition, this relied on all attendees to travel which at the time was often difficult. Apart from a permanent free call telephone number for audio conferencing in case one there was no provision of other technological tools for collaboration. The difficulties with collaboration were highlighted as the duration of telework lengthened.

### 4.6 Recovery phase – outcomes

The perceptions of outcomes of teleworking are considered in this section and were borne out of the continued experience of telework through the recovery phase and in hindsight after returning to a centralised office environment. Though there are degrees of overlap, the outcomes discussed at the individual and group level are flexibility, wellbeing, socialisation, work life boundary blur, financial impacts and productivity. Consideration of productivity is also included at the organisational level along with the outcomes for business continuity and adaptivity.

#### 4.6.1 Flexibility

Positively, telework generated a lot of flexibility for individuals and the case organisations. In a post-earthquake environment, there are a lot of household factors that require attention, for example, dealing with the earthquake commission assessors, insurance companies and repair workers. On top of this are family and community responsibilities, for example, child care when schools are closed, managing psychological trauma of self and family members and supporting your community. The ability to work from home allowed teleworkers to deal with these additional issues more easily, this was emphasised by one comment,

*'It was a horrendous time so having that, working from home, was, just made it easier. In fact I don't know how people who don't work from home manage it all.'* –S13

There was also the opportunity to schedule your day to suit personal preferences, for example, start earlier and take a longer break in the day for exercise or leisure. Being at

home also allowed household chores to be managed more easily, for example, a break would be used to hang out the washing or collect children, as described by one participant,

*‘Much more flexibility to ... keep my home life going at the same time as my work life without either of them suffering’. – M12*

There was positive spin offs for the organisation as by allowing people to deal with their personal circumstances more easily they could then focus on work at other times. Commitment to the organisation was also evident as the support for flexibility was appreciated. The flexibility of hours worked benefitted the organisation when out of normal hours work meant that they could respond more efficiently to their customers particularly in a rapidly changing environment. Moreover, providing flexibility was a support for wellbeing in teleworkers.

#### **4.6.2 Wellbeing**

Given the stressful circumstances, telework impacted positively on the wellbeing of individuals. The key factor in supporting wellbeing was the opportunity to be at home to support family members in an environment that felt safer than a central city office building. An example of a common comment was,

*‘I really preferred just to be within that five kilometre range of everybody that I can get them if I have to.’ – S5*

In addition, it meant that people could continue to work which contributed to a sense of normality where if they had to attend a centralised workplace, given other responsibilities and personal circumstances, this would not have been possible. This was emphasised by a unique participant from case two who is wheelchair bound. Access to other alternative work sites was less than ideal and in some cases impossible for wheelchair users and there were concerns over evacuating her safely during aftershocks. If telework had not been available she would not have been able to work at all. In her words, this would have been ‘ghastly’. The capacity to telework not only assisted this individual’s wellbeing but ensured that the skills and knowledge of a long serving professional were retained.

The option of teleworking was appreciated as beneficial to wellbeing in relation to what it would have been like if employees had been obliged to work at one of the temporary,

alternative locations. These locations were typically cramped and not well set-up, as one person put it,

*'There was trellis tables with horrible chairs, really noisy...it was crazy, there were people wandering around in yellow jackets carrying maps and all that type of thing all the time, it would have been terrible to concentrate' – S10*

Related to this was the fact that teleworking eliminated the need to commute. This was beneficial for wellbeing by eliminating the stressful experience of getting around the city on damaged roads with poor traffic flow.

Organisational support in general and for teleworking contributed to the sense of wellbeing. The organisations' focus in the initial stages and beyond was on the safety and wellbeing of their employees. This was evidenced, in one way, in the documents collected from case one as most of the communications reiterated 'the safety and wellbeing of you and your loved ones is your first priority'. Employee assistance programs were offered and ongoing support was provided by management and teams.

#### **4.6.3 Socialisation**

Social isolation was a negative outcome associated with teleworking. Even those who enjoyed teleworking felt a degree of social isolation over time and were surprised that they missed the interaction with others, not necessarily on work matters but general day to day conversations that made them feel connected. As an example, one person explained,

*'You do start to feel lonely at some point, although we all feel we hate it, coming to a very busy office, after the first second and third week you realise 'actually it's quite lonely during the week now', you can't just 'you know what happened to me last night' you can't do that type of thing.' – S5*

#### **4.6.4 Work life boundary blur**

While teleworking supported employees to balance their work and other life commitments through flexibility, there was a degree of blurring between their working lives and the other parts of their lives. This was associated primarily with family members and their adjustment to having someone working from home, as one interviewee said,

*'I suspect my wife would say she crept around a bit and tried not to talk... sometimes she did.' – S1*

The fact that the individual was working, though they were at home, had to be emphasised to family and friends. Also, continuing work after hours was a potential problem for some who found it difficult to delineate between work times and home times as work was always there. This was especially true if they did not have a dedicated, separate space to work away from family spaces where they could ‘shut the door on the work day’.

#### **4.6.5 Financial impacts**

Teleworkers used their home facilities including electricity, heating and internet connections and data traffic to enable teleworking. These expenses were not typically reimbursed by the organisation even though there were requests for compensation. There was no prior policy regarding this consistent with the general lack of preparation for a move to a teleworking situation. At the same time teleworkers did not incur travel costs and other commuting expenses such as time and car parking. Overall the participants in this study were relatively unconcerned with the lack of reimbursement, feeling that it was generally a case of ‘swings and roundabouts’ and realising that alternative work locations were available if required. In fact a common comment was along the lines of,

*‘There was enough other stuff going on, I felt like I was in a lucky position to be able to work from home so I wasn’t going to rock the boat.’-S12*

#### **4.6.6 Productivity**

The productivity outcomes of teleworking at an organisational level are difficult to determine as the earthquake period was generally chaotic and created large changes in productivity levels. For example, the productivity of case one was very low initially when they lost their IT infrastructure though they saw an increase in productivity for some of their operations when it was primarily home-based and more focussed on outputs. This varied, however, between individuals who seemed more or less suited to teleworking as time spent teleworking increased. For some areas work priorities changed so comparing work that was previously done in a centralised office work and teleworking was not possible.

Improved individual productivity was acknowledged by managers for tasks that required focus and benefitted from the lack of interruptions seen in a normal office setting. Productivity increases were also seen to be supported by the flexible and



extended hours seen with teleworkers. They felt, though, that group productivity was limited by the lack of proximity, communication and social interaction which restricted collaboration, created road blocks in work flow and limited the sharing of work load.

From an individual's perspective teleworking increased productivity for tasks that were performed better without interruptions, though was felt to be diminished for collaborative tasks. Once again, the flexibility offered by teleworking allowed them to work given other circumstances when they may not have been able to work at all and their productivity would have been zero.

#### **4.6.7 Business continuity**

Business continuity was considered the major positive outcome of teleworking for organisations. It enabled the organisations to continue to operate and deliver services to their customers without having to rely solely on other office locations. The lack of planning and preparation for teleworking meant that it was not utilised as fully as it might have been but without it the situation would have been more difficult, as one manager expressed,

*'Definitely it allowed business to continue. Otherwise it just would have screamed to a heap.'*-M7

#### **4.6.8 Adaptivity**

A further organisational outcome of teleworking was adaptivity, enhancing the organisation's ability to adapt to changing circumstances. In case one, once people had teleworked or seen teleworking used effectively for business continuity and to support the wellbeing of their people in the face of a disaster it was more accepted as a working practice and the potential benefits from teleworking were clearer. Case two recognised that teleworking offered another way to provide flexible working options for their people which are beneficial for continuity of service.

## 4.7 Returning to business as usual

The business continuity and adaptivity benefits experienced with the implementation of telework after the earthquakes has influenced the direction organisations have taken following their return to ‘business as usual’ (BAU). This is discussed below preceded by describing how the case organisations migrated teleworkers back to a centralised office.

### 4.7.1 Return to BAU process

The process of returning teleworkers to a central location differed between the case organisations perhaps largely due to the timing of their reintegration. Case one began the transition of returning to a permanent common location approximately four months and case two approximately 13 months after the February 22<sup>nd</sup>, 2011 earthquake event. The timing differences resulted in some different themes emerging from the two cases. For case one, the change process was highlighted by an emphasis on communicating information on the safety of the new office building to its people and slowly transitioning those traumatised by the events back to an office building. This was due to there being still fairly continual aftershocks at this time and many people having a heightened sense of anxiety in these events. Moreover, the relatively short period of time since the earthquake series began meant the trauma of the events were still very raw and many people were still experiencing stress emanating from the disaster and subsequent events, dealing with property issues and psychological trauma.

For case two, while building safety and wellbeing were considerations it was emphasised less by the participants. For non-managerial staff the theme which emerged was dissatisfaction in the return to a centralised office. As this group had experienced teleworking for a longer period of time they were generally disappointed with having to return full time to an office, particularly initially when it was a temporary office with less than optimal working conditions, as one person expressed,

*‘Why would we all sort of be dumped into this old ugly building if you have a choice and everything’s working so far?’ -S5*

Additionally there were difficulties with the transition from teleworking to the usual office environment, as an example,

*'I hadn't really seen everybody so it was nice to see everybody again. But then the novelty of that wore off because it was actually hard to transition back from working from home, it was.'* - S10

On the other hand managerial staff felt that teams worked better when co-located and there was social interaction.

#### **4.7.2 Ongoing telework**

The experience gained from adopting telework following the earthquakes has contributed to some organisational initiatives to support and extend the ongoing use of telework. In recognition of the value of telework in business continuity case one have initiated a trial of telework for some call centre staff. The greater acceptance of telework has seen an increase in its ad hoc use to support work without interruptions and to manage family commitments, though no specific teleworking policies appear to have been developed. Telework, however, is integrated into emergency management and business continuity planning. In addition it has been easily and successfully rolled out in recent extreme weather events such as snow and floods. Moreover, they have enhanced their technological communication tools with web cams and improved remote accessibility and network security.

For case two, there has been increased focus on technological development to support telework. Following on from the virtual platform that was established during the earthquake series, a project has seen the development of a more permanent platform through which all staff are able to remotely connect to the organisations systems from any device anywhere. In addition, business social media tools have also been trialled to improve virtual communication and collaboration. Hybrid, regular teleworking (some days or part days per week) has been initiated for those with special needs but otherwise there has been a return to pre-earthquake practices of informal, ad hoc teleworking to meet occasional personal responsibilities. Remote access work has been included in emergency management and business continuity planning. Amongst the participants of this study some were eager to continue to telework on a regular, part time basis but this has not been authorised. This was attributed to management attitudes that it is important for all team members to be in the same location so that they can collaborate,

communicate and share work load more easily. As non-managerial staff had adopted telework in a time of crisis, felt they had assisted the organisation and realised the benefits it offered them personally, it has created discontent that they are no longer able to telework regularly. Their feelings are summarised by this one comment,

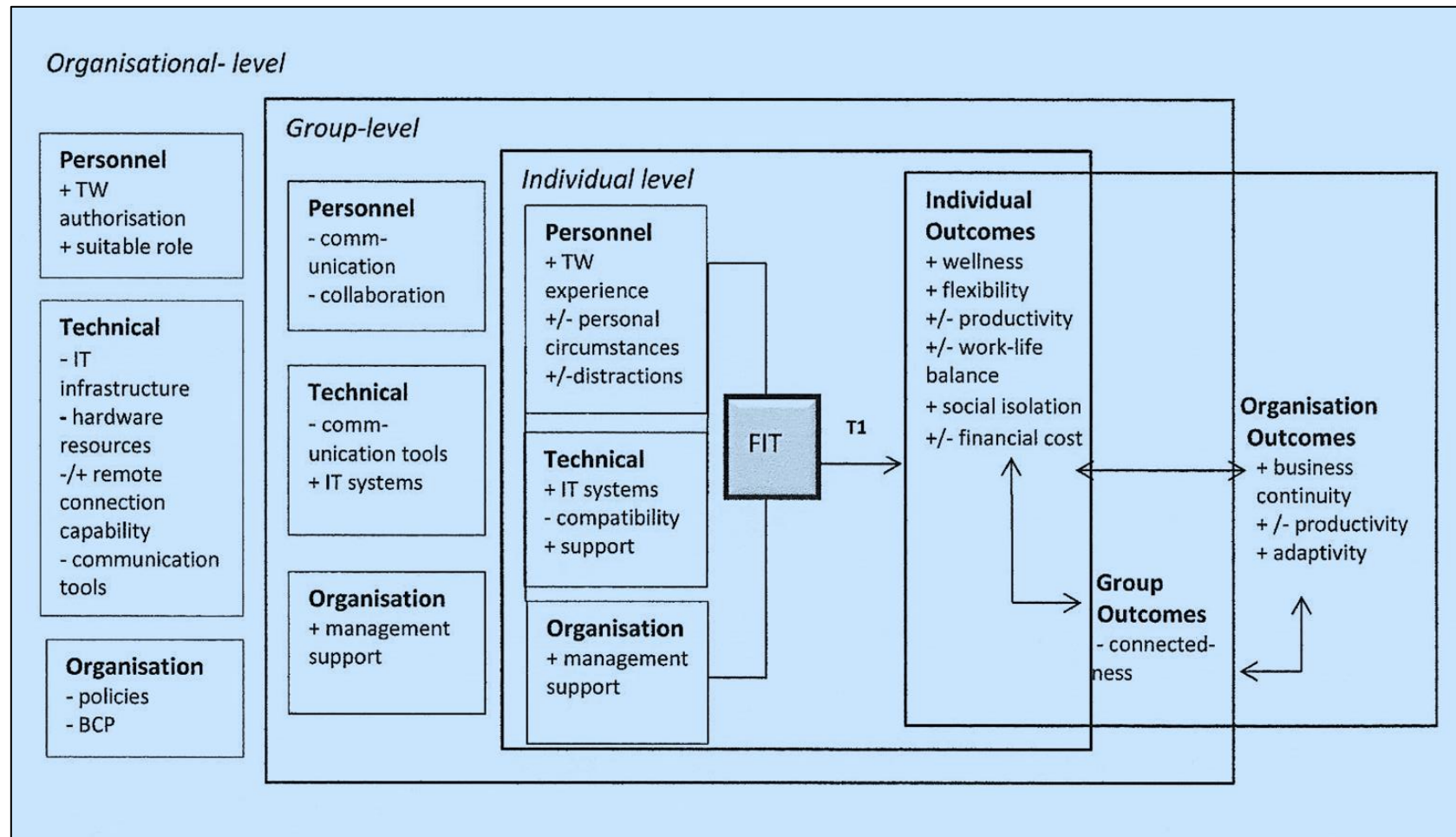
*'I do think it was a bit unfair, I thought well its ok for them when they need us to work from home but as soon as circumstances change and it doesn't suit them they don't want us to.'* –S11

There was also a sense that not being allowed to telework was due to the management approach that required physical presence to demonstrate that work is being done rather than being focussed on outcomes with a relationship based on trust. Additionally there was some sense of frustration that the benefits of productivity, reduction of commuting, savings on space and employee satisfaction were not being considered when teleworking was technologically enabled.

## 4.8 Findings summary

The findings from the analysis are represented as a summary in the socio-technical systems (STS) telework framework in Figure 10. This demonstrates the multi-level interaction between antecedents and outcomes across the sub-systems of personnel, technical and organisation of adopting telework following the earthquakes. This framework (Figure 11 and Figure 12) is also used to summarise the findings for each of the case organisations as they returned to a business as usual environment.

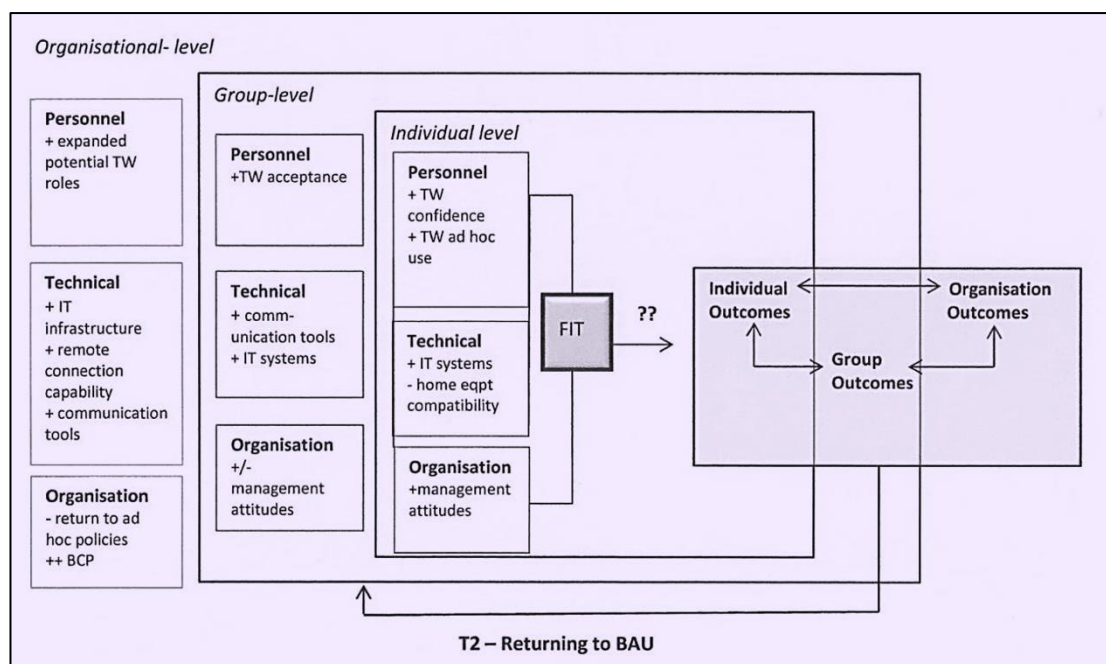
The model shows that at an organisational level the adoption of telework was enabled by prior authorisation of telework, having a role which was deemed suitable for teleworking and the technical capability for remote connection to organisations systems. Adoption of telework was made more difficult by the lack of telework policies and planning, poor IT infrastructure, and lack of hardware resources and communication tools. At a group level the change to a telework arrangement was facilitated through management support and satisfactory IT systems. The barriers for groups to telework were the limitations of communication and collaboration and the lack of technological tools to support these crucial functions. For individuals telework was aided by previous experience of teleworking and favourable personal circumstances. The lack of work interruptions also enabled telework though home distractions could make it more difficult. Telework was supported by IT systems and support but disabled by the lack



**Figure 10** A multi-level telework framework for the adoption of telework after the Christchurch earthquakes for two case organisations, + is an enabling factor and – is a disabling factor

of compatibility to use home technical equipment. The way that these factors interacted determined the outcomes seen with teleworking. For individuals, the adoption of telework in a post-disaster environment resulted in flexibility for balancing other commitments with work though there was some blurring of work-life boundaries. Telework also enhanced well-being in a difficult time. This was mitigated somewhat by the social isolation of working alone. Social isolation also impacted on productivity for collaborative tasks while teleworking facilitated productivity of tasks requiring independent focus. Costs of working from home were borne by individuals, although this was balanced somewhat by financial savings on commuting. These individual outcomes supported organisational outcomes of business continuity and adaptivity in a changing environment. Organisational productivity was supported by teleworking and inhibited by the resultant lack of group connectedness.

As the case organisations differed somewhat as they returned to a 'business as usual' environment one model is presented for each organisation. Figure 11 for case one and Figure 12 for case two.

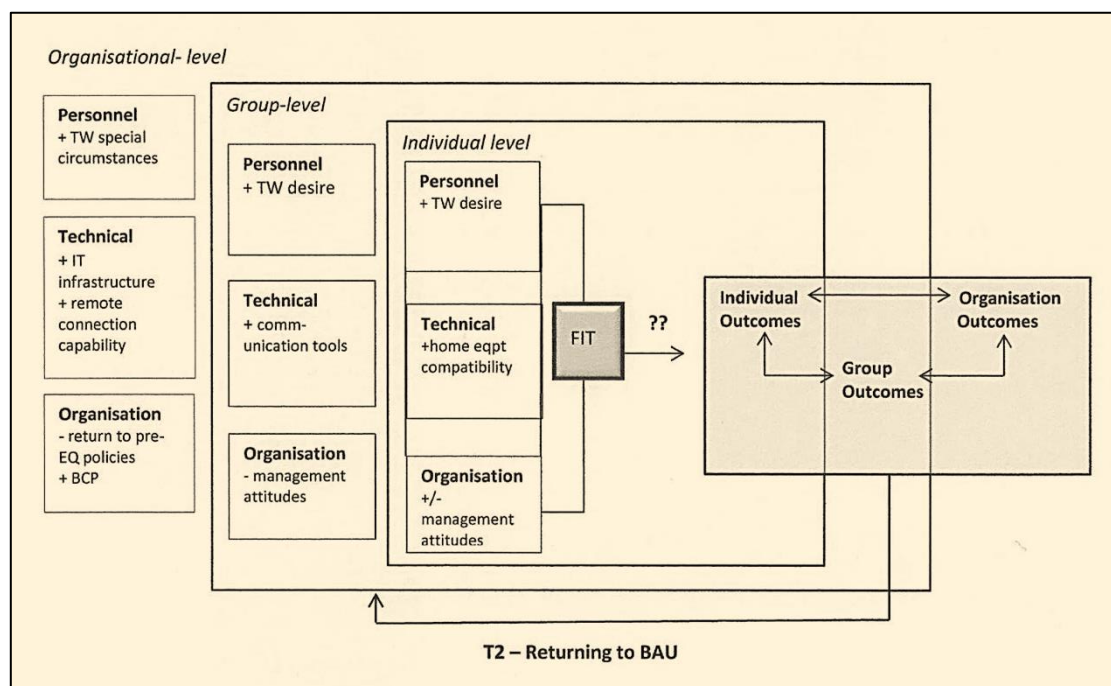


**Figure 11** Case one: a multi-level telework framework representing the change over time to a business as usual work environment following recovery from the earthquakes, + is an enabling factor and – is a disabling factor

With the return to a centralised office working arrangement from teleworking, case one (Figure 11) enabled ongoing telework by expanding the roles that could be teleworked, improving its IT infrastructure and remote connection capability and adopting some communication tools. Telework was included in business continuity planning though

teleworking policies in a business as usual environment have not been developed. At a group level telework became more acceptable as a usual, occasional practice supported by better technology. Ongoing regular telework was both enhanced and limited by individual manager attitudes. Individuals gained confidence in teleworking and there was an increase in ad hoc use for managing personal commitments, uninterrupted work opportunities and severe weather events. Ad hoc use of telework for individuals was supported by management attitudes. As time progresses further from the earthquake events the outcomes of teleworking in a business as usual environment remain to be seen.

Case two's teleworking status upon returning to a centralised environment (Figure 12) differs in that it developed a strong technological base for teleworking, allowing remote connection from personal devices anywhere and use of enterprise social media for communication. However this was not enabled by management attitudes with the ability of some groups and individuals to telework on a regular, part-time basis restricted by managers.



**Figure 12** Case two: a multi-level telework framework representing the change over time to a business as usual work environment following recovery from the earthquakes, + is an enabling factor and – is a disabling factor

Following a prolonged telework experience after the earthquakes the desire of groups and individuals to telework regularly increased and this was supported by some

managers in some circumstances. Again, the results of these directions will be determined as time goes on.

The implications of the findings are discussed further in the next chapter with respect to the research questions of this investigation, the existing literature and the theoretical framework. A consideration of the contributions of the research to the existing knowledge base, implications for organisations and the limitations of the study complete the chapter.



## **Chapter 5. Discussion**

This qualitative research study investigated the experiences of two case organisations who adopted telework as an alternative work arrangement in response to damage to their offices after the Christchurch earthquakes, and the need for business continuity. This investigation was grounded in socio-technical system theory and used a multi-level telework framework as a research lens. The study was conducted with a multiple-case study design and data collected through semi-structured interviews with 20 managerial and non-managerial staff and archival document records. The study found that the rapid adoption of telework following a natural disaster for the case organisations was enabled by prior telework capabilities and experience, adequate IT systems and management support. The barriers to implementation were IT infrastructure, hardware resources and a lack of planning. Once established, limitations of communication and collaboration were the barriers to effective telework. Inadequate communication tools to enable these functions and an inability to utilise home equipment were also barriers. Generally, the IT systems enabled telework satisfactorily and telework was aided by management support. The positive outcomes of telework for the individual were wellness and flexibility with some negatives of social isolation. For the organisation, business continuity was the most positive outcome, while telework also initiated greater organisational adaptivity. For groups there was a loss of connectedness which impacted on the outcomes for the individual and the organisation in terms of productivity and social isolation. With respect to the return to business as usual practice, case organisation one's teleworking was characterised by an increase in IT capability, acceptance and confidence. On the whole this was matched by positive organisational attitudes to teleworking for flexibility and adaptivity with some expansion of roles for teleworking. For case two the IT capabilities were enhanced as was staff desire to telework. This increase in teleworking capacity has not been fully matched by management attitudes, with regular, part-time teleworking being denied for all but special need circumstances.

Key findings will now be discussed in terms of the research questions posed at the outset of the study and with respect to the existing literature. The multi-level telework framework will be then examined with respect to its utility for this research and the contributions this study makes to the knowledge base in this area discussed. The

chapter concludes with a summary of implications for organisations and a consideration of the limitations of the research.

## **5.1 Research questions**

This research sought to answer the questions:

- i) What change processes did the case organisations adopt in implementing telework in response to a natural disaster?
- ii) What were the barriers and facilitators to rapid telework implementation in the case organisations?
- iii) What were the role of personnel, technical, task, environment and organisational factors and their interactions in teleworking implementation and outcomes?
- iv) What were worker and management perceptions of telework effectiveness and their intentions in relation to on-going teleworking arrangements in the case organisations?

The key findings addressing these questions are discussed in turn.

### **5.1.1 Change process, barriers and facilitators**

The change process to implement telework after the earthquakes was informal, crisis driven and limited by planning in both case organisations. There was a lack of business continuity planning in general and no planning related to utilising telework in the face of a disaster. This is consistent with findings in the United States where ITAC research (2005) stated that 41% of their sample did not include teleworking in their business continuity plans, and GAO (2011) where a lack of readiness for teleworking in response to an emergency was found. This is despite there being a Federal Act (2010) in the US to enhance telework and the country experiencing many disruptive events (e.g. 9/11 terrorist attack, Hurricane Katrina, Hurricane Sandy). The case organisations prior lack of telework adoption and planning does not provide support to Daniels et al. (2001) proposition that the threat of a natural disaster will encourage early adoption of teleworking practices as New Zealand has known of its earthquake risk for many years. For the case organisations, however, the experience of a natural disaster has encouraged the adoption of telework and increased the organisation's capability to employ it in

disruptive situations. In addition the use of telework is now part of their business continuity planning which, according to Battisi and Deakins (2012), will improve their adaptive capacity. This increase in interest in telework following a natural disaster was also reflected in the findings of Maria and Hitoshi (2012) who found that after the Tōhoku earthquakes in Japan attitudes towards teleworking were more positive when presented with respect to business continuity planning.

The deficiency in planning for telework in disruptive circumstances was also reflected in the lack of IT infrastructure and resources available to the organisations which initially was the main impediment to establishing telework. The difficulty of securing computer equipment in an unplanned change was a challenge also for the case described by Donnelly and Proctor-Thomson (2013).

As a process to adopt teleworking in case of disruption was not established the change in work arrangements focussed on securing alternative locations. This was difficult and took some time as office space in the city was so limited after the disaster. For those who were less impacted by the earthquake and able to work, there were lost opportunities for the organisation in terms of business continuity and productivity related to limited access to work. This mirrors the findings of the Donnelly and Proctor-Thomson (2013), where a large proportion of their sample did not begin working until more than a month or more after they felt ready to – although it is noted that the time frames for our case organisations to resume work were much shorter. In addition, the lack of ability to telework meant that those working in alternative locations often required increased travel, constant readjustment as more damage occurred, and often worked in poor environments. Thus, the reduced planning and ability to telework also had implications for non-teleworkers.

Most staff who teleworked had previous experience of teleworking or at least remote access ability. For these people the change to teleworking was relatively simple and made easier for those who had used the remote systems more frequently. This provides support for the assertions in the existing literature that experience in telework is a great advantage in a disaster situation (Cavanaugh & Leick, 2013; Roitz & Jackson, 2006).

### **5.1.2 Role of subsystems, levels, interaction and outcomes**

Once telework was established, the key factor that impeded telework at a group level was communication and collaboration. This affected the ease in which tasks could be

done when either a response from another or collaboration was required. This resulted in reduced productivity. The ability to communicate and collaborate was restricted due to the non-existence of technological tools, apart from telephones and email, to assist this. Existing literature suggests that the quality and social richness of communication technologies has an impact on productivity and satisfaction of teleworkers (Bélanger et al., 2001; Bosua et al., 2013; Turetken et al., 2011) and that this can be improved with tools such as online collaboration, presentation rooms and video conferencing (Bayrak, 2012; Ye, 2012). For the teleworkers, the efficiency of doing work was also hindered by the inability to use the equipment they already had at home, for example, large monitors or faster personal computers, due to incompatibility. Both case organisations have recognised the limitations of their existing ICT systems and have, post-earthquake, added some tools - for example video conferencing, trial of enterprise social media and establishing a virtual platform.

At an individual level social isolation is a downside to telework that is reported frequently in the literature (Bentley et al., 2013; Maruyama & Tietze, 2012) and was also an outcome for individuals in the current study. It is likely that the limitations of the available communication systems impacted on the social isolation felt by teleworkers. In the Donnelly and Proctor-Thomson study (2013), their case found the Facebook page set up for their organisation very useful as a way to communicate. This is in contrast to our case organisations whose Facebook pages were not widely utilised. This may have been due to the overall prevalence of Facebook use as their sample also used personal Facebook a lot while our participants generally were keen to keep their work and personal lives separate. Having an established means of alternative communication prior to a disruptive event is it likely to be important in ensuring its usefulness at the time of an event.

The experience of social isolation amongst the participants in this study is also likely to have been enhanced by the fact that face-to-face contact was difficult in the circumstances of the disaster and that personal contact became even more important in such a traumatic time. In addition, in a business as usual environment telework has optimal outcomes of satisfaction and productivity when it is a 'hybrid' model (Bentley et al., 2013; Golden, 2006), working away from the office one to three days per week, but in the environmental context of the earthquakes most telework was fulltime. This is coupled with the fact that prior to the earthquakes teleworking was ad hoc so there was a large social adjustment from working in a busy office to working alone so the

isolation may have been felt more keenly. Social isolation also impacted on the group outcome of reduced connectedness which reflects the negative effects on co-worker relationships found by Gajendran and Harrison (2007) and Golden (2006) for high intensity teleworkers.

Teleworking offered flexibility to manage other commitments during and following the disaster. This was valued by staff and contributed to the outcome of wellbeing. The positive effects of telework on wellbeing found replicate that of Roitz and Jackson (2006), who report on the teleworking experience of AT&T after Hurricane Katrina and Donnelly and Proctor-Thomson (2013) who report on the Christchurch IRD after the earthquakes. Wellbeing was also enhanced by the participants feeling supported by the organisation throughout the disaster and post-disaster phase and trusted while teleworking. Following other disasters basic help and social support had a positive effect on organisational commitment (Sanchez et al., 1995), and in a human resource management study after the Canterbury earthquakes Nilakant et al. (2013) found the perceptions of organisational support shaped work engagement. Teleworkers in both case organisations in this current study also showed evidence of organisational engagement by working flexible hours to reach work goals, using their home spaces and internet connections mostly without reimbursement and generally being flexible and working despite the difficult circumstances. This engagement is likely to have had an impact on their productivity which in turn assisted the business continuity, adaptivity and productivity of the organisation. The support they felt they had received over this period may have a positive effect on organisational commitment.

### **5.1.3 Telework effectiveness**

The adoption of telework after the disaster was effective for business continuity. This was supported by both the management and non-managerial staff from the case organisations. This finding provides supporting evidence for the existing body of literature that has claimed business continuity as a benefit of teleworking (Gill, 2005; International Telework Association and Council, 2005; Vivadelli, 2005). It also begins to respond to the call of others to investigate the efficacy of telework amidst disaster (Martin & MacDonnell, 2012). An aspect that does not appear extensively in the existing literature is that telework as a tool for organisational business continuity also supported organisational staff. They were able to continue to work and to meet their work goals which supported their wellbeing through a sense of normalcy and

employment security. Individuals and organisations were able to see the benefits of teleworking for business continuity in a disrupted environment. This has resulted in ongoing initiatives for telework.

#### 5.1.4 Ongoing telework

As outlined in section 4.8, the experience of adopting teleworking post-disaster sparked some technological innovation, inclusion of telework in business continuity planning, some increase in teleworking for case one and increased awareness and experience of teleworking. Since individuals had experienced more extensive telework and seen the benefits both from an individual and organisational perspective some non-managerial staff in case two felt some dissatisfaction with the return to a business as usual environment. In the first stage of the transition back to permanent offices there was a mandatory requirement to work from a temporary office building. As the environment was not ideal, and it was felt that teleworking was effective, the reasons behind this decision were not well understood by staff. This finding was also seen in the IRD case (Donnelly & Proctor-Thomson, 2013) when their staff were relocated from home to temporary offices and commented,

*‘...it just seemed to be a belief of the organisation’s that working in offices was better than working at home’, p. 39*

Dissatisfaction continued for some case two participants when, once work had been established in a permanent building, they were not allowed to continue to telework on a regular basis. This was attributed to management perception that staff were not as productive when distributed since collaboration and communication is limited and management style preferred staff to be visible. As there had not been extensive teleworking prior to the earthquake many opinions about telework had been formed through the experiences of post-earthquake adoption. Telework is considered an organisational and human resource innovation (Lee et al., 2009; Ruppel & Harrington, 1995) and as such many commentators consider that its introduction involves organisational adjustment of governance structure, coordination and control mechanisms, and relationship and reward systems (e.g. Daniels et al., 2001; Martínez-Sánchez et al., 2008; Watad & Will, 2003). In the situation post-disaster the adoption of telework was triggered by the organisational change and implemented rapidly without planning so that there was no ability for adjustment of any structural elements. Thus, if managerial attitudes about telework were formed from this disorganised state and if this

is carried through to a business as usual environment it is possible that the documented benefits of telework for employee satisfaction, organisational productivity and adaptive capacity will be unrealised (Bentley et al., 2013).

As telework was technologically enhanced post-earthquake in case two there is an apparent disconnect between this increased capability and management attitudes and current practice restricting its use. In contrast, case one have increased their use of ad hoc telework and extended the roles for which telework can be utilised. Management attitudes have on the whole supported this positively based on their experience of business continuity benefits seen after the disaster. Their attitudes to telework may have been more positive since the duration and intensity of teleworking were less than for case two, so any negative effects of ongoing telework were not seen. In addition, there could be a difference in organisational culture between the cases with case one supporting a more trust based culture and performance based management system which is considered more effective for teleworking than traditional management systems of face-to-face monitoring and supervision (e.g. Kowalski & Swanson, 2005; Offstein et al., 2010; Peters & Heusinkveld, 2010) . In the case presented by Donnelly and Proctor-Thomson (2013), telework had ceased and their staff also showed interest in ongoing hybrid teleworking in a business as usual environment if it was supported with sound policies and procedures, effective communication tools, training and appropriate technical and management support.

## **5.2 Multi-level telework framework**

For this research, Bélanger's (2012) multi-level framework for telework provided a valuable lens in which to consider the case study data. Firstly, considering the personnel, technical and organisational structure subsystems at each of the individual, group and organisational level allowed the complex, inter-related and voluminous information to be explained in a clear and logical way. For example, there were many important components related to IT but when considered in the model at different levels they became simpler to understand. As an illustration, infrastructure was critical at the organisational level, communication tools at the group level, and compatibility at the individual level. Secondly, it allowed the antecedents to be differentiated into subsystems which helped to clarify the areas where there were strengths or limitations

in the process of adopting telework after the earthquakes. Thirdly, using the concept of fit was beneficial to show how the subsystems interacted across the levels of analysis, and with the outcomes being differentiated by level it helped to illustrate that outcomes at one level will only partially explain the overall outcomes of the system. For example, the inadequacies of communication and collaboration tools at a technical level impacted on communication at the personnel level and were reflected in the individual outcomes of productivity and social isolation, the group outcome of connectedness and the organisational outcomes of productivity. Fourthly, since the use of telework changed over time as the case organisations returned to a business as usual situation, another strength of the framework for the enquiry was that it allowed comparisons between the different issues that emerged during this change and provided a way to consider what the outcomes across the levels may be and how these may affect the organisations for the future.

### **5.3 Contributions to knowledge**

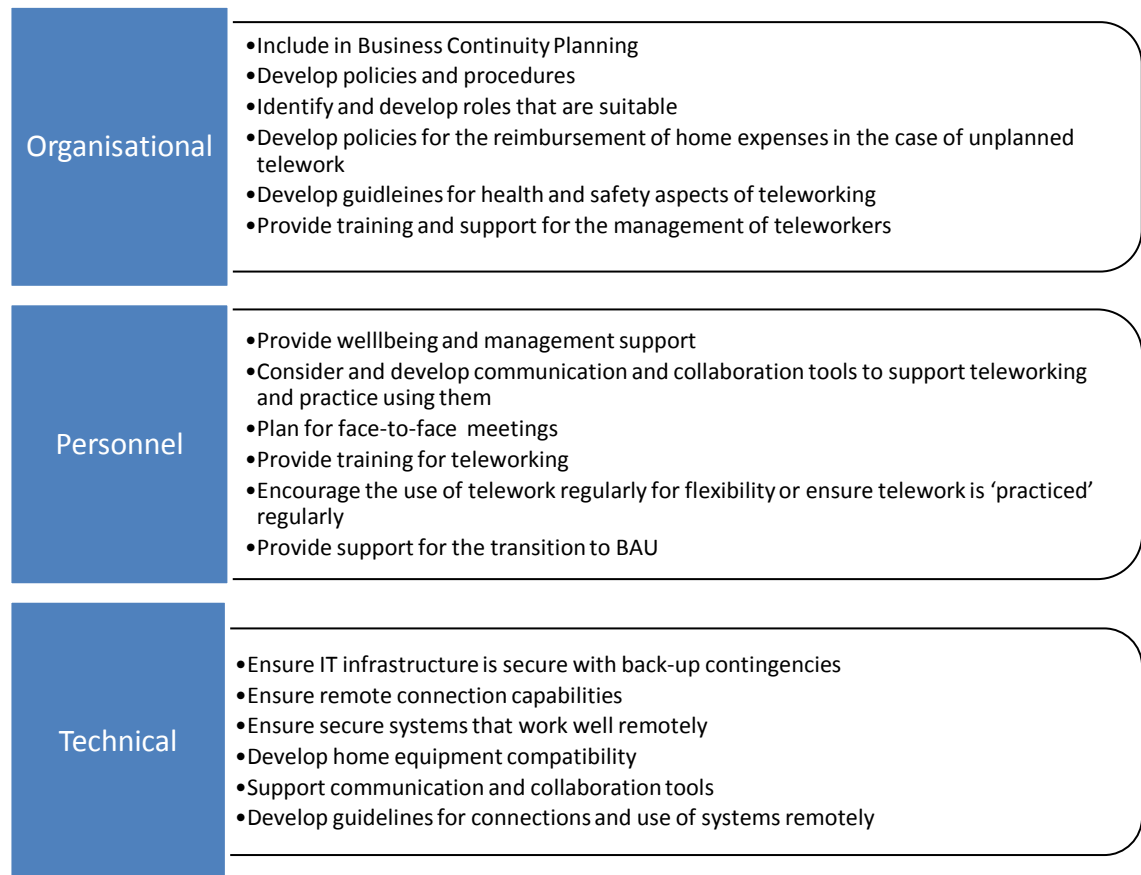
This research project makes several contributions to the existing body of knowledge in this area. First, applying the socio-technical systems (STS) theory to telework is novel and took up the call to action of Bélanger et al (2012) to test their framework in a variety of teleworking settings. Second, the study extended the STS telework framework to include the external environment of the organisations which was, after the earthquakes, rapidly changing. Third, as natural disasters are fairly infrequent this was an excellent opportunity to understand the ability of organisations to adapt to a dramatically changing environment and the outcomes that this had on their people and businesses. Fourth, this research provided an understanding of how telework can enhance organisational resilience in the face of a major natural disaster and what is required by organisations to realise this potential.

### **5.4 Implications for organisations**

Utilising telework after the disaster supported the organisations to continue their business and encouraged greater adaptivity. Learning from this, organisations should plan to use telework in times of disruptions in operations. This should include



consideration of personnel, technical and organisational aspects of adopting and utilising telework. Suggestions for organisations are shown in Figure 13.



**Figure 13** Suggestions for organisations based on the findings of this research to plan for adopting telework in disruptive situations

## 5.5 Limitations

As discussed in section 3.6, there are several limitations of this research related to the research design. The two case organisations involved in the study were recruited in a convenient way through business contacts of the researcher and may not be representative of all organisations in Christchurch who adopted telework as the result of the earthquakes. The findings from the case organisations in this research, however, corroborated with many of the findings in the IRD case study (Donnelly & Proctor-Thomson, 2013), suggesting that the experiences of many organisations were similar. In addition, the data were collected primarily through semi-structured interviews and, while a schedule was followed, there are many subjective aspects of the interview process which may influence results including rapport with interviewees, skill of interviewer, and recall of information. Collection of archival documentation associated

with the implementation of telework was used to verify some information provided although the amount of documentation was small and from only one case organisation. Interviewing both managerial and non-managerial staff was one way in which a range of views could be gathered though participation in this process was voluntary so the views of those who did not volunteer to participate may differ from what was found. Recording and transcribing the interviews so that the information provided could be repeatedly accessed and reviewed was in an effort to reduce misinterpretation of interview data. However, it is noted that the transcription process itself can be open to interpretation as oral language is 'translated' to written language (Hammersley, 2010). Limitations associated with the analysis of the data are common to all qualitative research and it is acknowledged that the prior knowledge base and orientations of the researcher may influence data analysis. Attempts were made to make this process as robust as possible by following methods for content analysis (Bazeley, 2009; Gibbs, 2007; Richards, 2005), using NVivo software to assist in handling the data and working within a theoretical framework. Finally, whilst the multiple case study design limits statistical generalisability there are analytic generalisations that have developed from the findings which may serve well as organisational learnings.

The final chapter concludes with a summary of the findings of this project, how the study has addressed some of the gaps of knowledge that exist in the current literature and suggestions for future research.

## **Chapter 6. Conclusions**

This research has explored the experiences of two case organisations that adopted telework following the Christchurch earthquakes. The findings have shown that the rapid adoption of telework was enabled by prior telework capabilities and experience, adequate IT systems and management support. Inadequacies in IT infrastructure, hardware resources and a lack of planning were the key barriers to implementation. Once telework was established in the post-disaster recovery phase it was limited by communication and collaboration difficulties and IT incompatibility with home equipment. Telework in a post-disaster environment was positive for the individual in terms of wellness and flexibility, although social isolation was a negative outcome and for groups a loss of connectedness was experienced. Utilising telework supported business continuity and adaptivity for the organisations.

This study has tried to address some of the gaps in the literature regarding the adoption of telework after a natural disaster. The findings of this study have helped to ascertain that prior use of telework supports adoption of telework after a disaster and its adoption may have been more effective if there had been more attention given to business continuity planning prior to the event. In addition it was determined that ICT is critical for telework after a disaster which is, in turn, vital for business continuity. The results of the study provide evidence that telework after a disaster is beneficial for individuals' wellbeing and managing other life commitments.

The impacts of telework on organisational productivity are not clear as productivity generally is difficult to determine in times of a disaster. However, it would be interesting to investigate the cost-benefit of implementing telework after a disaster compared to working at temporary locations. This study has also not been able to fully address the gaps concerning what types of organisations adopt telework post-disaster and to what extent it is used. This could be better explored with a larger scale study across many organisations using quantitative survey methods informed by the qualitative results of the current study to provide a more representative view.

The experience of teleworking after a disaster and the transition back to business as usual does influence teleworking plans for the future but if this impacts on long term adoption of telework or organisational commitment remains unclear. This needs to be

investigated by longitudinal studies to determine the use of teleworking and the commitment of people to the organisation as time after the disaster extends.

As both case organisations in this study were large, further research could look at the experiences of small and medium organisations and teleworking after disruptions. The limitations of communication and collaboration emerged as a key inhibitor to effective telework so investigations into what tools in this space enhance communication for teleworkers would be interesting. Finally, given the lessons learnt from the Christchurch earthquakes it would be of interest to look at whether telework has been included in the business continuity plans of other New Zealand companies and what has or has not influenced their uptake.

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## Appendices

### Appendix 1 Stakeholder Interview Schedule

#### Questions

1. What were your EQ work circumstances?
  - Change in location?
  - Absence?
2. Prior to the EQs was there a business continuity (BC) plan?
  - Your team?
  - Organisation-wide?
3. Did the BC plan include
  - Emergency response plan?
  - Incident management plan?
  - Business recovery plan?
4. Did planning include a way for staff to access work e.g. telework, alternative work arrangements?
5. How did staff get access to work?
  - From home?
  - Another location?
6. Before the EQs did you have staff who teleworked (worked at home or somewhere away from the main location of organisation at least one day per week)?
  - Were there any other types of flexible work practices?
7. Would you be willing to be involved in the study or provide contacts for the study?

#### Key general findings from stakeholder interviews

1. Following the February 22, 2011 earthquake both the large and the small organisations had an initial period of work shut down with a primary focus on the wellbeing of staff and their families.
2. The larger organisation had a business continuity plan including emergency response, incident management and business recovery plan but in the reality no one had fully prepared for an event of this scale.
3. Different parts of the large organisation had more or less well developed business recovery plans depending on their critical operational needs (e.g. real time operations of call centre were well developed).
4. Across the organisations emergency planning had been developed more fully or considered more carefully following the large earthquake in September, 2010. This had been very helpful.

5. The organisations planned for access to work by relocating to alternative premises. Working from home was used as a supporting function, especially initially, where it was possible. This was not explicitly planned for prior to the earthquakes.
6. Access to work planning was done by management teams and contact kept throughout the process with employees through text, phone and email. Management staff stepped up to do what was needed.
7. Biggest problems for resuming access to work, apart from access to buildings, were noted as IT issues (servers still in building, limited access to IT support to de-encrypt back up data, server damage).
8. Providing access to work appeared to be beneficial to the well-being of staff.
9. Telework was not used as a formal practice before the earthquakes but rather used on a case-by-case basis within the large organisation and as a tool for overtime for the small organisation.
10. The business Hub that was established following the earthquakes has had high occupancy by a number of users ('permanent' tenants, hot-desk use, meetings, and event space).



## Appendix 2 Participating organisation information sheet

# Participating Organisation Information Sheet



**Date Information Sheet Produced:** 9 November 2013

### Project Title:

A multi-level analysis of telework deployment and outcomes within organisations following a natural disaster.

### Research rationale and aims

Telework, working from home or another location (e.g. Business Hubs) away from the traditional office, offers many potential benefits for organisations including flexibility, cost-savings, and environmental sustainability. Following the Christchurch earthquake series it became clear that the ability of organisations to respond rapidly to a change in environmental conditions may be an important factor in their survival and recovery. Moreover, business continuity planning was one of the recommendations made from a report examining crisis management in the wake of the Canterbury earthquakes<sup>3</sup>.

While there is a large body of research on telework, research that explores the rapid implementation of telework in response to a major disruption to worker access is yet to be undertaken. In addition, research 'to enhance our resilience to challenges that nature throws at us' is included in the Report of National Science Challenges Panel<sup>4</sup> and specifically research activities around management aspects of resilient organisations.

Our research aims to understand the change process for organisations in implementing telework in response to a natural disaster and the outcomes of this change.

Gaining knowledge around the way in which teleworking was implemented following the earthquake series will help to provide a framework for teleworking in the future. This has potential benefits for organisations and the wider community for business continuity, organisational resilience and personal and community recovery.

### Please will you participate?

- We are looking for organisations that have moved between office-based work to telework arrangements as a result of the earthquakes.
- We are looking for management participants that they were either responsible for implementing telework arrangements or that supervised staff who moved to telework.
- We are looking for all documentation related to the introduction and outcome of telework arrangements.
- We are looking for staff that participated in teleworking at least one day per week.
- Participants will be interviewed by Nicola Green and it will require approximately 60 minutes of time with manager participants and approximately 30 minutes with employee participants will take place on site in a quiet location.
- The interviews will be recorded so that the interviews can be transcribed and the content analysed.

### Data collected

The research will form the basis of Nicola's Masters of Philosophy thesis and a report for the New Zealand Work Research Institute will be produced. It is anticipated that a journal article and a conference presentation may also result from this research project. Your organisation will be emailed a summary report and a summary report will also be posted on the NZ Work Research Institute website, [www.workresearch.aut.ac.nz](http://www.workresearch.aut.ac.nz).

<sup>3</sup> Battisi, M. & Deakins, D. (2012) Perspectives from New Zealand small firms: crisis management and the impact of the Canterbury Earthquakes. New Zealand Centre for Small & Medium Enterprise Research, Massey University; a report prepared for the Ministry of Economic Development

<sup>4</sup> Ministry of Science and Innovation (2013) Report of the National Science Challenges Panel, <http://www.msi.govt.nz/assets/Update-me/National-Science-Challenges/Peak-Panel-report.pdf>

**The Researchers**

I, *Nicola Green*, am an experienced ergonomist who has been involved with many projects within organisations. My supervisor is *Professor Tim Bentley* who is a very experienced researcher. He has published widely on issues relevant to the proposed research (including wellbeing, health and safety, ergonomics, management) and is currently leading the trans-Tasman Telework Study.

If you would like more information please contact Nicola Green, [nicola@ewh.co.nz](mailto:nicola@ewh.co.nz), telephone 021 750 020



## Appendix 3 Invitation to participate and information sheet

# Invitation to Participate and Information Sheet



**Date 'Invitation to Participate and Information Sheet' Produced:** 09 November 2013

### Project Title

A multi-level analysis of telework adoption and outcomes within organisations following a natural disaster.

### An Invitation

My name is Nicola Green; I am a Christchurch based ergonomist. I am interested in the way in which telework, or working from home or another location away from the traditional office but connected by technology, was adopted by organisations following the earthquakes in Canterbury.

I am conducting a research project which aims to explore the process of change to telework and what was the result of these changes, both to the organisation and to individuals. This research is for a Masters of Philosophy (Management) at AUT University.

I am looking for organisations and individuals to participate in this research and I hoped that you may be able to help. It will involve managers, who were involved in implementing or supervising telework, and staff who teleworked being interviewed by me. I also would like to collect all documentation related to the introduction and outcome of telework arrangements. Participation is completely voluntary and any participant may withdraw at any time before the data collection is completed.

All data collected will be confidential. The identity of your organisation, you and your staff will remain strictly confidential and nothing in the presentation of the data will allow an individual or your organisation to be identified.

### What is the purpose of this research?

The study will seek to produce recommendations for best practice in telework implementation and in producing desired outcomes in relation to productivity and wellbeing.

The research will inform the basis of my Masters' thesis and a report for the New Zealand Work Research Institute. It is anticipated that a journal article and a conference presentation may also result from this research project.

### How was I identified and why am I being invited to participate in this research?

Your organisation was identified through my business contacts or through other networks as being a potential participant since you may have moved between office-based work to telework arrangements as a result of the earthquakes.

We are looking for management participants that they were either responsible for implementing telework arrangements or that supervised staff who moved to telework and any staff that participated in teleworking at least one day per week.

### What will happen in this research?

Participants will be interviewed by me. It is anticipated that the interviews will take about 30 to 60 minutes and can be conducted in a quiet, location onsite. The interviews will be recorded so that the interviews can be transcribed and the content analysed.

### What are the discomforts and risks?

No discomfort or risks are anticipated! The interviews will be discussing the events, related to work, that followed the earthquake and I am mindful that this can be distressing for some. I

live in Christchurch and personally experienced all of the earthquakes and resultant impacts so I am fully aware of the sensitivity required when discussing these events.

#### **How will these discomforts and risks be alleviated?**

If I note significant distress, in discussing organisational change following the earthquakes, the interviews will be terminated and workplace support sought for the participant. Contact will be provided for workplace employee assistance programs, where available, and details of Quake Support and Counselling Services Helpline (ph 0800 777 846).

#### **What are the benefits?**

This research will help to gain understanding on ways to enhance telework practices for the future and benefit for organisations and individuals. It will help me gain a Masters of Philosophy (Management).

#### **How will my privacy be protected?**

All data collected will be confidential. The identity of your organisation, you and your staff will remain strictly confidential and nothing in the presentation of the data will allow an individual or your organisation to be identified.

#### **What are the costs of participating in this research?**

Your time! For manager participants the interviews will be approximately 60 minutes and for employee participants approximately 30 minutes.

#### **What opportunity do I have to consider this invitation?**

Please let me know that you can help by March 31st, 2014.

#### **How do I agree to participate in this research?**

Please read the attached consent form, sign it and give it to me before the interview.

#### **Will I receive feedback on the results of this research?**

Your organisation will be emailed a summary report and a summary report will also be posted on the NZ Work Research Institute website, <http://www.workresearch.aut.ac.nz/>

#### **What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Professor Tim Bentley, [tim.bentley@aut.ac.nz](mailto:tim.bentley@aut.ac.nz), telephone 09 921 999 ext 5446

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTC, Kate O'Connor, [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz), telephone 09 921 9999 ext 8316.

#### **Whom do I contact for further information about this research?**

##### ***Researcher Contact Details:***

Nicola Green, [nicola@ewh.co.nz](mailto:nicola@ewh.co.nz), telephone 021 750 020

##### ***Project Supervisor Contact Details:***

Professor Tim Bentley, [tim.bentley@aut.ac.nz](mailto:tim.bentley@aut.ac.nz), telephone 09 921 999 ext 5446

Approved by the Auckland University of Technology Ethics Committee on 22 August 2013,

AUTC Reference number 13/215.

## Appendix 4 Management Interview Schedule

Management Interview Schedule	
<b>A. The nature of the organisation and its staff and primary activities</b>	
<i>What is your team's role within the organisation?</i>	
<i>How many staff are in your team?</i>	
<i>What are the main activities of your team?</i>	
<b>B. The organisation's policy and practice in relation to telework prior to the earthquake events</b>	
<i>Prior to 2010 was there a policy regarding telework, working away from the main office, within the organisation?</i>	
<i>Within your team?</i>	
<i>Did people telework?</i>	
<i>How was this arranged? Formal? Informal?</i>	
<i>How was this supervised, monitored?</i>	
<i>Did you have a plan to deal with business interruption? BCP? Was telework included in these plans?</i>	
<b>C. The events immediately following the earthquake that led to telework implementation</b>	
<i>After the earthquakes what happened as far as access to work was concerned?</i>	
<i>How did staff work?</i>	
<b>D. The change process used to implement telework</b>	
<i>How was it arranged so staff could telework?</i>	
<i>How was this organised?</i>	
<i>How was it communicated?</i>	
<b>E. The extent of telework implementation and decisions on who should telework and who shouldn't</b>	
<i>How many staff in your team teleworked?</i>	
<i>What were the key drivers to implement telework?</i>	
<i>Who, what type of roles teleworked?</i>	
<i>How was this determined?</i>	
<i>Were there formal agreements?</i>	
<i>What did they do if they didn't telework?</i>	
<b>F. The barriers and facilitators to telework implementation and effective telework once implemented</b>	
<i>What were the positive/ negative aspects of setting up to telework?</i>	
<i>Was there anything that made setting up telework more difficult? Easier?</i>	
<i>What were the factors that made telework work well?</i>	

What were the factors that made telework not work, or more difficult?	
<b>G. The perceived influence of management attitudes to teleworking on telework implementation and outcomes</b>	
What were your personal attitudes to teleworking? Negative or positive? What impact did this have on what you did?	
How did you feel the process of getting people to telework went?	
Were there benefits /downsides for the organisation?	
Were there benefits /downsides for the individual? How so?	
How did you feel the teleworking went once it was going?	
Did it work as a tool for business continuity?	
<b>H. Management perceptions of teleworking effectiveness in terms of the fit between teleworking and people, tasks, technology, environment and organisation</b>	
What equipment was used? Tablets, laptops, phones, PC, printers?	
Where did they come from? Supplied? Own?	
Was there any assistance provided for setting up home office?	
What kinds of systems/ interfaces were used? VPN? Facebook? Websites?	
Were there security policies?	
How effective was IT for teleworking? Did IT fit with teleworking?	
How effective was communication for teleworking? Did communication fit with teleworking?	
How effective was teleworking for the job tasks? Did the tasks fit with teleworking?	
Were there any OH&S considerations for home or remote sites?	
How effective were people's work environments when teleworking?	
How effective was teleworking for the organisation? Did it fit?	
<b>I. Management perceptions of telework productivity and wellbeing of telework staff</b>	
How was your staff productivity when teleworking? How would of productivity compared if they had not been able to telework?	
How was your staff with teleworking? Was it good for their wellbeing in the circumstances?	
Were there any unintended consequences of teleworking?	

<b>J. Management systems adopted to manage telework effectively</b>	
<i>How was telework supervised or monitored?</i>	
<i>Did you change the way performance was managed?</i>	
<i>Did you change the way productivity was assessed? e.g. goal setting, outcome focus cf time at desk</i>	
<i>How did this work?</i>	
<b>K. Future plans with regard to teleworking – based on the organisation's experience of telework arrangements and outcomes</b>	
<i>Has anyone continued to telework?</i>	
<i>How did work arrangements return to 'business as usual'?</i>	
<i>Does the organisation now have policies or plans around telework?</i>	
<i>Is telework included in your emergency plans?</i>	
<i>Is telework included in your BC plans?</i>	
<i>How do you see telework in your organisation? Innovation? Disaster response? Staff benefit? Cost savings?</i>	
<b>L. Conclusion</b>	
<i>Do you have anything else to add?</i>	
<i>Do you have any documentation relating to implementing and managing telework e.g. emails, policy docs etc? If so please could I have a copy of them?</i>	

## Appendix 5 Staff Interview Schedule

Staff Interview Schedule	
<b>A. Their staff member's role and key tasks</b>	
<i>What is your role within your team and the organisation?</i>	
<i>What are the main activities? Key tasks?</i>	
<i>Hours of work per week?</i>	
<i>Is this the same as before the EQs?</i>	
<i>Prior to 2010 did you telework at all? How was this arranged? How was this supervised, monitored?</i>	
<b>B. The events immediately following the earthquake that led to telework implementation and their experience of change to telework arrangements.</b>	
<i>After the earthquakes how did the change to telework happen?</i>	
<i>How was this arranged, communicated?</i>	
<i>Was it voluntary or compulsory? How was it negotiated?</i>	
<i>How much did you work? How many hours? Different from normal?</i>	
<i>How did this go for you?</i>	
<i>How long did you telework for?</i>	
<b>C. The barriers and facilitators to telework implementation and effective telework once implemented</b>	
<i>What were the positive/ negative aspects of setting up to telework?</i>	
<i>Was there anything that made setting up telework more difficult? Easier?</i>	
<i>What were the factors that made telework work well for you?</i>	
<i>What were the factors that made telework not work, or more difficult for you?</i>	
<b>D. The environment they worked in when teleworking?</b>	
<i>Where did you work when teleworking?</i>	
<i>What were your living arrangements? Children? Other family?</i>	
<i>Other places?</i>	
<b>E. Their perceptions of teleworking effectiveness in terms of the fit between teleworking and people, tasks, technology, environment and organisation</b>	

<i>What kind of devices did you use? Tablets, laptops, phones, PC?</i>	
<i>Where did they come from? Supplied? Own? Who paid for them?</i>	
<i>What kind of systems/ interfaces did you use? VPN? Facebook? Websites?</i>	
<i>Were there security policies?</i>	
<i>How effective was the IT for teleworking? How was the quality? Did this impact on your work?</i>	
<i>How effective was the communication for teleworking? Did the communication fit with teleworking?</i>	
<i>How effective was teleworking for your job tasks? Did the tasks fit with teleworking?</i>	
<i>Were there any differences in the type of work you did teleworking compared with at the office?</i>	
<i>How was your work environment (workstation set-up, lighting, heating etc) when teleworking?</i>	
<i>Was it comfortable?</i>	
<i>How did this compare to working from the office?</i>	
<b>F. Their perceptions of their line manager's or supervisor's attitude to teleworking</b>	
<i>How did you feel you were supported when teleworking by your manager?</i>	
<i>Did you feel trusted to do you job?</i>	
<b>G. Their perception of their performance and productivity when teleworking?</b>	
<i>How do you feel your performance and productivity was when teleworking?</i>	
<i>How did this compare to when you were working at the office?</i>	
<i>Did your pay /rewards change?</i>	
<b>H. Impacts of teleworking on wellbeing, including work-life balance, social isolation, and job satisfaction</b>	
<i>How did teleworking affect your wellbeing?</i>	
<i>How did teleworking affect balancing your other life commitments?</i>	
<i>How did teleworking affect your job satisfaction?</i>	
<i>How would it have been for you if you were not able to telework?</i>	
<i>Were there any unintended consequences of teleworking?</i>	
<b>I. Their perception of the effectiveness of management systems for teleworking</b>	
<i>How was your telework supervised, monitored,</i>	

<i>coordinated?</i>	
<i>How did this work?</i>	
<i>How did this differ from when at the office?</i>	
<b>J. Future plans with regard to teleworking – based on your experience of telework arrangements and outcomes</b>	
<i>How did things return to 'business as usual' for you?</i>	
<i>Have you continued to telework at all? Why or why not?</i>	
<i>How do you feel about teleworking in the future?</i>	
<b>K. Conclusion</b>	
<i>Do you have anything else to add?</i>	
<i>Do you have any documentation relating to telework e.g. emails, information sheets etc? If so please could I have a copy of them?</i>	



## Appendix 6 Consent form

# Consent Form



*Project title:* A multi-level analysis of telework adoption and outcomes within organisations following a natural disaster

*Project Supervisor:* Professor Tim Bentley

*Researcher:* Nicola Green

- ☐ I have read and understood the information provided about this research project in the Invitation to Participate and Information Sheet dated 09 November 2013.
- ☐ I have had an opportunity to ask questions and to have them answered.
- ☐ I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.
- ☐ I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- ☐ If I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- ☐ I agree to take part in this research.
- ☐ I wish to receive a copy of the report from the research (please tick one): Yes ☐ No ☐

Participant's signature: .....

Participant's name: .....

Participant's Contact Details (if appropriate):

.....

.....

.....

.....

Date:

**Approved by the Auckland University of Technology Ethics Committee on 22 August 2013, AUTEK Reference number 13/215**

*Note: The Participant should retain a copy of this form.*

## Appendix 7      Transcription plan

### February 2014

Transcription of the electronic recordings of the interviews will be completed so that the informational content can be more easily accessed for review and analysis (Powers, 2005; Sandelowski, 1994).

The recordings will be transcribed following an ‘intelligent verbatim’ convention. This is a full and accurate transcription but one in which repeated or unnecessary words are omitted (Academic Consulting Ltd, 2013). This includes

- filler words such as ums, ahs, and ers unless at the beginning of a sentence followed by a pause.
- Words that are started but not completed
- Word repetitions or other stutters or stammers
- Any initial comments at the beginning of the interview not relevant to the content
- Non-verbal sounds will be recorded according to the style conventions listed below

Details at the beginning of the transcript will provide information about the purpose, date, and personnel of the recorded event. The date of transcription and transcriptionist will be recorded.

#### *Style convention*

Notation style	Description
• Name	• speakers identifying name
• Text of speech	• On the line after the speakers identifying name
• <i>text of speech of interviewer</i> • text of speech of participant	• to differentiate between interviewer and participant for ease of coding software use
• [unintelligible, time]	• Words that cannot be heard or understood
• [pause]	• Long pauses only, short pauses are indicated with a comma
• [laughter]	• Laughter
• [recording change]	• Change of recording within a single interview
• [interruption, description, time]	• For interruptions
• [interview ends, time]	• When an interview is clearly finished but the recording continues
• [noise made]	• Where a “strange” noise is made
• ...	• To indicate the trailing off and/or “picking back up” of a sentence
• (name deleted)	• Deleted name for confidentiality
• -	• Indicates a word has been cut-off mid-way through speech
• Xyz (M:abc) and cde	• Overlapping speech

## Appendix 8 NVivo Node Classification Sheet

Name	Description	Sources	Refs
Access to work	Gaining access to work or workplaces after the EQ	16	30
Lost opportunities	Opportunities for productivity which were lost	5	10
Adaptivity	Organisations ability to be flexible and responsive	8	21
Business continuity	Continuation of business activities after the EQs with TW	12	32
Capabilites for TW	Capability of organisation and individuals to TW	14	29
Change to TW	Change associated with moving from BAU to a telework situation post- EQ	24	72
Individual differences	Individual characteristics and circumstances	16	38
Collaboration	Working together to achieve shared goals whilst TW	13	25
Communication	Conveying information whilst TW	24	63
Face-to-face	Communication that is done in person rather than remotely	9	14
Proximity	Being physically close to facilitate ease of communication	13	19
Social media	The use of social media for communication	14	26
Disaster IT	Information and communication technology aspects in the disaster phase.	16	45
Security	Security of information	7	12
Distractions	Distractions when working	2	4
Disabling	Distractions that disable productivity	8	16
Enabling	Lack of distractions that enable productivity	14	24
Equipment for TW	Hardware equipment used for TW e.g monitors, printers, telephones etc	20	33
Financial impacts	Financial impacts of TW	8	11
Attitudes	Attitudes towards financial impacts	8	12
Travel	Financial impacts of travel when TW	4	6
Flexibility	Flexibility for individuals to manage other committments	16	46
IT for telework	Information and communication technology used to do work tasks	18	57
Support	IT support to enable TW	6	9
Management of TW	Aspects of managing staff to perform their tasks while teleworking	19	53
Support	Management support of TW	18	31
Ongoing TW	TW policies and practices following a return to BAU	19	79
Attitudes of management	Management attitudes to TW	15	49
Lessons learnt	Opportunities for TW in the future based on learnings from EQ experience	13	31
Preparedness	Organisation preparedness for disaster and business interruption	9	22
Prior TW policies and practices	TW policies and practices prior to the EQ	19	43
Productivity	Perceptions of productivity and performance when TW	18	53
Returning to business as usual	Experiences when returning to BAU in a centralised location	17	44
Job satisfaction	Feelings about job statisfaction when TW	8	13
Organisational committment	Engagement or organisational committment related to TW experience	9	15
Socialisation	Impact on social needs of TWers -socialisation and social isolation	14	30
Wellbeing	Effetcts of TW on wellbeing	19	64
Better than...	Preferable working arrangement compared to other work arrangements post-EQ	14	25
Organisational support	Support for wellbeing from organisation	14	27
Travel	Travel to and from work	7	17
Work life boundary blur	Merging of home and work life associated with TW	15	30
Working environment	The working environment in which TW took place	18	49
Health and safety	Heath and Safety of TW	10	12