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The development of telehealth services: An enquiry across Australia and Brazil

by

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ABSTRACT

This thesis explores the development and sustainability of telehealth services in Australia and Brazil. A telehealth service is defined as a “healthcare activity supported at a distance by information and communication technology service(s)”. Policymakers expect that telehealth services will improve healthcare access and increase system efficiency, and providers seek to ensure that healthcare is effective and safe. However, stakeholders exhibited a range of underlying views over the role of technology in healthcare, prompting the question, “Does the technology used by telehealth services shape our healthcare, or do we, as humans, collectively change and shape the technology and services used in healthcare?” This enquiry seeks to identify the real influences on telehealth services in the context of the Australian and Brazilian universal healthcare systems.

These systems were chosen because they provide public and private healthcare within politically federated systems, to geographically dispersed populations, from healthcare facilities concentrated in metropolitan and coastal conurbations. For telehealth services within these systems the processes advocated in practice guidelines were identified. Then, in an effort to uncover the rationale for these guidelines, a literature review considered explanations of the processes influencing the development of telehealth services. It found that organisational and professional contexts were key to understanding these processes. Using these findings, a conceptual model of enquiry was built to guide field research using realist methods to explore the underlying processes and mechanisms of telehealth service development. This field research comprised four interlinked phases commencing with exploration and enquiry phases, during which evidence was collected across Australia and Brazil which included 135 semi-structured participant interviews, followed by analysis and comparison phases, in which the themes in participant interviews were identified and compared using iterative, theoretically grounded processes.

Telehealth services in Australia and Brazil were found to face similar challenges. Healthcare systems, medical culture and practices have changed to support healthcare activities across places supported by technology. Political, organisational, economic, and regulatory reforms have significantly influenced the organisational and professional contexts of telehealth services. Despite differences in the structure of the Australian and Brazilian health systems, the underlying mechanisms influencing telehealth services and their contexts were found to be similar.

The principal conclusions of this research are that continued operation, development, or sustainability of telehealth services is never guaranteed, but is contingent on and sustained by interactions between contexts and telehealth services through four key mechanisms, which:

- legitimise practice based on explicit and implicit sociotechnical codes including strategies, guidelines, and clinical routines;
- build confidence through accepting technology, management of the risks, and creation of trust in practice;
- build relationships between stakeholders; and
- acquire resources, such as information and communications technology, human resources, and funding.

The relationships between these contexts and mechanisms is described by a new meta-theoretical model of how organisational and professional contexts influence telehealth services over time, and how, under the influence of mechanisms, new contextual states become the “new normal”. In other words, as human agents, we collectively change and shape the technology and services used in healthcare.

Translations

Unless otherwise stated, all documents in this thesis are cited in their English versions, or with titles translated into English. Unless otherwise stated, all other translations in this thesis, including excerpts from interviews, are the author’s own.

LIST OF ABBREVIATIONS AND DEFINITIONS

ACRRM	Australian College of Rural and Remote Medicine
AMA	Australian Medical Association
ATA	American Telemedicine Association
CEO	Chief Executive Officer
CFM	Federal Medical Council (in Brazil)
DoH	Australian Government Department of Health
DoHA	Australian Government Department of Health and Ageing
GP	General Practitioner (in Australia)
ICT	Information and Communications Technology
ISO	International Standards Organisation
Medicare	The Australian universal healthcare system
MBS	Medicare Benefits Schedule
NBN	National Broadband Network
RUTE	Brazilian University Telemedicine Network
RACGP	Royal Australian College of General Practitioners
RDAA	Rural Doctors Association of Australia
RN	Registered Nurse
Teleconsultorias	Provision of second opinions between Brazilian doctors using telehealth
SA	South Australia
SIGs	Brazilian Special Interest Groups (for telehealth)
SUS	Sistema Único de Saúde (The Brazilian universal healthcare system)
UNA-SUS	Open University of the Brazilian Universal Health System

DECLARATION

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and

2. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Signed Alan Taylor

Date 20th July 2020

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“The image of technology as an autonomous force with unavoidable actions and consequences has been employed across the centuries to erase the fingerprints of power and absolve it of responsibility. The monster did it, not Victor Frankenstein.” (Zuboff, 2019, p. 225)

1 INTRODUCTION

In highly developed universal healthcare systems, access to healthcare is seen as a citizen’s democratic right. In these systems, the societal expectations of telehealth services are that, by supporting healthcare activities at a distance using information and communications technology (ICT), access to health services can be improved and the costs of healthcare reduced. If these expectations are correct, an explanation of how telehealth services do or do not develop is important.

I came to this investigation after a long journey through the engineering world while working in telecommunications in Europe, Africa and subsequently, health information technology in Australia. Short, but critical deviations in this career path; firstly, postgraduate study the sociology of science and technology in relation to the South African gold mining industry (Taylor, 1978) and secondly, a short course in humanitarian assistance, developed my curiosity in the interactions between the engineered world of technology and the social world of people. My work in health information technology focused on the provision of services to regional communities using telehealth services. So it was that in the course of this work I came to see very clearly that the nature of technology solutions has direct consequences for the health of people living in regional communities, and there was a need to explain of how people could influence those solutions.

The key issue to be understood in reaching such an explanation is: Does the technology used in telehealth services shape our healthcare, or do we, collectively, change and shape the technology and services used in healthcare? Obtaining answers to this question requires an investigation of the contexts in which telehealth services operate and of their aims; investigation is required also into whether technology (the monster) or Victor Frankenstein is responsible for determining how technology is used in healthcare.

These are very broad questions and therefore my research focuses on one segment of technology-enabled healthcare services, that is, telehealth services. Nevertheless, an understanding of how technology is used in telehealth services will have wider implications for our understanding of the future directions for healthcare, and more broadly of innovation and change. To build an understanding of these issues through the use of technology in telehealth services, I have structured my investigation into five stages which sequentially build a body of knowledge about the development of telehealth services.

In this chapter, I clarify the scope of telehealth services to be included in my investigation. The second stage of my investigation in Chapter 2 examines the guidelines for telehealth services in order to build an understanding of how they have been implemented and operated. The third stage of my investigation, in Chapter 3, interrogates the published literature on telehealth services for explanations of the issues encountered in implementing and operating telehealth services. The resulting themes from the literature synthesis enabled the construction of a conceptual enquiry model and field research questions which I have used to guide my field research. The fourth stage of my investigation, in Chapter 4, outlines the theoretical perspective, field research methods, tools, and analytical processes that I applied during the collection of data during my field research in Australia and Brazil.

The fifth and final stage of my investigation is the presentation of the findings from my field research in two parts. The first part, obtained during the exploration and enquiry phases of my field research and presented in Chapter 5, outlines the role of contexts in influencing the operation of telehealth services in Australia and Brazil. Operation of the respective universal care systems and the organisation of, and access to, care is compared, as are the resources available to telehealth services in each country. The second part of my findings, also arising from the enquiry phase of my field research, is summarised in Chapter 6. Themes emerging from my findings centre on the influences of organisational and professional contexts, and the many practices which legitimise telehealth services and professional practices which I have termed “sociotechnical codes” and defined in Section 1.2. The need to build relationships between healthcare actors and to provide resources for effective operation of telehealth services is highlighted. The chapter concludes by presenting evidence on the extent to which telehealth services in Australia and Brazil are considered routine or normalised within the healthcare system.

I discuss the findings arising from my field research in two parts, in Chapters 7 and 8. Firstly, in Chapter 7, I illustrate how organisational and professional contexts have influenced the operations of telehealth services and continue to define their development over time. Next, in Chapter 8, I outline four key mechanisms -- changing behaviours, legitimising practices, building relationships, and applying resources -- which operate within the healthcare system to influence the development of telehealth services. To conclude Chapter 8, I discuss how my findings change our understanding of the development of telehealth services and propose a meta-theoretical model for the interactions between the contexts and key mechanisms which shape telehealth services.

Chapter 9 reflects on the approach I have taken to my research, addressing the research design, my analytical tools, the validity of my findings, and the research limitations. My final chapter,

Chapter 10, revisits my research questions and presents the implications for practice, theory, and future research of my findings. Figure 1 illustrates the organisation of this thesis.

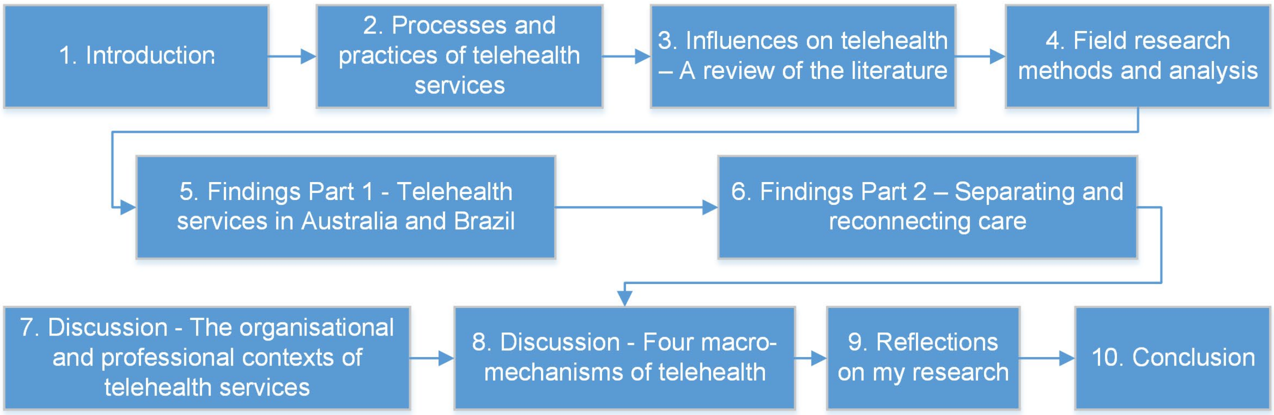

***Figure 1.* Organisation of this thesis.**

1.1 Defining Telehealth Services

The core concept of a telehealth service is any healthcare activity where a health professional or carer works with someone who is not physically present, to resolve a health problem using some form of communications technology. Inherent in this activity is the provision of healthcare to someone who would not otherwise be able healthcare in person. This conceptualisation positions telehealth services as seeking to improve access to healthcare based on need, rather than on ability to pay or proximity. It is this improvement in access which seems to motivate many health professionals to deliver telehealth services (Chandra, Pettry, & Paul, 2005; Jack & Mars, 2014; MacFarlane, Murphy, & Clerkin, 2006). Many types of technology have been applied in healthcare: Telephones, information systems, or video communications have all been applied to the provision of care at a distance, which has created considerable diversity in the terminology used in this field of healthcare.

Each new wave of technology has influenced healthcare, from the steam engine to the railroad, the motor car, the telephone, the Internet, as well as information technology, diagnostic machines, and artificial intelligence. Associated with each wave, a range of concepts, linguistic labels, codes, practices, and cultures have served to support the manufacture, marketing, deployment, and use of technology in healthcare. In the English-speaking healthcare industry, the most recent incantations of these concepts have been known as telehealth, telemedicine, telecare, eHealth, mHealth and, more recently, digital health. In part, these terms serve as powerful marketing tools, but the same terms also serve to define the academic and project literature. Before one can pursue the question of the relationships between healthcare and telehealth services, it is necessary to understand how telehealth services are currently conceived. The International Standards Organisation (ISO) commented that:

> It is not yet clear when the term telehealth or telemedicine should be used to describe such initiatives, because these terms can be described and interpreted in different ways in the absence of a unifying concept. (ISO, 2014, p. 1)

In order to provide a unifying concept for my investigation and to remove the tendency to focus on different types of technology when discussing telehealth services, the definition of a telehealth service that I will use in this thesis is a "healthcare activity supported at a distance by information and communication technology service(s)".[1]

However, the sheer quantity and diversity of the technology options used in telehealth remains a problem for any research project because telehealth, telemedicine, mHealth, and eHealth initiatives all depend on technology. Therefore, it was necessary to define clearly the scope of my investigation. In order to identify the common usage, relationships, and overlaps between topics closely related to telehealth, a frequency count of peer-reviewed articles referring to telehealth, telemedicine, mHealth, and eHealth was undertaken. Peer-reviewed literature was investigated through the Flinders University library service Findit@Flinders bibliographic database search engine (Flinders University, 2019). Details of the databases covered by this search engine are given in Chapter 2. Literature searches undertaken in 2016 targeted literature which had one of the terms "telehealth", "telemedicine", "health technology", "mHealth", or "eHealth" in the title (hyphenated or non-hyphenated).[2]

The number of returned items corresponding to each of the search terms was mapped into two Venn diagrams to provide a visual assessment of the relationships between terms. In the diagrams shown in Figure 4, the area of each ellipse is proportional to the number of returned items corresponding to the frequency of occurrence of each term in the literature. The diagrams demonstrate that in 2016, eHealth, telemedicine, telecare, and telehealth topics significantly overlapped, with telemedicine dominating the literature; health technology as a topic is quite unrelated to either telemedicine or eHealth (see Figure 2).[3] While mHealth initiatives have experienced a lot of publicity, this was not yet reflected in the literature in 2016.

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[1] This definition has been proposed for international adoption in a revised international standard that will replace the current international technical specification, ISO/TS 13131:2014 – Health informatics – Telehealh services – Quality planning guidelines (ISO, 2014).
[2] These literature searches are worldwide and in the English language, with no other search criteria. In other language worlds, the results could be different. For instance, in Brazill *telessaude*, which literately translates as "telehealth", is the dominant term used. In Australia, "telehealth" is widely employed.
[3] This literature search has not been updated because its purpose was solely to determine the initial scope of my research commencing in 2016.

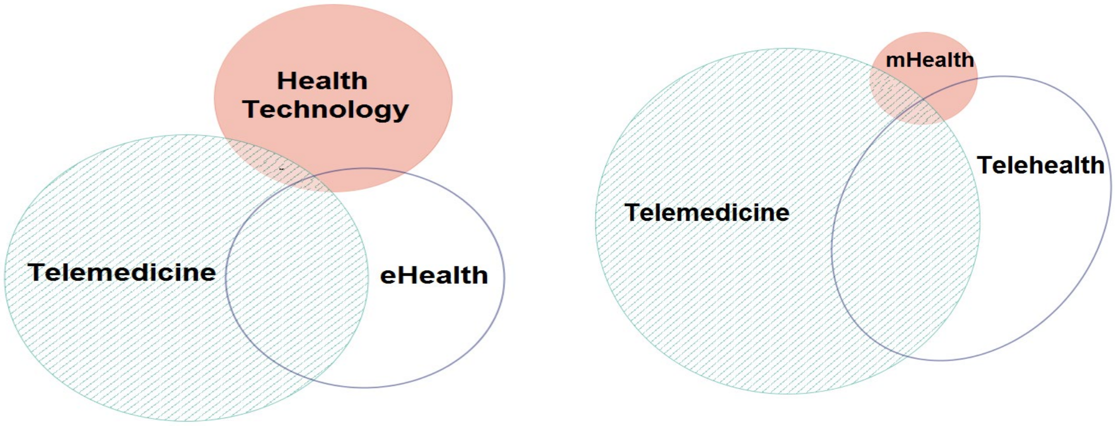

Figure 2. **The domination of telemedicine and telehealth topics in the peer-reviewed literature.**

The term “eHealth” tends to be defined and used more broadly as the transfer of health information and the conduct of healthcare by electronic means. Oh, Rizo, Enkin, and Jadad (2005) observed that many definitions of eHealth exist, so some consideration of the usage of the terms eHealth, telehealth, and telemedicine is required. In Australia and elsewhere, discussion of eHealth tends to focus more on health information systems, and less on the support of healthcare at a distance. These findings confirmed that eHealth, telemedicine, telecare, and telehealth topics significantly overlap, with the topic of telemedicine again dominating the literature.

The dominant conceptual term in academic literature has been and continues to be “telemedicine” with the subsidiary terms of “telehealth” and “telecare”. Other services, such as health technology equipment (diagnostic machines), mHealth (mobile phone applications), and eHealth initiatives (electronic medical health records) are important ancillaries to telehealth but are not examined in depth in this study. Because the term “telehealth” is more widely used in the Australia than “telemedicine”, the term telehealth services has been be used as the primary term in my thesis and should be taken to include telemedicine and telecare services. Based on these findings, the primary scope of this investigation focussed on understanding telehealth, telemedicine, and telecare services, but acknowledges contributions from the literature analysing the eHealth, mHealth, and health technology domains.

1.2 Understanding how Telehealth Services Work

To understand how telehealth services have developed and the factors which have shaped their development, in the first step of my research I examined the processes, practices, and motivations for telehealth service provision. Process and practices can exist as explicit norms (guidelines) or implicit norms, such as patterns of work, mental models, or patterns of behaviour. The most visible manifestation of the processes and practices applied in telehealth services are the documented frameworks, guidelines, regulations, policies, recommendations, rules, or standards used in these services. Together, these documents are referred to as the explicit guidelines for telehealth services. Therefore, my first research question sought to discover:

> What are the explicit processes or practices which form part of, and simultaneously shape, the ways in which the technology is used within telehealth services that are advocated by organizations and professional groups? (RQ1)

In Chapter 2, I report the investigations of these explicit processes and practices of telehealth services as seen through the lens of the guidelines, regulations, and frameworks used in the operation of these services. A review of the literature associated with telehealth guidelines identified the work or functions performed by guidelines in providing healthcare using telehealth services, including aspects such as quality and safety, responsibilities of clinicians,[4] improving access to healthcare, and ethical considerations such as privacy and confidentiality.

The sociotechnical environment for telehealth services includes the economic, social, and technological structures of healthcare delivery systems which together provide the contexts of telehealth services. Technological structures, especially information and communications technologies, may be influential. Therefore, it is important to understand how technologies are built. According to Feenburg (1995), individual technologies are constructed from "decontextualized technical elements combined in unique configurations to make specific devices" (p. 78). A simple example would be the combination of transistors and resistors to make an amplifier of electrical signals. How that amplifier is used depends on social norms or codes which I term sociotechnical codes.

I have used the concept of sociotechnical codes to analyse telehealth services from a wider sociotechnical perspective. I define sociotechnical codes as the "norms, processes, and practices which form part of and simultaneously shape the way in which the technologies are adopted".[5] My conceptualisation of a sociotechnical code draws on extant concepts of a "technical code" (Feenberg, 1995, p. 85), where economic and social interests constitute "a background of unexamined cultural assumptions literally designed into the technology itself", the concept of technological frames (Bijker, Hughes, & Pinch, 1987), and the work of Flichy (2007) on the role of technical codes. Application of the concept of a sociotechnical code enables social and technological factors to be studied together without implying that one or the other is a determinant

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[4] The terms "clinician" and "health professional" are used interchangeably in this thesis, as they were by interview participants.

[5] I argue that a more recent conceptualisation, originating from within a critical realist tradition, of sociotechnical entities is analogous to my conceptualisation of the sociotechnical code. Sociotechnical entities comprise both human actors and material objects (Elder-Vass, 2017) where interactions between human actors take place within norm circles (Elder-Vass, 2010, p. 115) comprising members of social groups. Therefore, the concept of a sociotechnical code will continue to be used in this investigation.

or that the relationship between the social and the technical works in a particular way. Certainly, “to privilege the technology of telemedicine over the context of a telemedicine organisation would be a grave mistake” (Whitten, Sypher, & Patterson, 2000, p. 130).

Sociotechnical codes can be found in explicit telehealth guidelines and implicit guidelines linked to processes buried within economic, social, and technology contexts. Acknowledging the need to understand these processes, Greenhalgh et al., writing in 2004, recommended further research to establish “by what processes are particular innovations to health service delivery and organization implemented and sustained (or not) in particular contexts and settings and can these processes be enhanced?” (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004, p. 620). To date, a handful of authors have directly taken up this challenge (Gundim & Wen, 2009; Mayoka, Rwashana, Mbarika, & Isabalija, 2012; Radhakrishnan, Xie, & Jacelon, 2015; K. Russell, Saffle, Theurer, & Cochran, 2015; Wade, Eliott, & Hiller, 2014; Whitten, Holtz, & Nguyen, 2010). In response to this challenge to undertake further research, the third phase of my investigation in Chapter 3 interrogates the published literature in order to understand:

> What are the influences on the development of telehealth services as represented in theories addressing this process? (RQ2)

During my review of this literature, organisational and professional contexts emerged as key themes. Building on a definition of context by Pawson and Tilley (1997), I define context as:

> the spatial and institutional locations of social structures and their material parts, together with the norms, processes, practices and inter-relationships found in them (i.e. the cultural structures) which condition the potential interactions between social or cultural structures and individual or collective agency. (adaptation of Pawson & Tilley, 1997, p. 216)

In this research, as working definitions, social structures are taken to be analogous with organisational systems of individuals or “organisational contexts”. Cultural structures are conceived as relating to the thoughts, views, behaviour, and practices of individuals in their professional roles or “professional contexts”. Taken together, this conception of social and cultural structure is analogous to the definition by Giddens (1984) of structures as “rules and resources, or sets of transformation relations, organized as properties of social systems (where systems represent) reproduced relations between actors or collectivities, organized as regular social practices” (Giddens, 1984, p. 25)

Noting the importance of contextually sensitive research, Pawson and Tilley (1997) argued that “it is futile for researchers to ignore and anonymize the contexts of their programs as in experimental evaluation” (p. 70). In support of this sentiment, Wade (2013) suggested that telehealth services could be better understood through further research to acknowledge the importance of contexts, developing:

> a more extensive theory that is applicable to the whole set of complex innovations in healthcare, of which telehealth is just one example. … one might begin by investigating the implementation of telehealth in healthcare systems outside Australia. Most value would be gained by seeking an intentionally diverse sample; for example by including a planned system where telehealth is more fully developed, such as Canada, Norway or Finland, and also an unplanned system in a developing country, such as India. One could then add three wider comparisons, each of which would contribute to theory development. (p. 208).

Therefore, I chose to analyse the development of telehealth services in two large countries with universal healthcare systems and politically federated structures -- Australia and Brazil -- in order to discover:

> How can the sustainability and development of telehealth services, over time and between organisational and professional contexts, be explained? (RQ3)

1.3 Investigating the Development of Telehealth Services

My field research was guided by a conceptual enquiry model, developed in Section 4.1. The model highlighted the importance of interactions between organisational or professional contexts and telehealth services. Implicit in this model was the proposition that the practices of telehealth services can only be understood by studying the economic, social, and technology components of organisations and the wider "sociotechnical environment" in which organisations operate. Based on this model I developed four questions specifically to guide my investigations in the field. These field research questions are outlined in Section 4.2.

My research paradigm was founded on an ontology described as critical realism which views reality as stratified and complex. In this ontology, underlying the empirical world that we observe are mechanisms which influence events occurring in the observable world. In the case of telehealth services in Australia and Brazil, we can see immediately that these services operate in certain ways. This is an empirical reality. However, to understand why these services operate in a particular way, a deeper investigation was needed into the underlying reality of the two countries. Using realist methods, my research looked for the mechanisms which would explain why and how telehealth services come to operate in a certain way.

My field research techniques were based on a technique proposed for realist research by Danermark (2019), known as "explanatory research", which is suited to large-scale, comparative investigations and which employs analytical processes of comparison, abduction, and retroduction.

The field research process and subsequent analysis (illustrated in Figure 16, in Chapter 4), comprised four interlinked phases of exploration, enquiry, analysis, and comparison.

Investigating the social and technical phenomena of telehealth services within healthcare contexts is challenging because descriptions of the complex, changing nature of contexts can generate large amounts of data. The analysis of large data sets poses dilemmas for researchers with limited resources. For instance, it is possible to reduce complexity within a field of investigation by restricting research to a case study of a single health service, hospital, or program. However, when context is restricted to the program level, it becomes inevitable that wider insights may be missed. When conducting a case study, a researcher may be embedded in an organisation and able to capture detailed information. In contrast, when a research context is large, it is logistically difficult to become embedded in several organisations and even more difficult to analyse a large amount of detailed information. My pragmatic solution to this dilemma was to focus on telehealth services, largely operated by public sector healthcare organisations, in a small number of selected health systems that I have worked in, or to which I could obtain access.

Therefore, my first choice of context for field research was two Australian state-based public health systems where I have had significant experience of implementing telehealth services. My field research in Australia was undertaken in the states of South Australia and Queensland, shown in Figure 3.

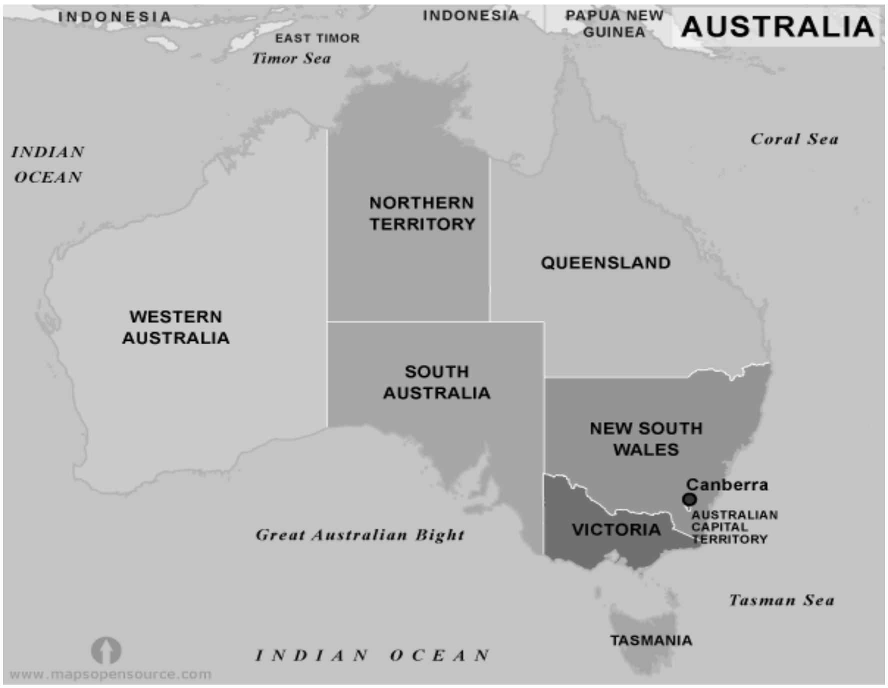


Figure 3. **Map of Australia (mapsopensource, 2019a).**

My choice of a second research context was guided by the need to identify a second country operating extensive telehealth services in a different healthcare context. Brazil met this criterion. The Australian and Brazilian health systems serve large regional populations and have used telehealth to overcome the challenges of healthcare provision at a distance. My field research in Brazil was undertaken in the states of Sao Paulo, Santa Catarina, and Rio Grande do Sul, shown in Figure 4.

Figure 4. **Map of Brazil (mapsopensource, 2019b).**

My enquiry begins in Chapter 2 with an examination of telehealth guidelines in order to identify the key processes and practices advocated in operating telehealth services.

2 PROCESSES AND PRACTICES OF TELEHEALTH SERVICES

This chapter reviews the explicit guidelines used in telehealth services and subsequently analyses the literature on telehealth service guidelines in order to answer:

> What are the explicit processes or practices which form part of, and simultaneously shape, the ways in which the technology is used within telehealth services that are advocated by organizations and professional groups? (RQ1)

Analysis of the literature begins with a review of the explicit guidelines used in telehealth services, followed by an analysis of the processes and practices advocated in guidelines and the medical ethical principles that are applied to normalise telehealth service practices. Figure 5 illustrates the organisation of this chapter.

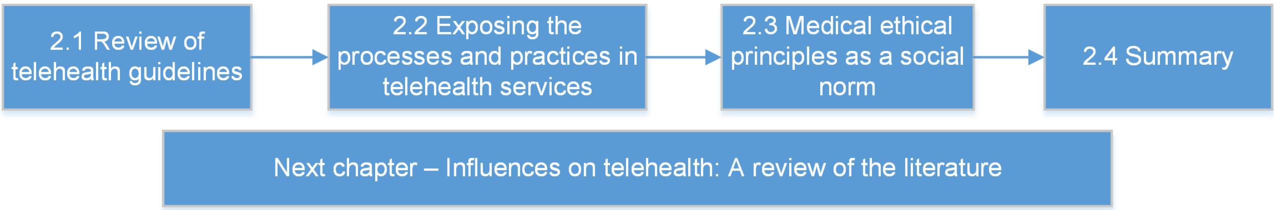


Figure 5. **Organisation of Chapter 2.**

Guidelines contribute important elements to the operation of technology. For example, without guidelines governing the thickness of boilerplate in steam engines, it is possible that railroads using these engines would not have been as successful as they were. Analysis of written guidelines for telehealth reveal two categories: operational and clinical guidelines. Clinical guidelines emphasise medical diagnosis and procedures and are of less relevance to service operations. In all cases, the role of these guidelines is to control the implementation and operation of technology and clinical services. Guidelines and the associated literature can reveal much about how health services operate and the role of technology, and they function as proto-theories about the use of technology in health service delivery. A working assumption throughout this review is that all guidelines are composed of, relate to, or are influenced by both social and technical forces, and are effectively sociotechnical codes.

2.1 A Review of Telehealth Guidelines

The intent of this review is to gain an understanding of processes or practices which form part of, and simultaneously shape, the way in which technology is used within telehealth services. This review begins with an exploration and analysis of the explicit, documented guidelines used in telehealth services. The review then searches for and discusses the published literature relating to the guidelines used in telehealth services.

Literature reviews can take many forms; 14 were identified in one survey (Grant & Booth, 2009). Other types of review and analysis have subsequently been proposed, such as the realist review and synthesis. My methodological approach to this literature review does not rely on any single review typology, such as a systematic review, or a realist review, or meta-narrative review, and so on. Instead, my review has been customised to the area under investigation (Jagosh et al., 2014), specifically, guidelines for telehealth services and the literature associated with the topic of telehealth guidelines. This review relies on a variety of literature sources.

2.1.1 Pre-existing sources of guidelines and literature

Firstly, between the years 2013 and 2014 I was project lead within the ISO's health informatics committee for the preparation of quality guidelines for telehealth: ISO/TS 13131:2014 Health informatics — Telehealth services — Quality planning guidelines (ISO, 2014). ISO collaborates with national member bodies to agree on international standards for a range of industries. ISO standards cover a wide range of technical and process matters, such as the well-known ISO 9000 family of standards for quality management of services and products. The project to develop quality guidelines for telehealth included a review of all identifiable, country-based guidelines for telehealth services, and resulted in the collection of a number of guidelines, standards, associated literature, and commentary. The collection included a large amount of "grey" literature, collected over time during my professional career, some of it paper based and traceable to electronic documents, some traceable to web-based documents, and a small amount which could not be traced to an existing source. Organisational guides and standards are an example of this type of grey literature. Where feasible, this literature has been placed in a standalone version of the Zotero open access reference manager (Zotero, 2019). Some of these items were obtained through personal contacts or through unstructured searches of organisational websites, and it is therefore possible that other items, particularly guidelines held internally by organisations, have not been discovered.

2.1.2 Bibliographic literature sources

Secondly, to identify literature associated with telehealth guidelines, a bibliographic database search was conducted using the Flinders University FindIt@Flinders library service (Flinders University, 2019) which searches 351 bibliographic databases. FindIt@Flinders is a search engine which provides ranked results from the library's online and print collections. It includes items in the Flinders University Library's catalogue (books, ebooks, and DVDs), content from the library's databases (journal articles) and research from the Flinders Academic Commons (a repository of Flinders University research). Results were stored in the Zotero reference manager.

The Findit@Flinders service was able to access multiple indexed databases, including ACM, BioMed, BMJ, Cochrane, DataCite, Dialnet, Directory of Open Access Journals, Elsevier, Emerald, Gale, Hindawi, IEEE, Informa, Informit, LegalTrac, Mary Ann Liebert, MEDLINE/PubMed, MIT Press, New England Journal of Medicine, Oxford Journals Open Access, Royal Society Open Access Journals, Sage, SciELO Brazil, ScienceDirect, Scopus, Springer, Taylor & Francis, Web of Science (Science, Art and Humanities and Social Science citation indexes), and Wiley.

Additional databases were used to confirm that no significant and accessible grey literature had been missed and to check samples of previous searches to confirm that the Findit@Flinders search engine had in fact identified the available literature. These included an experimental service from the UK academic network, CORE (The Open University and JISC, 2019), and an open access publication service, BASE (Bielefeld University Library, 2019).

Google and Google Scholar (https://scholar.google.com.au/) were used to confirm citations, to obtain full texts or articles, and to conduct general searching which did not employ systematic use of keywords. Snowball methods, where one document leads to another document or one issue leads to another strand of investigation throughout the course of my research, have been used extensively.

2.1.3 Searching the literature sources

Searches of the literature sources were conducted between September 2015 and February 2016. A set of automated literature searches have since been used to maintain the currency of the resulting collections. A raw search of the literature containing the words telemedicine, telehealth, or telecare (hyphenated and non-hyphenated) in the title of an item returned about 58,000 items. A targeted search was conducted to identify any explicit guidelines for telehealth services referenced in the Findit@Flinders databases. The search used the advanced keyword fields in the user interface to target literature which had one of the terms telehealth and telemedicine in the title (hyphenated or non-hyphenated) and which also referred to one of the following terms for guidelines: namely, a framework, guideline, licensing, policy, regulation, rule, or standard, in plural or singular form, in the title of the target. These keywords were derived from cascading synonyms for the word “guideline”, and the keywords in titles of documents with which I was familiar through my work on international standardisation. Table 1 shows the distribution of returned items for each keyword.

Table 1.

Distribution of Returned Items by Keyword

Keyword	Telemedicine	Telehealth	Telecare	Total Items
Code	68	27	6	101
Framework	86	38	31	155
Guideline	205	68	53	326
Licensing	15	2	1	18
Policy	59	41	20	120
Regulation	101	28	6	135
Rule	238	38	38	314
Standard	374	117	79	570
Totals	1146	359	234	1739

2.1.4 Search inclusion and exclusion criteria

Inclusion criteria for the bibliographic searches were as follows:

- Any date of publication, i.e., not date delimited;
- Peer-reviewed articles;
- Other articles;
- Any type of literature review; and
- Any postgraduate thesis.

No date or item restrictions (e.g., peer-reviewed paper, or language) were used in order to improve the possibility of obtaining a broad understanding of a wide range of material. Exclusion criteria were as follows:

- Duplicate items;
- Items for which full text sources could not be obtained through electronic means or inter-library loans;
- Items not available in English or Portuguese (I am fluent in Portuguese);

- Items which focused solely on describing a clinical intervention; and
- Items not of relevance to telehealth using a quick visual appraisal of the title, abstract, and contents, where available, in that order.

2.1.5 Additional searches

To ensure the literature search was as comprehensive as possible additional searches included:

- Manual searches within items collected during prior research by the writer during 2013; and
- Automatic updating of previous searches using keywords stored in the Findit@Flinders search engine. Relevant items were added to the reference manager as they were discovered, scanned for content and, if required, modifications were made to the literature review in this section.

Further items of interest were discovered through a process known as snowballing or forward citation, which occurred when there was initial evidence that a particular author or paper was influential and previous work by that author was deemed relevant. Some literature was discovered during preliminary analysis of the literature. In total, more than 1,700 items were collected.

A number of biases were apparent in the search results. Firstly, the returned items were overwhelmingly written in English, although no restrictions had been placed on language. Recovery of non-English language items is improved when the search terms used are written in the appropriate language, for instance, in Portuguese telehealth is written as "telessaude".

Secondly, retrieval of an article even when the title was returned in a search was often not possible from smaller publishers, or for publications based in low- and middle-income countries. Thirdly, a large number of results were obtained from the USA. Many of these results discussed the complexity of implementing telehealth across a large multijurisdictional fee-for-service health system. It is therefore possible that the non-English speaking world and countries with more unitary health systems are poorly represented in the search results.

2.1.6 Analysis of telehealth service guidelines

A total of 49 unique generic guidelines for telehealth services were identified from the material I collected between 2013 and 2014 when I was project lead within the ISO’s health informatics committee for the preparation of quality guidelines for telehealth as outlined in section 2.2.1. Further sorting identified 27 guidelines from Australia, 10 from the USA, 10 from the rest of the world, and two focussing on evaluation methods which could be classified as code of practice, guidelines, practices, rules, recommendations, standard, or evaluation guideline. This is an increase on the 23 guidelines identified in an earlier survey (Loane & Wootton, 2002, p. 69). The majority of the identified guidelines were generated in the USA and Australia, followed by Europe and the UK. As mentioned, 42 codes which related mainly to clinical matters ("clinical guidelines") were not included in this analysis but were retained in the reference manager for possible future reference. The exception to this rule were several American Telemedicine Association (ATA) guidelines, which were sufficiently generic to warrant inclusion. The dominance of guidelines from Australia and the USA can be attributed to the greater utilisation of telehealth services in those countries at that time, and the degree to which guidelines are made publically accessible by health organisations. Guidelines are often generated to internal organisational use and are therefore not made publically available. This may change over time. For instance access many ATA guidelines have since been restricted to members of the ATA.

The process used for analysing guidelines was different from that used for analysis of published articles. In guidelines, the content was generally systemised into well-known categories, such as "consent" or "safety" or the like. The International Specification for Telehealth Quality Guidelines (TS 13131) (ISO, 2014) was chosen as a reference framework for analysis and comparison purposes. TS 13131 provides generic international guidelines for telehealth in high-level categories and includes a reasonably comprehensive set of quality objectives for telehealth services, which provided a reference set against which national or professional guidelines could be compared.

Each of these guidelines was manually scanned for content which related to sections within TS 13131, including telehealth service provision; namely, quality management, financial management, service planning, workforce planning, healthcare planning, responsibilities (of providers), facilities management, technology management, and information management. Coverage for each of these aspects was given a score of one where some discussion of an aspect was identified, and zero where no discussion was found. Results were aggregated and ranked in Excel spreadsheet software and rankings were generated into three groups. The first group (*n* = 9) containing those guidelines which covered 40% or more of the key aspects in TS 13131 were categorised as comprehensive guidelines. These included two guidelines from Australia, four from the USA, and three from the rest of the world. The second group (*n* = 11) of guidelines contained material which overlapped with between 20% and 40% of the key aspects in TS 13131. This group of guidelines were categorised as significant guidelines.

Guidelines in the third group, covering less than 20% of the material in TS 13131, were categorised as minor guidelines (*n* = 27). There were 18 minor guidelines from Australia, three from the USA, and six from the rest of the world in this group. The audiences for these minor guidelines were for the most part clinicians (any specialty) and specialists in a particular discipline, and these guidelines are not discussed further.

Comprehensive telehealth service guidelines (Table 2) included a guideline from the Australian College of Rural and Remote Medicine (ACRRM) Telehealth Advisory Committee Standards

Framework, which relied heavily on an early pre-publication draft of TS 13131 and received input during its preparation from a wide range of healthcare organisations.

Table 2.

Comprehensive Telehealth Service Guidelines

Organisation	Title	Date
Australian College of Rural and Remote Medicine (ACRRM)	Telehealth Advisory Committee Standards Framework (ACRRM, 2012)	2012
Royal Australian College of General Practitioners (RACGP)	Standards for general practices offering video consultations (4th ed) (RACGP, 2011)	2013
Accreditation Canada	Canadian National Initiative for Telehealth Framework of Guidelines (Accreditation Canada, 2003, Hogenbirk, et al., 2006)	2003
British Columbia Health (BC Health)	Technology-based patient consultation (McMahon, Fiona., 2012)	2012
European Union (Momentum)	Personalised Blueprint for telemedicine deployment (Momentum, 2014)	2014
American Telemedicine Association (ATA)	Guidelines for TeleICU Operations (ATA, 2014b)	2014
ATA	Core Operational Guidelines for Telehealth Services Involving Provider-Patient Interactions (ATA, 2014a)	2014
ATA	Practice Guidelines for Live, On Demand Primary and Urgent Care (ATA, 2014c)	2014
Telligen	Telehealth Start-Up and Resource Guide (Telligen, 2014)	2014

Seven significant Australian telehealth guidelines were identified, three from the USA, and one from the rest of the world (Table 3).

Table 3.

Significant Telehealth Service Guidelines

Organisation	Title	Date
Australian Nursing and Midwifery Federation (RNMF)	Guidelines For Telehealth Online Video Consultation Funded Through Medicare (Australian Nursing and Midwifery Federation, 2013a)	2013
RACGP	Guidelines for interprofessional collaboration between general practitioners and other medical specialists providing video consultations, Emergency Medicine Appendix (RACGP, 2014a)	2014
RACGP	Implementation guidelines for video consultations in general practice (RACGP, 2014b)	2014
Royal Australian and New Zealand College of Psychiatrists (RANZCP)	Professional Practice Standards and Guides for Telepsychiatry (Royal Australian and New Zealand College of Psychiatrists, 2013)	2013
New South Wales Health (NSW Health)	Telehealth Resource Package (New South Wales Health, 2014)	2014
Rural Doctors Association of Australia (RDAA)	Telehealth Key Principles (RDAA, 2014)	2014
South Australian Health (SA Health)	Guidelines for Sub-acute Services Offering Digital Telehealth Network Consultations (South Australian Health, 2013)	2013
ATA	Practice Guidelines for Video-Based Online Mental Health Services (ATA, 2013)	2013
ATA	A Blueprint for Telerehabilitation Guidelines (ATA, 2010)	2010
Federation of State Medical Boards (FSMB)	Model Policy for the appropriate use of Telemedicine Technologies (FSMB, 2014)	2013
European Union	European Code of Practice for Telehealth Services (Telehealth Quality Group, 2018)	2014

Two guidelines focussed on evaluation were encountered during the literature analysis:

- A Unified Approach for the Evaluation of Telehealth Implementations in Australia (Dattakumar, 2013), empirically linked to the Australian Institute of Health and Welfare National Health Performance Framework which considered patient, clinical, organisational, and technology factors; and
- A Model for Assessment of Telemedicine Applications (MAST) which is based on a prior model, the European Health Technology Assessment model, HTA Core Model (Lampe et al., 2009). This model included nine evaluation domains including the health problem and description of the application, safety, clinical effectiveness, patient perspectives, economic aspects, organisational aspects, sociocultural, ethical, and legal aspects, and employs various research paradigms (Kidholm et al., 2012). [6]

These guidelines have aggregated the lessons from case studies of telehealth services into more generic guidelines for evaluation purposes. Textual analysis, using of the guidelines categorised as comprehensive or significant completed my analysis of guidelines. This analysis involved scanning each guideline for topic based sub-headings, recording those topics, extracting blocks of text relating to a particular topic, and aggregating textual extracts from each guideline for each topic into themes (nodes within NVivo software). Table 4 shows the principal themes found in the guidelines, the number of guidelines mentioning each theme, and the processes or practices associated with each theme.

Table 4.

Themes, Processes, and Practices Contained in Telehealth Service Guidelines

(N = 22 guidelines)

Theme	Codes containing each theme	Associated practice or process
Privacy and confidentiality	19	Processes to protect patient information and privacy
Consent	20	Processes to inform patients and gain consent for treatment
Safety	18	Processes to protect patients from harm
Evidence	17	Processes ensure contemporary medical practice is based on best available evidence
Risk	17	Processes ensuring there is a documented risk management plan and explicit risk management protocols
Access	15	Processes which increase opportunities for patients to receive healthcare

[6] In 2016 the Pan American Health Organization published a Framework for the Implementation of a Telemedicine Service drawing on the MAST model.

Theme	Codes containing each theme	Associated practice or process
Liability and Legal	15	Processes to protect health professionals from legal liability arising from telehealth practice
Ethics	12	Processes to ensure compliance with professional ethical principles
Responsibility	14	Processes which make it clear who has responsibility for care of the patient
Relationships	12	Processes to support or maintain a provider-patient relationship within the context of a telehealth activity
Quality of Care	10	Measures which confirm the consistency and quality of care provided to patients

Note. Each guideline may contain more than one theme.

The following section discusses telehealth service guidelines and the associated literature in order to understand how explicit and implicit processes and practices have been adapted to the technology used by telehealth services and how services have, in turn, been shaped by the guidelines developed by organisations and professional groups.

2.1.7 Analysis of the literature on telehealth service guidelines

Analysis of the literature took place in two phases. The first phase screened potential literature items for relevance and eligibility according to the inclusion and exclusion criteria as shown in Figure 6. Following the removal of duplicate items, 1,143 items remained to be screened against the exclusion criteria listed in Section 2.1.4, leading to the removal of 228 items which did not satisfy these criteria.

A total of 42 items related to clinical specialties -- for example, telesurgery or telepsychiatry; clinical matters such as the diagnosis, treatment, and management of conditions, whether using telehealth services or otherwise -- were retained in a separate reference manager collection because the principal purpose of this literature search was to obtain a generic view of telehealth practices irrespective of specialty. Remaining items were scanned for the relevance of the abstract and in some cases the full article text, leading to the exclusion of 405 items.

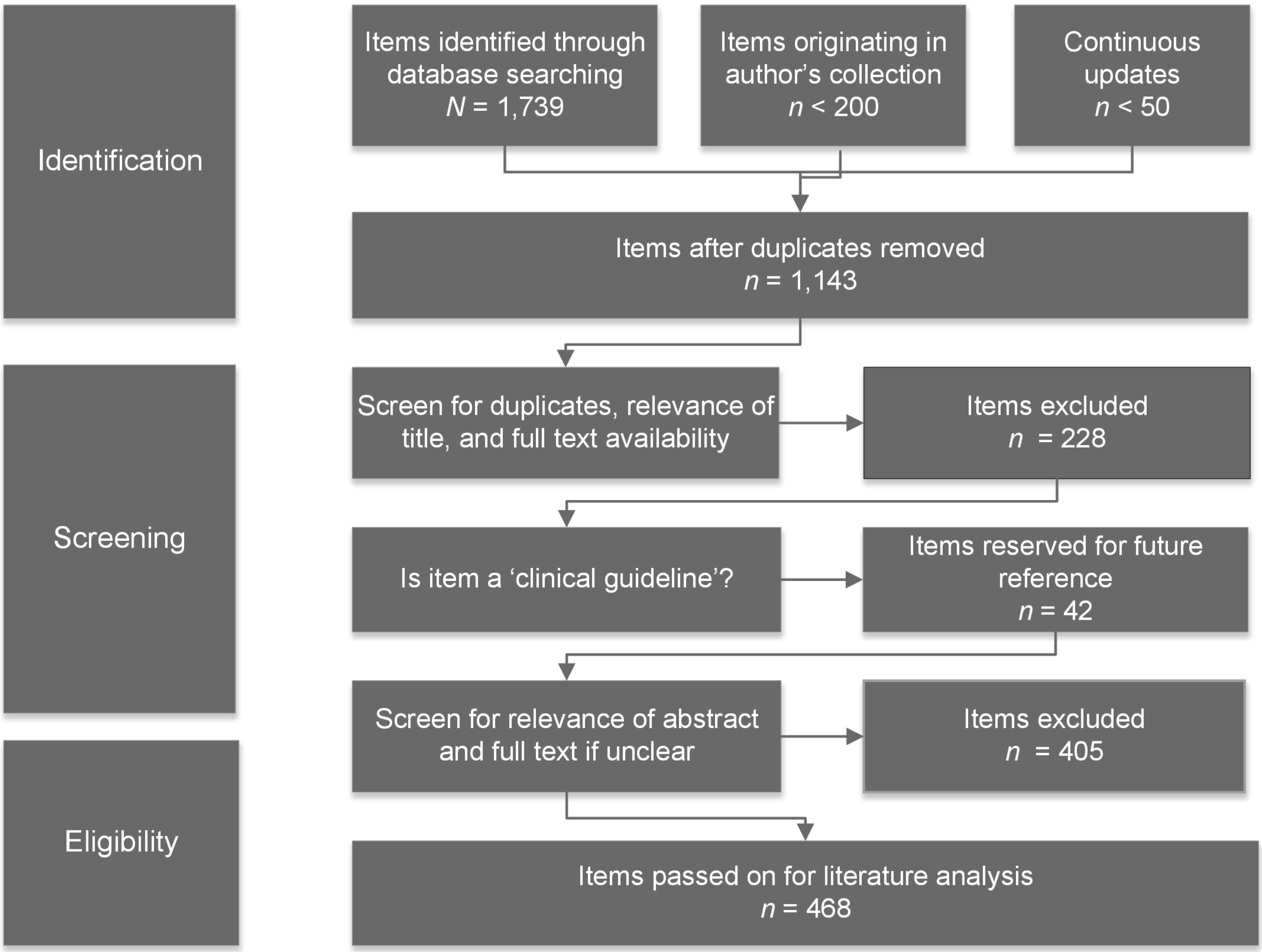


Figure 6. **Phase 1 literature exploration decision process.**

Remaining items (n = 468) were initially sorted into the collections listed in Table 5 on the basis of keywords in the title (e.g., code, framework, policy, standard, etc.), abstract, and content.

Table 5.

Literature Search Results

Collection	**Items in each collection**	**Collection**	**Items in each collection**
Codes	28	Policy	87
Frameworks	72	Regulations	51
Guidelines	82	Rules	51
Licensing	13	Standards	84

Items providing generic guidelines for telehealth services in the form of codes of practice, guidelines, rules, polices, position statements, regulations, or standards were identified and retained in a Zotero reference manager collection. The second phase of literature analysis undertook detailed screening of items for relevance, as shown in Figure 7. An initial screening undertaken in the Zotero reference manager excluded 163 items. A second screen found a further 72 items to have no useful content, leaving 233 items.

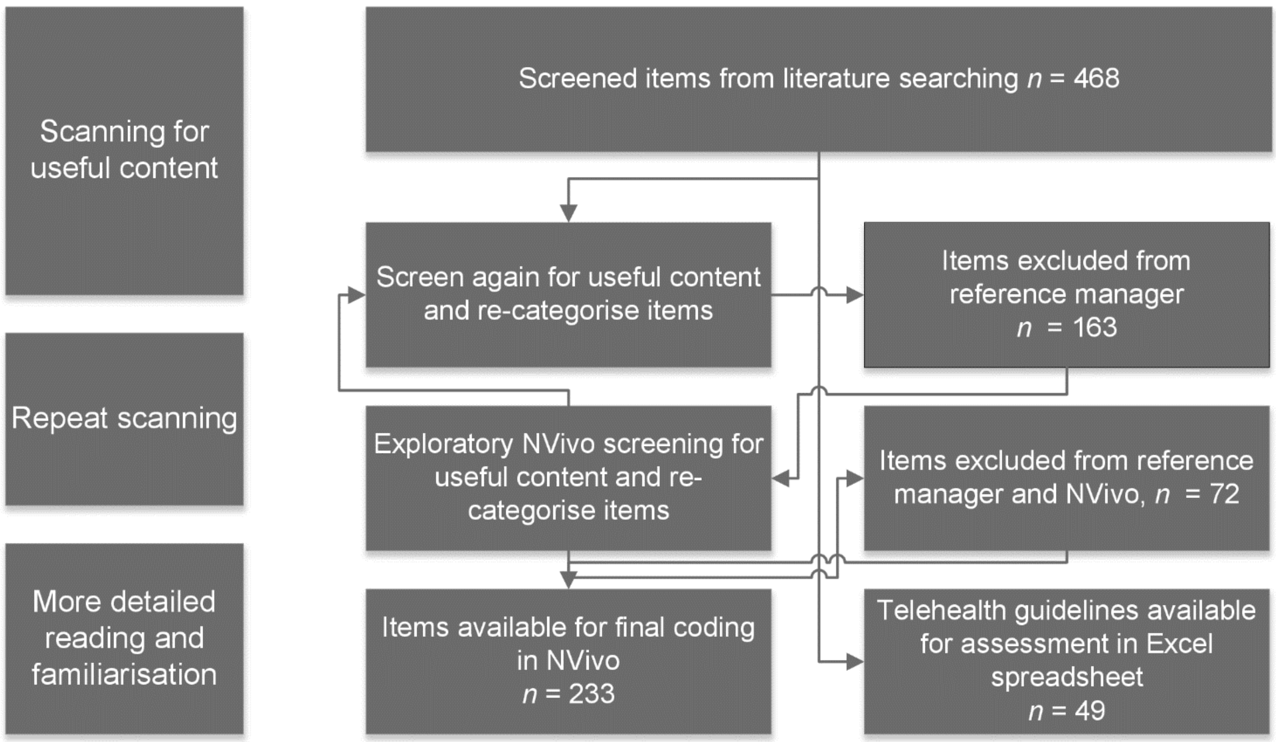


Figure 7. **Phase 2 literature analysis decision process.**

To undertake more detailed thematic analysis, the collection of 233 items was imported into NVivo software (QSR International, 2019). To this collection were added the 49 telehealth service guidelines identified in section 2.1.6. NVivo software facilitates automated queries including word frequency counts, word maps and word trees, and queries, which were used to develop the initial classifications into more sophisticated themes. My analysis followed a framework approach (Ritchie & Spencer, 1994) comprising five stages of qualitative data analysis. Using NVivo software, familiarisation was gained with the literature using exploratory word searches. Next, the key issues and concepts were grouped under the themes contained in in telehealth service guidelines (Table 4), namely; autonomy, beneficence, credentials, ethics, justice, legal (matters), liability, licensing, privacy, quality, risk, safety, and trust. These themes were found to be a useful container for processes, and practices discussed in the wider literature and facilitated the third and fourth stages of indexing and extracting key text from items to be included in each theme. During this stage of the analysis, items containing significant discussions of each theme were printed and read, and significant observations or information manually highlighted. Highlighted sections of text in each item were electronically coded in NVivo nodes representing themes with a custom coding spread of 15 or 20 words to ensure that the surrounding text was available. As familiarity with each item grew, in some instances the entire reading, highlighting, and coding process could be completed on screen within the NVivo software. Some amalgamation of themes containing similar content was possible. For instance, items coded against a keyword search with the word “legal” were found to be similar to those coded with the keyword “liability”, so the two themes could be merged. The final list of themes ranked in order of frequency of occurrence is shown in Table 6.

Table 6.

Final Themes for Review of Literature on Telehealth Guidelines

(N = 233 items)

Theme	Articles containing each theme	Theme	Articles containing each theme
Quality of Care	40		
Access	31	Responsibility	6
Liability and Legal	24	Consent	6
Risk	21	Innovation	5
Confidentiality and Privacy	20	Credentials	4
Safety	20	Licensing	4
Ethics	12	Evidence	3
Trust	11	Justice	2
Autonomy	9	Beneficence	2
Relationships	8	Treatment	1

Note. Items may contain more than one theme.

Through this process, familiarity with each item was attained so that when the coded references for each NVivo node were printed, relevant and interesting references could quickly be highlighted by hand and used to build the literature review. The fifth and final stage of analysis involving the mapping and interpretation into associations and typologies is described in the following section.

2.2 Exposing the Processes and Practices in Telehealth Services Guidelines

Several observations can be made about the guidelines examined. Firstly, they have been prepared by medical associations, such as the RACGP and the ATA, and healthcare providers such as Queensland Health. This may explain why the focus of many guidelines is on workforce planning (skills and training of clinicians), responsibilities of providers (to explain telehealth services to patients, keep records, and obtain patient consent), facilities management (primarily of equipment), and information management (privacy of patients and confidentiality of health records).

A common thread running through all telehealth guidelines was the need to facilitate, legitimise, and standardise the ways in which telehealth services are delivered. Loane and Wootton (2002) see guidelines as playing an important role in facilitating the deployment of telehealth services. Beginning in 2003, the ATA published 14 sets of guidelines for different medical specialties' use of telehealth services. In Australia, each professional medical organisation has published its own set of guidelines. Two transnational guidelines stand above this diversity -- the ISO telehealth guidelines (ISO, 2014), and the European Code of Practice for Telehealth Services (Telehealth Quality Group, 2018) -- but even these are intended to be customised to suit the needs of different organisations and specialties. Many guidelines assume different forms according to whether they are intended for use as clinical guidelines, for operational or instructional purposes for clinicians, or for technical purposes relating to the use of the technology (Loane & Wootton, 2002).

Clinical, operational, and technical aspects of guidelines may be expressed in diverse forms, such as legislation (Garcia, Silva, & Terra, 2015), standards (Australian Nursing and Midwifery Federation, 2013b), guidelines (ATA, 2007), position statements such as that by the Royal Australian and New Zealand College of Radiologists (RANZCR, 2007), policies (Western Australia Country Health Service, 2012), frameworks (Ramirez, 2014), and detailed toolkits (Canadian Stroke Network, 2013).[7]

The following sections discuss the processes and practices advocated in guidelines and highlight commentary in the literature about privacy, confidentiality, and patient consent processes; treatment, quality, evidence-based practice and safety considerations; practices defining responsibility for patients and relationships with patients; processes to minimise liability and risk; and one of the key motivations for telehealth services, improving access to healthcare.

2.2.1 Privacy, confidentiality, and patient consent

[7] This toolkit has since been updated.

Processes to protect patient privacy and confidentiality of information, and to gain consent for treatment, are advocated in almost all telehealth service guidelines. While some guidelines acknowledge that the same privacy and confidentiality requirements should be no different from those for “normal” consultations where technology does not mediate a consultation with a patient (e.g., RDAA, 2014), others provide extensive advice on how to ensure privacy and confidentiality when relying on communications and information technology media. Some guidelines require providers to have specific policies in place; others define specific requirements, such as password protection for computer screensavers (e.g., RACGP, 2011) or encryption of information (e.g., FSMB, 2014). Underlying the advocacy of these processes is the concern that once patient information is located or transmitted beyond the physical facility of the provider, providers of healthcare cease to have control over that information.

There are several strands in the literature on privacy and confidentiality in the context of telehealth service provision. Authors were concerned about the confidentiality of technology-based consultations (Kaspar, 2014; O’Shannessy, 2000), but displayed little awareness of the technical measures built into the transmission of information (such as video and audio) over telecommunications networks. Some authors reported concerns over the physical privacy of telehealth service consultations arising from the use of inappropriate facilities (rooms which were not soundproof). Others noted that telehealth used in the home can increase privacy by reducing home visits or hospital appointments but can also intrude on a person's daily life by the use of home-based monitoring devices (Mort et al., 2013). Protection of information held in electronic health records has largely been regulated through legislation, such as the Health Insurance and Portability Act (HIPPA) in the USA, in Australia though the Australian Privacy Principles (Victorian Department of Human Services, 2015), and in Europe by the European Commission Data Protection Regulation (European Commission, 2015). The majority of codes (but not all) do provide advice on the privacy of health records.

Concerns over patient consent to participate in a healthcare activity when using telehealth services are illustrated by the requirements in one guideline that “the patient gives explicit prior consent and repeats this consent on camera” (RACGP, 2011, p. 15). Another guideline requires “advance agreement that participating specialists will not bring other parties to a telehealth consultation without the explicit prior consent of the patient” (South Australian Health, 2013). Remarkably little discussion of patient consent was identified in the literature, yet the vast majority of codes contain advice to obtain patient consent for telehealth consultations. It may be that such a fundamental procedure for medical professionals is simply not controversial enough to generate much discussion. Nevertheless, the way in which consent is obtained does depend on the policies of jurisdictions. Some require written consent (Queensland, Australia); in others, written consent is optional and oral consent suffices (NSW, Australia), although this requirement may vary between services. The most interesting discussion of consent issues identified in the literature was written from a South African perspective which suggested:

> obtaining informed consent becomes more difficult when the patient has had limited exposure to and knowledge of ICT. There is an obligation to explain that the consultation will not be with a physician in the same room, but rather that sophisticated ICTs will be used.… This is a difficult task, even for the computer- and technology-literate doctor dealing with the computer-literate patient. Good patient-physician communication is required to achieve this. In South Africa, with 11 official languages and diverse cultures, patient-physician communication may be more difficult. (Jack & Mars, 2014, p. 60c)

Hence, the separation of care between places and the interposition of a technological medium in a healthcare activity has modified procedures for patient privacy, confidentiality of information, and consent. Modified rules, processes, practices, and behaviour of technology now "patch" the previous place-based procedures to enable new services. Consultations are now available through, for instance, videoconferencing, while other media, such as mobile devices (ATA, 2013), are still treated with reservation. Policies on storage of information, access to information, and the gaining of consent have been changed to reflect the changed contexts, and new sociotechnical codes for information management have emerged governing the behaviour and capabilities of technology and individuals.

2.2.2 Quality, evidence-based practice, and safety

Guidelines emphasised the need to maintain quality of care when provided using telehealth services. In Australia the Rural Doctors Association guideline stated services "must adhere to the basic assurance of quality and professional health care in accordance with each health care discipline's clinical standards" (RDAA, 2014, p. 2). However, some authors (Dattakumar, 2013; R. Scott et al., 2007), found that there was little agreement on the means by which safety and quality of care for telehealth recipients can be measured. Intuitively, when quality of care increases, safety should also improve (Bosse, Breuer, & Spies, 2006) although the two measures are not synonymous and can be based on very different indicators (P. Mitchell, 2008).

Quality is one of those concepts which is deceptive: it can be moulded to suit many purposes. Lack of physical contact in telehealth services is considered by some (Wade, Eliott, & Hiller, 2012) to result in a lower quality consultation. On the other hand, the possibility that telehealth technologies can improve access to (higher) quality health services originating from metropolitan providers for rural populations is suggested to be an important driver for telehealth service provision (Chandra et al., 2005; Jack & Mars, 2014; MacFarlane et al., 2006).

A guideline which did address the issue of quality of care stated, “there is limited evidence on the clinical effectiveness and risks of video consultations in the Australian primary healthcare setting” (RACGP, 2011, p. 3). Stanberry (2006) argues that guidelines can help to describe a standard of care. Loane and Wootton (2002) suggest that guidelines prove the maturity of a practice, and hence define a comparable service to face-to-face consultations for regulatory purposes (FSMB, 2014). The use of guidelines, especially "evidence-based" guidelines, is often proposed. Current telehealth guidelines revert to the current norm for place-based care by stating that practice should be:

> based on best available evidence in the context of current Australian general practice ... (and) in the absence of well conducted clinical trials or other higher order evidence, the opinion of consensus panels of peers is an accepted level of evidence and may be the best available evidence at that time. (RACGP, 2011, p. 18)

Many authors (Daniel & Sulmasy, 2015; Loane & Wootton, 2002; RDAA, 2014) acknowledge the usefulness of evidence-based clinical guidelines and the need to customise guidelines to the telehealth service model, but Bosse et al. (2006) argue that the multidimensional character of quality and safety in healthcare and the context in which a service operates is just as important. While authors seem prepared to accept that telehealth services can improve the quality of healthcare, discussions of safety in the telehealth usually sound a cautionary note: namely, whether telehealth is safe. In the USA the FSMB’s model policy states “medical boards, in fulfilling their duty to protect the public, face complex regulatory challenges and patient safety concerns in adapting regulations and standards historically intended for the in-person provision of medical care to new delivery models” (FSMB, 2014, p. 3).

In a recent study of the challenges for existing health safety standards in Australia, I found that “safety and quality health service standards may require extension to cover new risks introduced by telehealth healthcare delivery” (A. Taylor, 2015, p. 94). I identified four new areas of risk which mediate the delivery of healthcare when using telehealth: financial management, to ensure telehealth becomes a sustainable mode of healthcare delivery; facilities management, to provide an appropriate environment; technology management, to underpin the delivery of services using telehealth; and information management, to safeguard information privacy, security, and health information. Importantly, all but one of the guidelines reviewed failed to discuss technology management (service support, delivery, infrastructure and deployment management, and technical support).

There is no doubt that telehealth services challenge existing healthcare practices and notions of safety. However, guidelines for telehealth services have to date focussed on safety from a technical perspective only; for example, the ATA guidelines for tele-rehabilitation highlight the “need to take appropriate measures to familiarize themselves with equipment and safety issues with client use” (ATA, 2010, p. 7). Discussions of safety in the literature on telehealth take a wider perspective. For example, prescription of medicines remotely may increase risk of fraud or error (Fitzgerald, 2008). Extending the chain of healthcare outside of the clinic walls into the patient’s home, as in the case of home monitoring (Mort et al., 2013), poses questions of responsibility for the quality of safety of healthcare to patients, carers, and clinicians.

2.2.3 Responsibility for and relationships with patients

Execution of the implicit responsibilities of health service providers, often framed as a duty of care, plays an important role in building confidence or trust with patients and within the health profession. Telehealth services confront these problems in dealing with patients across geographical, organisational, or jurisdictional boundaries because it is necessary to decide who has responsibility for treating a patient (Nohr, 2000; Wade et al., 2012). Ensuring that the responsibility for the patient is clearly stated when care is separated and healthcare activity is supported at a distance by ICT services is a concern of several guidelines (Accreditation Canada, 2003; RACGP, 2011, 2013). Telehealth service guidelines have focussed on the maintenance of relationships established during a face-to-face consultation between a doctor and a patient (ATA, 2014a, 2014b; RACGP, 2013). Opinions differ on the importance of the in-person, face-to-face relationship compared with a telehealth mediated consultation. Some evidence exists that telehealth service consultations may actually improve the experience for patients (Lee, 2015). In research conducted in Adelaide, Australia, assessing the outcomes of a telehealth service to the home trial for rehabilitation and palliative care, I found that:

> The effectiveness of telehealth was judged by clinicians as equivalent to or better than a home visit on 71.6% (192/268) occasions, and clinicians rated the experience of conducting a telehealth session compared with a home visit as equivalent or better in 90.3% (489/540) of the sessions. (A. Taylor, Morris, Pech, et al., 2015, p. 1)

Despite such positive experiences of separated care, the disruption of prior place-based norms and practices when telehealth services mediate relationships can lead to conflicts over the norms and practices of medicine. Many jurisdictions allow telehealth service consultations for a range of conditions. Other jurisdictions (e.g., Brazil) have concerns that telehealth consultations do not allow for trust to be built with patients (Garcia et al., 2015). For instance, Bateman (2011) points out that fear of potential competition, particularly from unqualified persons, is a concern for the medical community. In-person consultations permit a physical examination of the patient to take place, which may be required to identify some conditions and allow place-based relationships between providers and patients to be built. When medical practices change, concerns of provider liability and risk arise.

2.2.4 Minimising liability and risk

Many guidelines address legal or liability matters, practitioner competence (licensing and credentialing), safety (mostly patient safety), privacy and confidentiality, and the responsibilities stemming from the nature of the relationship between the healthcare "provider" and the "recipient" of healthcare. Consent by the patient to accept treatment and legal liability resulting from inappropriate treatment by a telehealth service were of considerable concern to many guidelines (e.g., Australian Nursing Federation, 2013; FSMB, 2014; Telligen, 2014). Opinions were divided over whether telehealth reduced liability by increasing patient safety, especially in rural areas, or increased liability when a physical examination of the patient could not be made (Wade et al., 2012).

The credentialing and licensing of medical professionals by health professional associations and regulatory bodies was seen as key to minimising potential liabilities. Patients need to know if a physician is legally qualified to treat them. Health systems need to be sure they are paying someone competent to deliver care. Mechanisms function at a state, national, federal, or supra-national level depending on the locality. Credentialing and licensing bodies involved in practitioner administration have often grown from municipal associations or boards dealing with the local public health concerns in the 19th century (Gupta & Sao, 2011), or associations of medical practitioners (such as the British Medical Association) formed to promote the professional legitimacy of medicine through exchange of knowledge and representation to employers or government.

Credentialing and licensing issues have been a more significant issue for telehealth services which cross state borders in the USA. Until recently, each of the 52 states had responsibility for these matters (Magenau, 1997) although steps have been taken to try to harmonise practices (FSMB, 2014). In contrast, in Australia (with six states and two territories), the federal Australian Health Practitioner Regulation Agency has responsibility for national assessment and accreditation (Victorian Department of Human Services, 2015). The power of social norms to influence credentialing regulations to shape telehealth practice is best illustrated by tele-ophthalmology services in Brazil which must include refractive diagnosis services because optometrists in Brazil, unlike Australian optometrists, are unable to provide prescriptions for glasses (Umpierre, 2019).

The processes a telehealth service provider employs to mitigate the risks of healthcare activities impact their potential liability in law (Victorian Department of Human Services, 2015). Some authors express the opinion that the use of technology in healthcare fundamentally changes liability. Others are of the opinion that provided a reasonable standard of care has been provided though the technology, then the nature of the healthcare has not changed. Some authors argued that guidelines provide measures against which a reasonable standard of care can be measured (Alverson, 2014; Loane & Wootton, 2002; Stanberry, 2006). Support for this view came from an

ATA survey of users of its clinical practice guidelines which found that most respondents felt that guidelines add credibility, standardise approaches, and reduce liability (Krupinski, Antoniotti, & Bernard, 2013).

It is difficult to discuss liability without identifying the precise risks which may present. For instance, misdiagnosis or equipment failure are two different types of risk which require handling in different ways. All forms of guidelines recommend processes and practices to manage risk in some way, even when risk is not specifically mentioned. Many guidelines recommended undertaking a risk analysis and creating a risk management plan (e.g., Accreditation Canada, 2003; ISO, 2014; Momentum, 2014). However, one form of risk, the risk of not improving access to healthcare, receives little attention in guidelines.

2.2.5 Improving access to healthcare

The majority of telehealth guidelines examined argued for a vision of healthcare where improved access to healthcare through telehealth services resulted in better health outcomes. A few guidelines specifically suggested that groups disadvantaged by other factors, such as ageing, medical condition, or financial position, could enjoy more equitable access to healthcare via telehealth services (Agency for Clinical Innovation, 2019; Audiology Australia, 2013). Other guidelines highlighted the desire to improve the cost efficiency of healthcare (Telligen, 2014). The New South Wales Agency for Clinical Innovation stated that telehealth services can optimise the use of the existing workforce in healthcare because

- Chronic care patients need access to specialist services that may not be available in their local area…;
- (telehealth services) promote self-care management (promoting patients to manage and take control of conditions) leading to empowerment of patients; and
- (telehealth services increase) access to specialist care and specialist input to care which has, in the past not been available. (New South Wales Health, 2014, p. 3)

Surprisingly, the literature directly associated with telehealth service guidelines had little to say about the role of services in improving access to care. Jack and Mars (2014) commented that telehealth services could perpetuate inequality of health service provision because they could not replace in-person care. Dickens and Cook (2006) suggested that telehealth service provision could make it easier for specialists to move away from rural areas into metropolitan areas while still servicing their patients. One feature found in many guidelines was reference to the norms of medical practice expressed in medical ethical principles.

2.3 Medical Ethical Principles as a Social Norm

Medical ethical principles developed by Beauchamp and Childress (2001) have become social norms for designing medical practice. These principles advocate for the interests of individuals (autonomy), the benefits of care (beneficence), avoidance of possible harm (non-maleficence), and fairness of care (justice) (Beauchamp & Childress, 2001). While guidelines refer to the need to support ethical behaviour, only two guidelines provided specific examples: informed consent (Accreditation Canada, 2003), and equality of patient access to telemedicine services (Kidholm et al., 2012). Some guidelines attempted to group many issues, such as safety, consent, privacy, and confidentiality, under the banner of ethics.

Examination of the literature associated with telehealth guidelines exposed the role of professional bodies as keepers of medical norms of practice. The right of the medical professional to determine matters related to healthcare is supported by the dominant notion of the relationship between the medical "professional" and the "patient" where the patient is seen "face to face" by a health practitioner in their consulting rooms. Embedded in the norms of medical practice are the assumptions that the professional provides treatment; the patient receives treatment; the professional is paid for their services by the patient, sometimes with a subsidy from the state; and the professional holds the expert knowledge which is needed by the patient. The professional thereby determines the medical practice which becomes embedded in case law or legislation (Stanberry, 2006).

However, traditional medical norms have been eroded over time not only by the advent of telehealth services, but also by the changing nature of the relationship between the medical professional and the patient as patients become more knowledgeable and are encouraged to take more responsibility for their own health (Mort et al., 2013). New forms of healthcare, such as telehealth services, permit new processes and practices to be developed which may conflict with existing medical practices. Protagonists in debates over guidelines are not above using ethical principles to resist changes to practice which may be proposed in guidelines. Two common arguments have been used to oppose telehealth practice; firstly, that telehealth practice is not ethical and secondly, that professional (medical) status was threatened by the use of unsuitably qualified personnel employed by telehealth services. Examples found in the literature include the debate over telemedicine regulations in Brazil (Federal Medical Council [CFM], 2018) or changes to professional roles when new technology becomes available, where professional organisations can argue that healthcare is being "offered for sale by a biologically orientated licensed mechanic" (Kluge, 2011, p. e1).

2.4 Summary

The purpose of my review of the guidelines for telehealth service and associated literature was to identify the key norms, processes, and practices of telehealth services. The research question posed was:

> What are the explicit processes or practices which form part of, and simultaneously shape, the ways in which the technology is used within telehealth services that are advocated by organisations and professional groups? (RQ1)

Eleven major process groups have been identified (as presented in Table 6) which have been the focus of telehealth guidelines and associated literature. My review shows that telehealth service guidelines encapsulate many of the explicit processes and practices to manage common risks, although there is a large variation in the issues considered. Guidelines provide advice on the skills and training needed by clinicians, licensing, credentialing, processes for management of equipment, privacy, and confidentiality.

With a few exceptions, guidelines restrict commentary on the potential for telehealth services to improve equity and access to healthcare to headline introductions indicating that telehealth services can change healthcare and improve access to care. This illustrates that while guidelines support the legitimisation of new healthcare norms, they do not play a major role in establishing healthcare policy priorities. Guidelines do provide policies on storage of information, access to information, and the gaining of consent, reflecting the changed sociotechnical environment. Such policies provide new sociotechnical codes designed to govern the behaviour and capabilities of technology and individuals.

The disruption of prior place-based norms and practice when telehealth services mediate relationships is a key concern in guidelines. Guidelines seek to manage conflicts over the norms and practice of medicine, especially the responsibilities of providers and relationships between providers and patients. In part, this type of conflict is managed by advocating the maintenance of ethical principles which originated in place-based medicine. Guidelines seek to allow new processes and practices for healthcare activity supported at a distance by management of the risks arising from the modification of place-based practice. The evidence arising from this review is that guidelines reflect the processes developed by telehealth services to manage risks and support norms, processes, and practices, or sociotechnical codes, for telehealth services.

This review has provided an initial insight into the processes and practices advocated by guidelines for telehealth services. The following chapter discusses the analyses contained in the literature associated with telehealth services in order to deepen an understanding of how processes and practices have been adapted to the technology used by telehealth services and how, in turn, services have been shaped by the guidelines developed by organisations and professional groups.

3 INFLUENCES ON TELEHEALTH: A REVIEW OF THE LITERATURE

The aim of this literature review is to explore the influences on telehealth in order to understand:

> What are the influences on the development of telehealth services as represented in theories addressing this process? (RQ2)

Exploration of the literature located five major influences in the development of telehealth services: the visions provided by advocates of these services, the role of organisational and professional contexts in shaping services, the influence of technology, the acceptability of telehealth services for health professionals and patients, and the changing relationships resulting from the physical separation of care. Lastly, drawing on the wider literature on the relationships between technology and social change, explanations are sought for the extent to which telehealth services have been incorporated into contemporary healthcare systems. Figure 8 illustrates the organisation of this chapter.

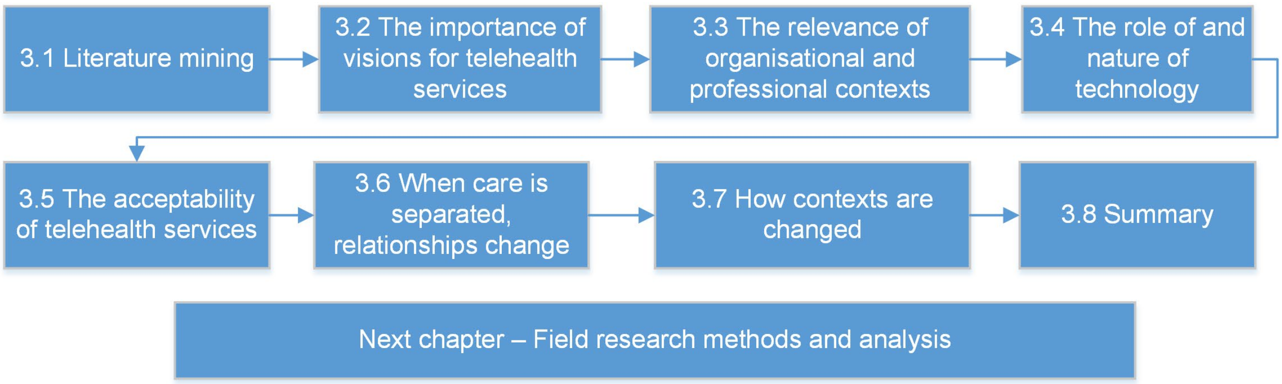


Figure 8. **Organisation of Chapter 3.**

Essentially, this literature explorations mines the literature for explanations of the various influences on the development of telehealth services. In selecting literature for explanatory value, I sought literature on telehealth services which contained theories and frameworks. I take the definition of a theory, from Okoli, as “an integrated collection of explanations about the relationships between one or more pairs of concepts that represent real-world phenomena under specified conditions; such explanations might be accompanied with predictions and implications for intervention and action” (Okoli, 2015b, p. 4).

3.1 Literature Mining

Theory mining and building have been described by Meyer and Ward (2014), who advise the use of a “pluralistic approach for theory verification and generation” (p. 525). Meyer and Ward provided seven steps to follow when integrating theory into research design and analysis. When analysing field data, they proposed a dual approach requiring a research design to commence within a theoretical framework (in this case, the literature of telehealth services) followed by refinement of findings, and an iterative process for development of new or alternative theoretical approaches. I have modified this approach for use in my analysis. My modified approach, shown in Table 7 (based on Meyer & Ward, 2014, p. 530), included seven steps, where Steps 5 to 7 have been specifically customised to the needs of this review.

Table 7.
Literature Mining Approach

Step	Literature mining activity
1. Literature exploration	Systematically search the literature of eHealth, health technology, and telehealth services for contributions which employ a theory, framework, or technique to explain the operation or development of telehealth services. Apply inclusion and exclusion criteria.
2. Refinement	Expand exploration using forward and backward citation, consideration of implementation and innovation frameworks, key authors in the field, and theories of technology.
3. Categorisation	Improve search criteria. Group and re-group literature collections in a meaningful way. Reduce duplication. Identify literature which directly discusses telehealth services.
4. Analysis	Summarise and group the literature on telehealth services according to the theories, methods, techniques, and subjects discussed.
5. Theory review	Identify the theories and frameworks found in the literature which may inform the research question.
6. Theme development	Read the literature in depth to identify key sections of text which address themes of interest.
7. Concept development	Based on the identifiable themes, construct a conceptual framework informed by a manageable set of themes and sub-themes

To begin this process, my literature mining commenced with exploration of the literature using the same semi-automated bibliographic database search tools which were used when I reviewed the literature of telehealth guidelines reported in Chapter 2.

3.1.1 Literature exploration and refinement

A search of the literature using the Findit@Flinders library services for items containing the words telemedicine or telehealth or telecare (both hyphenated and non-hyphenated) in the title returned about 58,000 items (in February 2015). A more targeted search explicitly identified some of the theoretical concepts used in the literature on telehealth services using the Findit@Flinders databases. This search was similar to the search executed to identify the literature associated with telehealth guidelines but used different secondary keyword terms. Lastly, keyword fields in the user interface targeted literature with one of the terms telehealth, telemedicine, or telemedicine in the title (hyphenated or non-hyphenated) as a main search term. The secondary keywords used in the bibliographic searches relevant to identification of explanatory theories and frameworks are listed in Table 8.

Examples of the theories found in the literature were actor network theory (Aanestad, 2003), normalisation process theory (J. Morrison, 2014), and the technology acceptance model (Hu, 1998). This last example raises the interesting debate as to when a model (or a framework, for that matter) is also a theory. I take the view that a model, or a framework or method linked to a theory, may not support an explanation but can used as a step in the development of an explanatory theory. For instance, a model of the planetary system (which may take many forms) does not explain by itself gravitational processes but may predate fuller explanations.

Literature which used a framework (or model) to assess telehealth services was included in my literature review because frameworks and models may highlight possible relationships between multiple factors within a particular context. Frameworks can be a means of including contextual factors in an analysis or describing contextual influences on telehealth services. Types of framework widely used in the literature include literature reviews, economic evaluation (Le Goff-Pronost & Sicotte, 2010), or historical accounts (Ferreira, O'Mahony, Oliani, Araujo Júnior, & da Silva Costa, 2015). For all literature searches, other inclusion criteria were as follows:

- Any date of publication;
- Peer-reviewed articles;
- Other articles;
- Any type of literature review; and
- Any postgraduate thesis.

No date or item restrictions (e.g., peer-reviewed paper, or language) were used in order to improve the possibility of obtaining a broad understanding of a wide range of material. Exclusion criteria were as follows:

- Duplicate items;
- Items for which full-text sources could not be obtained through electronic means or inter-library loans;
- Items not available in English or Portuguese;
- Items which focused solely on describing a clinical intervention or case study;
- Systematic reviews without any theoretical foundations;
- Opinion pieces and news items;
- Items found not to be relevant using a quick visual appraisal of the title, abstract, and contents, where available, in that order; and
- Items discussing eHealth, mHealth, health technology, or any other topic which did not appear to be useful for comparison purposes based on a quick visual appraisal of the title, abstract, and contents, where available, in that order.

Keyword search terms for use as a secondary search parameter were informed by prior reading and literature already collected by the author. The initial list of secondary search terms (case insensitive) is shown in Table 8. Searches also targeted references to key authors recognised as leaders in the discussion of sociotechnical change in healthcare and in society and as a whole.

Table 8.

Distribution of Returned "Explanatory" Articles by Secondary Search Term[8]

Preliminary search term	"Hits"	Preliminary search term	"Hits"
Greenhalgh	371	Network Theor*	20
May Carl & May C.	355	Organi*ational change	20
Theory & Theories	234	Framing	19
Technology Acceptance Model	212	Structuration	18
Diffusion of Innovation*	194	Cognitive Theor*	17
Histor* in Title	165	Feenberg	17
Rogers EM	158	Acceptance and use of Technology	16
Evidence based medicine	145	Social capital	14
Socio* in Title	107	Realist review	13
Health economics	94	Gatekeeping	11
Economic* in Title AND analys* in Title	69	Social Construction	10
Pawson	54	Karl Marx	8
Socio*technical	53	Constructivist	7

[8] The * character acts as a wild card, permitting any character to be substituted in the search term.

Preliminary search term	“Hits”	Preliminary search term	“Hits”
Domestication	49	Modernity	7
Normali*ation process	40	Critical Theory	6
Computer mediated communication	38	Systems theor*	5
Change Management	36	Activity Theory	4
Actor network	31	Semiotic	4
Planned behaviour	31	Media Richness	3
Social Presence	30	Positivism	1
Health Belief Model	20	Use and gratification	1

Searches were conducted between September 2015 and February 2016. Initially, 2,707 articles were returned in the search results. Each keyword search was stored in a separate collection in the Zotero reference manager previously referred to in Chapter 2. Results were stored in a standalone version of the Zotero open access reference manager. A process of preliminary organisation and indexing of the articles (Bryman & Burgess, 1994), combined with application of the inclusion and exclusion criteria, reduced these results to 2,093 articles. Appendix A shows the resulting collections and the number of items in each collection. Articles were added to the reference manager subject to the inclusion and exclusion criteria when:

- Additional articles of interest were discovered while reading some texts. This is known as snowballing or forward citation;
- Initial evidence showed that an author or paper was influential in which case a backward citation was undertaken;
- Search engines identified similar papers to the ones being analysed; and
- Grey literature (e.g., organisational policy statements) was discovered “by chance”.

Examination of these collections showed considerable overlap between collections. Some items had been misclassified and some collection names were not helpful, or duplicated each other, leading to a revised list of secondary search terms (shown in Appendix B). This search engine can perform regular searches and email notices of updates and new items which have been discovered. Subsequently, following the initial literature search, between February 2016 and June 2019, relevant articles from automatic searches of the Findit@Flinders databases were added to the reference manager as they were discovered; they were scanned for content and, if required, modifications were made to the literature review in this section.

3.1.2 Literature categorisation and analysis

A second application of the inclusion and exclusion criteria was undertaken during March to May 2016, reducing the collection to 1,624 articles with limited overlap between collections. Collections were grouped into the following themes: context, technology, cognitive, innovation, health economics, organisational, complex theories (e.g., normalisation process theory), key author related items, and reviews of any type. Analysis of these collections using Structured Query Language (SQL) database queries of the reference manager database showed that there were 1,380 unique items following the second screen.

Further analysis reduced the number of articles contained in more than one collection. Items not easily accessible (without payment) in full-text form, or those that were of little value to an analysis of the theoretical literature (for instance, short reviews, media pieces), were removed from these collections (181 items). At this point in the literature analysis, no attempt was made to exclude any item based on a quality assessment of its content. During this period, 24 articles found through automatic searches were added to the collections. Resulting collections contained 1,223 unique items covering literature on mHealth, eHealth, health technology, telehealth, telemedicine, and telecare. An SQL query for items specifically relating to telehealth, telemedicine, or telecare returned 746 items. Items were then analysed in an Excel spreadsheet to determine which items had theoretical relevance, using the following process:

- Repeated application of the inclusion and exclusion criteria;
- Inclusion of works where authors applied theories, models, or methods, such as the technology acceptance model, or built or modified existing theories;
- Inclusion of works where authors applied a framework, such as guidelines for evaluation, risk, and ethical frameworks, or which considered multiple issues relating to the application of telehealth services within an organisational context, or evaluated design and human factors relevant to users, or considered wider health system or societal factors; and
- Inclusion of works where authors used a technique of theoretical value, such as econometric analysis or a historical survey.

Several articles were excellent case studies, systematic reviews, or evaluations, but were not theoretically orientated. These items were placed in an archive category for later reference. Items were retained when they contributed to or used a theoretical perspective; for instance, Cho's multi-level analysis of a telehealth innovation (Cho, Mathiassen, & Robey, 2006) or proposed conceptual frameworks for assessing organisational factors which condition telehealth service adoption by hospitals (Gururajan & Hafeez-Baig, 2014). One significant work (Wade, 2013) employed grounded theory methods. Figure 9 shows the process of decision-making used to determine which articles to analyse further.

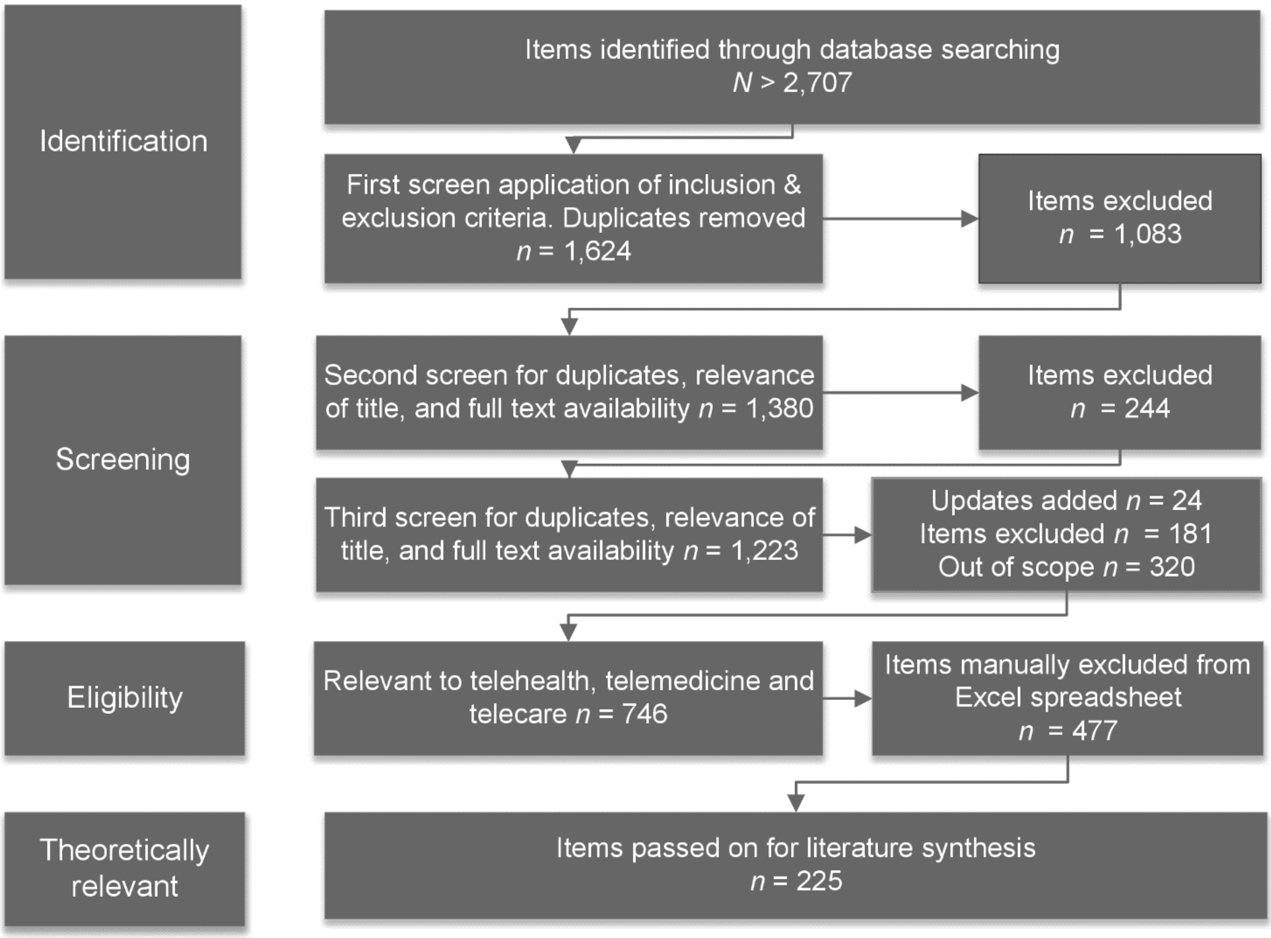


Figure 9. **Literature categorisation process.**

A total of 225 articles were retained for further literature synthesis. This literature represented the telehealth service subset of the wider literature on eHealth and information technology in healthcare (Cockcroft, 2015). Note that, as a result of predefined automatic searches, approximately 21 additional items were discovered between 2016 and August 2019 and are not shown in Figure 9. While these items informed this review, they were not considered to affect significantly the original analysis which had been undertaken during 2016. Collected literature (220 articles after five duplicate articles were removed from the collection) was classified, screened for useful information relevant to the research questions, summarised, and further analysed in Microsoft Excel spreadsheet software (see Figure 10).

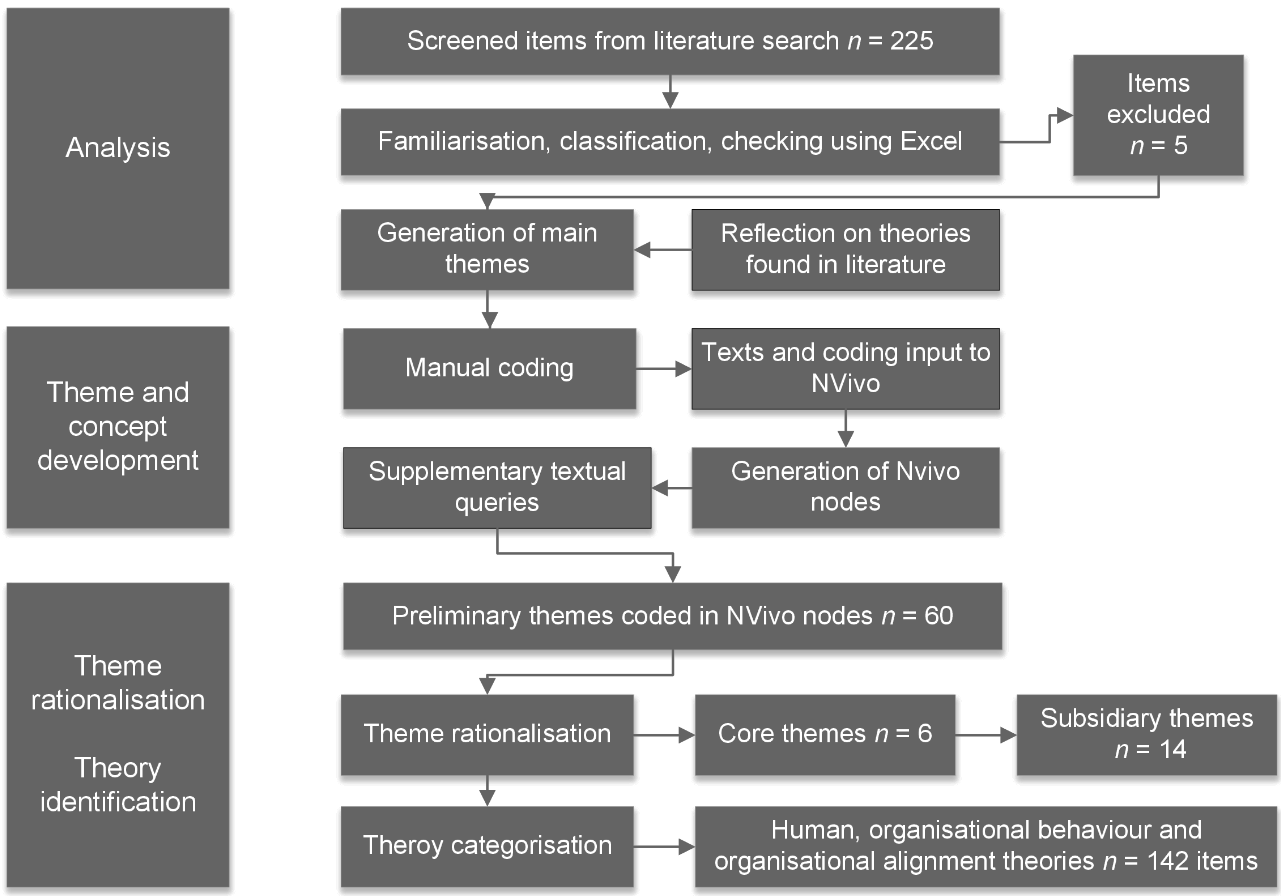


Figure 10. **Literature analysis process.**

A classification scheme inspired by Okoli (2015a) was developed with the following criteria:

- Aims of each study described in introductory sections;
- Methods and techniques used, for instance, qualitative, review, case study, theoretical, descriptive, historical or economic of analysis, surveys, interviews;
- Types of theories used, for instance, normalisation process theory, diffusion of innovations or sociotechnical;
- Principal domain or context of the study, such as the behaviour of users, organisational issues, use or development of guidelines, risk and safety;
- Explicit and implicit sociotechnical codes, factors, or barriers considered or derived in each study; and
- Key conclusions of each study. (adapted from Okoli, 2015a, p. 892)

Of the 220 items retained for further analysis, 78 did not reference any formal existing theory, model, or method. For instance, nine works set out an analysis or systematic review of the economic impact of telehealth services, largely from an organisational perspective (e.g., Mistry, 2012) and 27 provided some historical perspective on the development of telehealth services (e.g., Higgins, Dunn, & Conrath, 1984). References to theories made in passing and references to theories only found in the bibliography were judged not to provide evidence of engagement with a theory. The original collection (after application of basic inclusion and exclusion criteria) contained approximately 2,093 items related to telehealth services, telemedicine, or telecare. Those works containing an explanatory or theoretical component (142) represented about 6.8% of the literature. Previous research (Gammon, 2008) estimated a comparable value of 5% of the literature. The major theories, models, and frameworks found in the literature on telehealth are outlined in the following section.

3.1.3 Theories, models, and methods applied to telehealth

A total of 142 works discussed, used, or based their analysis on one or more formal theory, model, or method. Some authors (21) engaged with three or more theories; for instance, Anderson and Jansen's (2012) discussion of how user innovation could challenge existing institutional barriers. One author applied grounded theory (Wade, 2013) which is not discussed further in this analysis, because it is really a method. Works were classified according to their relevance to professional users of telehealth services (92 works) and organisations (97 works), with some addressing both user and organisational factors. It was found that 16 works explicitly discussed codes, guidelines, and standards in telehealth services, and 15 works concerned issues of risk and trust when providing healthcare using telehealth services.

A prior analysis of the literature by Greenhalgh et al. (2012) identified four discourses: humanistic uses of technology to support better care; a modernistic and technological deterministic outlook; a political economy analysis of the drive for commodification of healthcare; and a managerial view of large-scale technology program change management. In contrast, my literature review was focussed on identifying different explanatory categories in the literature. Three broad streams of academic writing were found: on technology acceptance by users (such as the theory of planned behaviour), on organisational impact of technology (activity theory or normalisation process theory), and social change (structuration theory). An analysis of the telehealth literature performed by field (Wade, Gray, & Carati, 2016) identified a similar, but less extensive, suite of theories used in the field.

Theories about the acceptance of the technology by users included:

- Technology acceptance model (TAM), (F. Davis, 1989; Walsham & Sahay, 1999), applied by many authors (e.g., Rho, Choi, & Lee, 2014);
- Theory of planned behaviour (TPB), (Ajzen & Fishbein, 1980), applied by many authors (e.g., Chau & Hu, 2002);

- Unified theory of acceptance and use of technology (UTAUT), (Venkatesh, Morris, Davis, & Davis, 2003) applied by many authors (e.g., Kohnke, Cole, & Bush, 2014);
- Health belief model (HBM) (Rosenstock, Strecher, & Becker, 1988), applied by Hsieh & Tsai (2013);
- Theory of interpersonal behaviour (TIB), (Triandis, 1980), applied by Gagnon et al. (2003);
- Theory of reasoned action (TRA), (Fishbein, 1975), applied by Soroush (2011), Su, Tsai, & Hsu (2013);
- Equity-Implementation model (EIM) (Joshi, 1991), applied by van Offenbeek, Boonstra, & Seo (2013);
- Interaction theory (Markus, 1983) (InT), applied by van Offenbeek et al. (2013), Zailani, Gilani, Nikbin, & Iranmanesh (2014); and
- Task, Technology and Fit (TTF), (Goodhue & Thompson, 1995), applied by Maiga & Namagembe (2012).

Of these theories, TAM, TPB, and UTUAT dominated, being used in 40 of the 47 works addressing the acceptance of technology by users. Theories discussing technology impact within organisations included:

- Normalisation process theory (NPT), (May et al., 2009), applied by many authors (e.g., French et al., 2013);
- Activity theory (AT) (Coleman & Coleman, 2013), applied by Bardram, Bossen, & Thomsen (2005), Lin & Hsieh (2014), Nicolini (2007);
- Lewin's change management theories (LC), (Lewin, 1943), applied by Rufo (2012), Sutherland (2013);
- IS Success model (ISM), (Jafari, Ali, Sambasivan, & Said, 2011), applied by Jen-Hwa Hu (2003), Lerouge, Hevner, Collins, Garfield, & Law (2004), Soroush (2011);
- Critical Realist methods (CR), (Collier et al., 2016; Vassilev et al., 2015; Wynn & Williams, 2012), applied by (keland, Bowes, Flottorp, & Flottorp (2010), Kidholm et al. (2012), Vassilev et al. (2015);
- Strategic Alignment model (SAM), (Henderson & Venkatraman, 1999), applied by Boonstra, Broekhuis, Offenbeek, & Wortmann (2011);
- Social practice theory (SPT), (Reckwitz, 2002), applied by Nicolini (2007);
- System, society, dominance theories (SSDT), (C. Smith & Meiksins, 1995), applied by B. Russell, Smith, Valsecchi, & Bäck (2015); and
- Technology organization environmental framework (TOEF), (Oliveira & Martins, 2011), applied by Cilliers (2014).

Of these theories, normalisation process theory and activity theory were the most prevalent, with 12 out of 16 authors applying these theories to issues relating to the alignment of telehealth services within organisational contexts. Authors used a range of social theories to examine the adoption of technologies by users and organisations within broad social contexts. These included:

- Diffusion of innovations (DI), (Rogers, 1971), applied by many authors (e.g., Cho, Mathiassen, & Gallivan, 2008);
- Actor network theory (ANT), (Latour, 2007), applied by many authors (e.g. Oudshoorn, 2008);
- Social construction of technology (SCOT), (Bijker, 2009), applied by many authors (e.g., Dardelet, 2001; Oudshoorn, 2012);
- Structuration theory (ST) (Anthony Giddens, 1984), applied by many authors (e.g., Peddle, 2007);
- Critical theories (CT), e.g., critical realism (Porpora, 2015), critical theories of technology (Feenberg, 2002), applied by Cornford & Klecun-Dabrowska (2001), Klecun-Dabrowska (2002), Klecun-Dabrowska & Cornford (2000); and
- Levi-Strauss's concept of bricolage (Levi-Strauss, 1972; Miner, Bassof, & Moorman, 2001), applied by Essén (2009), Greenhalgh et al. (2013).

Of these theories, diffusion of innovations (32 authors), followed by actor network theory (18 authors) and social construction of technology theories (12 authors) were the most used. Some authors applied more than one theoretical approach.

3.1.4 Identifying themes in the literature

Detailed examination of the collected literature identified several themes and sub-themes. Identification of some themes was influenced by my prior experience and reading of the wider literature on eHealth, health technology, management information systems, and technology. Thomas and Harden note that:

> This stage of a qualitative synthesis is the most difficult to describe and is, potentially, the most controversial, since it is dependent on the judgement and insights of the reviewers. The equivalent stage in meta-ethnography is the development of "third order interpretations" which go beyond the content of original studies. (J. Thomas & Harden, 2008, p. 7)

The initial themes included the people and organisations who use technology, the codes of practice or guidelines used in the implementation of telehealth services, and considerations of safety and risk. Each text and the associated list of themes were imported into NVivo computer software (QSR International, 2019) and transferred into NVivo nodes. Automatic execution of text queries in NVivo for each theme supplemented the manual coding process.

The preliminary set of themes (*n* = 60; see Appendix C) stored in NVivo were rationalised by editing definitions of themes and merging smaller themes into larger themes. For instance, the theme “Views of telehealth” was merged into a theme labelled “Visions”. Themes of technology “fit” (used by social constructionism) and technology alignment and “normalisation” (used in normalisation process theory) were initially used as labels but were subsequently collapsed into a normalisation theme. This theme and others, such as “user acceptance” or “power”, arose more from consideration of key concepts (J. Thomas & Harden, 2008) in the literature rather than from any single theory. Table 9 lists the final working set of themes comprising six core themes and 14 sub themes.

Table 9.

Themes and Sub-Themes Found in Telehealth Literature

Major themes	Sub-themes		
1. Visions	-	-	-
2. Context	Organisational frames	Professional frame	Economic and social frames
3. Role of technology	Properties of technology	Technology as a mediator	Appropriation of technology
4. Changing behaviour	User acceptance	Risk management	Trust building
5. Changing relationships	Separation of care	Changing professional roles	Controlling interventions
6. Changing contexts	Diffusion processes	Normalisation processes	-

The major themes in the literature identified by applying the literature mining approach outlined in Table 9 were:

- Visons for telehealth services promoting outcomes, such as increased access to healthcare, better health outcomes, and improved system efficiency;
- Contexts, particularly organisations and professional contexts in shaping the development of telehealth services and determining their outcomes;
- Role of technology in (re)connecting separated care, together with its properties, its role within healthcare, how it is implemented, and the rules, guidelines, and codes, associated with technology;
- Changes in behaviour occurring when health professionals accept the practices and technologies used in telehealth services, together with the role of risk assessment and trust in accepting modified practices;

- Changes in relationships occurring when healthcare activity is supported at a distance, including the modification of health professional roles or practices and the emergence of conflicts between the different interest groups over these roles and practices; and
- Changes in contexts occurring when technologies and practices “diffuse” through an organisation or become normalised practice on the part of health professionals.

The remaining sections of this chapter discuss each of these themes, commencing with the visions for telehealth contained in the literature.

3.2 The Importance of Visions for Telehealth Services

The presence or absence of visions for telehealth services has been widely discussed in the literature. Greenhalgh et al. (2012) suggested that telehealth service providers and their stakeholders lack an "organizing vision" (p. 1) due to their different backgrounds, interests, and viewpoints competing with each other. Yet this diversity reflects the diverse nature of telehealth services and the contexts in which they operate. One of the visions or theories is that a telehealth service will improve the health of people living in regional areas. Legislation for the Brazilian Universal Health System (SUS), as reported by Moura (2016), includes this and other themes. Strategic objectives for the Brazilian Telehealth Networks Program state:

> Telehealth will materialise as an integrated and shared network of health services and information systems, to contribute to the processes of care and continuing education, as well as to facilitate the creation of regional or inter-municipal health projects, managed in a shared, integrated and coordinated manner, ensuring the use of Telehealth to increase the reach and the quality of care. (Moura, 2016, p. 3)

As Moura illustrates, multiple, longstanding ambitions for telehealth services exist, key of which are improvement of access to, and quality of, healthcare. Long before the dawn of the Internet, an editorial in *The Lancet* in 1910 suggested that London doctors could correctly diagnose a patient in the country using the transmission of stethoscopic sounds over the telephone network (Aronson, 1977). The theme of access to healthcare at a distance has continued in contemporary visions of telehealth services (Ramos, 2010; A. Smith & Gray, 2009). Access to universal healthcare in remote areas has become a major issue for governments (Higgins et al., 1984) with the expectation that better and safer healthcare for these populations will result (Queensland Government, 2014). Alternative visions for telehealth services are possible; for instance, Klecun-Dabrowska and Cornford (2000) ask:

> ... if telecare’s aim will become, for example, to enable the elderly and fragile to stay independent or to cut the costs of providing home care by reducing the numbers of personal

> visits? Does the application of telemedicine have to lead to a better service or just a more cost-efficient one? Is the aim of telehealth … to offer an additional service or will it lead to a reduction in surgeries' opening times? (Klecun-Dabrowska & Cornford, 2000, p. 59)

Disconnects between the vision and reality of the contexts for telehealth services and disputes over how the technology should or should not be used indicate that the telehealth project can be a site of multiple, contradictory visions, unintended consequences, and challenges (Petersson, 2011). For instance, Petersson (2011) argued the need to recast the vision for telehealth services into one in which telemedicine was "envisioned as a means to shift some parts of healthcare out of the traditional care institutions altogether" (p. 59). In contrast, the dominant perception in the literature reviewed is that telehealth services should be integrated into mainstream healthcare (Lerouge & Garfield, 2013). Other applications for telehealth services in mainstream healthcare have been driven by health systems' managers, who wish to redesign the health system to improve continuity of care to promote service integration and system-wide collaboration (Darkins, 2014; Hendy & Barlow, 2012), or to reduce the costs of healthcare (Lacal, 2004; Thrall & Boland, 1998). Even simple availability of more information to patients and providers through eHealth initiatives is seen as an enabler for change (Andreassen, Kjekshus, & Tjora, 2015; Soar, 2011).

In contrast, a sentiment exists that the expectations of technologies in healthcare are not being realised (Croll, Norton, Gray, Bryett, & Smith, 2012). Reductions in demand for place-based hospital services are difficult to demonstrate, sometimes due to the unintended consequence that improved access to services can increase service demand (Petersson, 2011). Nevertheless, the expectation that strategies to implement telehealth services "will lead to a reduction in hospitalisations, reduced patient transport costs, and shorter waiting lists" (Australian Digital Health Agency, 2018, p. 43) remains strong. Support for this assertion can be found in a theoretical model of telemedicine services that operates alongside traditional outpatient services which found that telemedicine should be implemented when "the transportation cost is high or patients have a large gap between online and off line waiting sensitivity" (Wang, Zhang, Zhao, & Shi, 2019, p. 1).

It can be seen that the visions for telehealth services provide the norms to legitimise changes to the processes and practices of healthcare. That telehealth services can deliver on these various visions for health system change is rarely questioned. Instead, the gap between expectations and reality is posited in terms of factors or barriers to the take up of telehealth services (A. Smith, Caffery, Saunders, Bradford, & Gray, 2014). Organisational and professional contexts provide the terrain for the testing of these visions.

3.3 The Relevance of Organisational and Professional Contexts

It was suggested in Chapter 1 that it was important to understand the sociotechnical contexts within which telehealth services operate. There are two components of context evident in the literature: organisational and professional. Organisations provide the structural conditions, such as resources, management, and technology for telehealth services. For instance, Klecun-Dabrowska (2002), in a study of telehealth in the UK National Health Service, claims that: “technology does not follow a pre-determinate path, but is shaped by people, who in turn are constrained by historical conditions and current structures” (p. 2). Professional contexts encompass the interactions between people where norms, processes, and practices, the sociotechnical codes of telehealth services, are formed, tested, and operationalised. Examples in the literature included discussion of legal frameworks (Jack & Mars, 2014; Siegal, 2011) and ethical considerations (Cornford & Klecun-Dabrowska, 2001; Wade et al., 2012).

The complexity of context is difficult to portray, but a useful model of technology innovation with contextual components was developed by Greenhalgh, Robert, Bate, et al. (2004) as part of a report on how to improve innovation in the health system for the UK National Health Service (NHS). According to Greenhalgh et al., the NHS comprises an inner context consisting of the “hard” visible organisational structure and the “soft” medium of culture and ways of working, both of which vary enormously between organisations. Inner context also includes individual health professionals. Outer context includes the social and political climate, incentives, mandates, and relationships with other organisations. My review of the literature has identified that the two most important contexts for telehealth services are organisational and professional contexts.

3.3.1 Organisations provide a place to practice

For the most part, organisations (public, private institutions, and small business), not individuals, provide telehealth services. They provide the physical infrastructure, such as buildings, communications and computing facilities, consulting rooms, diagnostic services, and financial arrangements, where clinical and professional staff practise healthcare care. Organisational influences have been studied from several perspectives. Frameworks have been developed which describe contextual influences, such as those developed for the design of teleconsulting services (van Offenbeek et al., 2013), understanding user resistance (Esser & Goossens, 2009), or designing systems in developing countries (Mayoka et al., 2012). Studies of telehealth services from an organisational perspective have focussed on implementation (Hendy et al., 2012), adoption (Al-Qirim, 2007; Higa, Sheng, Hu, & Au, 2009; C. Liu, 2011), and information technology (Andreassen et al., 2015; Elbanna & Linderoth, 2015).

Other studies have linked organisational contexts, reform, and technology. Organisational reform agendas have always been close to the heart of protagonists who have seen technology as a means of improving access to healthcare (Peddle, 2007). For instance, towards the end of the 20th century, Norwegian health service administrators had concluded that “if telemedicine was an instrument to be used in direct medical practice, it was also a tool in the work to restructure the healthcare system” (Spri, 1998, reported by Petersson, 2011, p. 56). Drawing on an ANT theoretical base, Peterson illustrates how inherent contradictions then emerged:

> Instead of decreasing the burden upon specialists, the application of telemedicine consistently resulted in more patients being forwarded for a specialist opinion, either through referral or by electronic encounters. Hence, these efforts to bridge the distance between GPs (General Practitioners) and specialists in order to accomplish a more rational use of healthcare resources appears to have been misguided. Contrary to the expectations of some policy makers, keeping things apart seems to have contributed to containing resources. (Petersson, 2011, p. 58)

Resources are often discussed from an organisational perspective. Organisations provide a defined context within which economic assessments of telehealth services are feasible. For instance, within an organisation, telehealth services may be less costly than transferring a patient by helicopter (Mistry, 2012). While organisations provide resources they also provide the context in which norms, values, and visions directly influence practice innovation (Barlow, Bayer, & Curry, 2006). Organisational processes, such as appointment scheduling and other workflow processes (Vuononvirta et al., 2011), are key to the operation of telehealth services. Nicolini (2006) supports the value of investigating telehealth services from an organisational perspective when he argues that “by observing telemedicine from this perspective, we can investigate to what extent this (new) way of doing medicine is aligned with the existing professional and institutional arrangements, and to what extent it deviates from them” (p. 2756).

3.3.2 Professional practice influences services

Many researchers argue that telehealth services are most successful when tailored to existing professional practices (Barlow, Bayer, & Curry, 2003; Brooks & Manson, 2012; Elbanna & Linderoth, 2015; Gagnon et al., 2003; James, 2010; Patel & Antonarakis, 2013). At the simplest level this may mean ensuring a clinician does not have to climb stairs to access a system (Higa et al., 2009).

Other studies focus on the difficulties encountered in integrating telehealth services with place-based services. Place-based healthcare requires the patient to attend at a physical facility which maintains its own workflow for managing activities for that patient. Logistical and scheduling complications arise when telehealth services are used alongside place-based service provision, in part because a telehealth appointment or service requires a second workflow to be created at the other “end” of a telehealth service. Hence, telehealth services were often described in the literature as interfering with normal practice from a workflow perspective (Halford, Lotherington, Obstfelder, & Dyb, 2010; May, Harrison, et al., 2003). Such issues were cited as the explanation for customising practices and workflows so that the diffusion of telehealth services can be accelerated (Walker & Whetton, 2002). Workflow management was not seen as the only problem. An extensive investigation of UK Department of Health’s Whole Systems Demonstrator Program for the use of telehealth services found that:

> whole system working was not a large part of the culture being enacted and driven by staff. In practice, there was little evidence of integrated services, or any move towards integration, with services largely operating within traditional cultural, structural and financial silos and sector boundaries. (Hendy et al., 2012, p. 5)

While telehealth services were argued to “interfere” with normal practice (Nicolini, 2006; Pols & Willems, 2011), it was not always clear why particular practices are viewed as normal, although one example found in the literature indicated that conflict can occur over established medical culture such as patient consent procedures (Barnes, 2006; Dickens & Cook, 2006). My analysis of the literature supports the assessment that existing, and perhaps thereby “normal” professional contexts, including clinical practice, authority, and roles, exert a powerful influence on the development of telehealth services. How technology interacts with organisational and professional contexts will be discussed in the following section.

3.4 The Role of and Nature of Technology

Understanding the relationships between technology and telehealth services in particular contexts requires an understanding of the properties of technology, how technology is designed and used, and the impact of technology.

3.4.1 Technology has a social component

All of the literature on telehealth services discusses technology. Video cameras, vital signs monitors, computer records, imaging machines, and human movement detectors are the most common manifestations of the technology used by telehealth services. Usually these technologies capture some sort of information which is transmitted via an invisible communication network to a healthcare provider. Surprisingly, in three quarters of the papers examined, the technology was presented, in some cases described, but rarely dissected or critically analysed. Only in a minority of papers (44 out of 219) were the properties of technology and its role in relation to people, organisations, and clinical practices discussed. Most authors agreed that the relationship between technology and healthcare is complex. Many acknowledged this complexity and argued that simplicity is desirable to ensure adoption, as indeed I found when implementing a home telehealth service using “simple” consumer-based products (A. Taylor, Morris, Tieman, et al., 2015). However, whether simplicity is ever achievable has been questioned as a “fallacious modernist vision of efficient, effective ‘plug and-play’ technologies” (Sugarhood, Wherton, Procter, Hinder, & Greenhalgh, 2014, p. 86).

Whether there is a set of technologies unique to telehealth services or whether they are simply components of ICT is still contested. Dardelet (2001) defines telehealth as a “merging of information technology with medical activities” (p. 3). If this is the case, then other technologies, such as pharmaceuticals and genetics, would fall in the same category, and telehealth services becomes less special. An extension of this argument has been made for home telemedicine, which “is not strictly ‘technology’, but an innovative instrument (based on healthcare personnel more than high technology instruments), which will help the doctors’ daily duties for patients and their families” (Vitacca, Mazzù, & Scalvini, 2009, p. 96).

The technology used in telehealth services has been described as a communications tool by various authors (Lehoux, Sicotte, Denis, Berg, & Lacroix, 2002; Mclaren & Ball, 1995; Soroush, 2011), albeit with limited use (Lehoux et al., 2002), or as an access, economic, and education tool (Whitten et al., 2000). The tendency to view technology as a tool is supported by authors who divide technologies into hard and soft categories. Hard technology is conceived as the equipment, machines, or systems while the soft category is the instructions, rules, processes, and individual perceptions regarding use of the equipment (May & Ellis, 2001; May et al., 2001; T. Williams, May, Mair, Mort, & Gask, 2003). The dividing line between hard and soft technology may become blurred when both are sold as products, which is particularly the case for processes which are encoded into computer programs (software).

Feenburg (1995) makes the point that soft technologies “meet social criteria of purpose in the very selection and arrangements of the elements from which they are built up” (p. 78). This social wrapping around and within the technical elements from which technologies are built has been described as a fluid component. The fluid component of technology is seen as the human activity around the technology, which may change from one context to another (Petersson, 2011, p. 44). An example of such fluidity comes from palliative care nursing: when nurses provided palliative care services, they added a layer of human activity to telehealth monitoring system alerts by interpreting each patient’s symptom scores using their prior knowledge of the patient’s condition and circumstances (Collier et al., 2016; Tieman et al., 2016). Without this additional social layer of design, the technology would have been useless.

3.4.2 Technology is designed and tamed

Obstfelder, Engeseth, and Wynn (2007) argue that "new technologies alone do not create change. Rather, it is the interplay between technical and social factors that produces particular outcomes" (p. 1). The period of interplay between the social and technical factors is variously viewed as a time when human agency chooses and purposefully designs new technology, or one where humans struggle to tame a technology which has its own life force. When technology is purposefully designed, explicit and implicit assumptions about function, standards, guidelines, and frameworks come into play. The design phase is when "new technologies are nominated by industry for trial and evaluation to see if they work and are useful" (Bonder & Zajtchuk, 1997, p. 258). Design methodologies have come to include a user-requirements stage in which "the basic elements of the service, such as its aims and objectives, its content and its delivery, as well as the key outcomes and expected benefits should be laid down" (Kolitsi & Iakovidis, 2000, p. S2:38).

Participation by users, or "co-design" during the design phase, is an extension of the proposition that technology can be purposefully designed to meet user requirements. Co-design depends on the assumption that having users involved in the design (Hasvold & Scholl, 2011), adapting design to consider the user at all stages of the design process (Esser & Goossens, 2009), or considering socio-psychological factors in the context (Mieczakowski, King, & Fehnert, 2014), will reduce the resistance to the subsequent implementation of an intervention (S. Andersen & Jansen, 2012). Linked to the co-design movement is the proposition that having the eventual users of a technology involved in its design will enable the designs to extract medical practices from users and automate those processes in a technology. The proposition is that, "sub-practices in care can be replaced with automated telecare devices without disrupting the overall care process …. [and] …. take[s] for granted a symmetry between design and user contexts" (Kiran, 2012, p. 188). The expectation of co-design is that more usable devices will ease the integration of new telehealth services into mainstream healthcare, "operating more or less as 'plug and play'" (Sugarhood et al., 2014, p. 86).

When technology is viewed an independent component, the design phase is replaced by an adaptation period when "technology has to be tamed, it has to be tinkered with to fit the practices of the users. The technology, however, is not meekly put to use (tamed), but is unleashed as well, affecting care practices in unforeseen ways" (Pols & Willems, 2011, p. 484). The adaptation of technology to fit the needs of users has been described as bricolage (Essén, 2009; Greenhalgh et al., 2015; Klecun-Dabrowska, 2002; Nicolini, 2010), where "bricolage is the repurposing and refashioning of the old in making something new … and it involves recombining existing elements rather than fabricating them from scratch" (Essén, 2009, p. 102). The bricolage process essentially describes how individual technologies are constructed from '"decontextualized technical elements combined in unique configurations to make specific devices" (Feenberg, 1995, p. 78). The assembly of technical elements which fit the practices of users recognises that use of technology has social consequences (S. Andersen & Jansen, 2012; Lluch & Abadie, 2013; Mezni & Zeribi-Benslimane, 2008).

3.4.3 Technology has a social impact

Two distinct views of technology were found in the literature: firstly, that technology carries a social component, and secondly, that technology is socially neutral. If technology is given socially neutral properties, its progress, use, or deployment can be abstracted from social reality. The “ideal” state of a new technology is described as one in which the technology has diffused through an organisation or society (Cho et al., 2008), is stabilised (May, 2006; May, Mort, Williams, Frances, & Gask, 2003), or is normalised in respect of its context and becomes embedded “as a routine and taken-for-granted” (Bee, Lovell, Airnes, & Pruszynska, 2016; May, 2006; May et al., 2001; May, Harrison, et al., 2003; Mcevoy et al., 2014; T. Williams et al., 2003). When technology is cast as being free of a social component it can be argued that use of technology to deliver healthcare at a distance can free services from the restrictions of place-based care and improve access (Whitten & Cornacchione, 2010). Assigning time- and place-bridging properties to ICT has reinforced the popular notion that technologies can transform care and in some cases restructure the healthcare system (T. Andersen, Bjørn, Kensing, & Moll, 2011; Bee et al., 2016; Correa & Domènech, 2013; Esser & Goossens, 2009; May, 2006; May et al., 2001; Mort, May, & Williams, 2003; Nicolini, 2007; Oudshoorn, 2012; Peddle, 2007; Petersson, 2011).

There are obvious contradictions in the argument that socially neutral technologies can transform health systems. Several authors argue that technology is shaped by the purpose for which it is used and the social contexts in which it is used (Nicolini, 2006; Ulucanlar, Faulkner, Peirce, & Elwyn, 2013). The literature on the social dimensions of technology is based in a variety of theoretical schools ranging from studying the social shaping of technology, social constructivism, cultural construction, systems theory, to ANT. All of these theories assume that technology is a social product, or at least takes a social dimension. Some, such as ANT, go further by providing technology with an identity and role in society equivalent to that of human actors. According to Ulucanlar et al. (2013) there are three main concepts at play in ANT:

> first, the idea that a network of actors including technology itself shapes the direction of technology adoption; second, the idea that technology is represented and apprehended through information and “evidence” that is socially constructed and open to divergent views; and third, the idea that technology itself has material qualities that constrain and enable its use, including matters such as skills, user modifications and structures of work organisation. (Ulucanlar et al., 2013, p. 96)

When such concepts are adopted, technical devices can be viewed as new inhabitants of the home (Oudshoorn, 2012) with time- and place-bridging properties presented as having an empowering quality for patients and providers, although opinion is divided on whether this is actually the case (Greenhalgh et al., 2013). According to Dyb and Halford (2009), “technology does not, in any simple way, free us from place” (p. 246), because place-based culture, practices, and processes can shape or determine the feasibility of telehealth service implantation. When technology is assigned its own identity the proposition that technologies can be purposefully designed to be compatible with existing practices changes. Instead, authors emphasise the importance of technologies not interfering with established (clinical) processes or relationships (Chau & Hu, 2002; Hu, Chau, Sheng, & Tam, 1999; Kowitlawakul, 2008; May, 2006; Oudshoorn, 2008; Pols & Willems, 2011). Others point to evidence that technologies may be contributing to conflict and power struggles (Klecun-Dabrowska & Cornford, 2000; Walker & Whetton, 2002).

Whether the technologies used by telehealth services are compatible or incompatible with existing processes and practices can only be judged by health professionals who use the technologies. In the literature, acceptance of new technologies by health professionals is seen as a key behavioural change which determines the acceptance of services.

3.5 The Acceptability of Telehealth Services

Acceptance of technology theories built on human behavioural sciences have been extensively applied to explaining technology acceptance in healthcare. Acceptance of technology has been defined as ‘‘an individual’s psychological state with regard to his or her voluntary or intended use of a particular technology’’ (Gattiker, 1984, as cited in Chau & Hu, 2002, p. 298).

3.5.1 Models of technology acceptance

The theories about the acceptance of telehealth services by users, identified in Section 3.1.3, focussed on the acceptance of technology by providers or patients, with the implication that high acceptance of a telehealth (technology) treatment leads to better health outcomes (Rho, Kim, Chung, & Choi, 2014). Acceptance theories see acceptance or non-acceptance as being the only possibilities, and treat the technology being studied as an invariant object rather than as a set of techniques, skills, or methods used to assemble technical devices and systems which evolve over time. Theories used by these perspectives include the TAM, followed by the TPB, which are both derived from psychometric research into the use of information systems. These theories, in most cases, employ a mathematical analysis of people’s responses to surveys in order to establish relationships (both causal and predictive) between acceptance or intent to accept a technology and a number of variables, such as perceived usefulness and perceived ease of use. TAM and TPB have been compared by Chau and Hu (2002) using questionaries and statistical modelling. According to these authors:

> TAM suggests that a physicians' [sic] perception of the degree to which telemedicine technology is easy to use affects both perception of usefulness and attitude toward using the technology. (Chau & Hu, 2002, p. 299)

and

> TPB states that a physicians' intention to use telemedicine technology is simultaneously determined by such factors as positive or negative evaluative affect about using the technology, perception of others opinions on whether or not to use technology, and perception of the availability of skills, resources and opportunities necessary for using it. (Chau & Hu, 2002, p. 299)

Chau and Hu (2002) found that "TAM may be more appropriate than TPB for examining technology acceptance by individual professionals" (p. 297), but "the fact that none of the investigated models was able to explain half of the behavioural intention variance may signify the need for a broader exploration of factors beyond TAM and TPB" (p. 308). Addition of variables, or the inclusion of another theory to improve the fit with observed reality, is a common practice in science. To improve the explanatory power of TAM and TPB, a number of authors have extended these theoretical frameworks (Gagnon, Orruño, Asua, Abdeljelil, & Emparanza, 2012; Huang & Lin, 2014; Hwang, Kim, & Lee, 2014; Orruño, Gagnon, Asua, & Abdeljelil, 2011; Rho, Choi, et al., 2014; Su et al., 2013; Yam, 2012), using additional variables and different survey instruments.

Other authors have chosen to combine the TAM model with other models and theories, such as TPB (Hu, 1998), a revised Information Systems (IS) success model (Soroush, 2011), social capital theory (Tsai, 2014), and the Health Belief model (Hsieh & Tsai, 2013). Gagnon et al. (2012) used a modified technology acceptance model to evaluate healthcare professionals' adoption of a new tele-monitoring system. Some researchers have built models which relate several factors in order to provide some explanation as to why telehealth applications are, or are not, successful (Gundim & Wen, 2009). The possibility of multiple explanations of telehealth service uptake has also been indicated by Wade (2014) who used stakeholder interviews and grounded theory to build a contextual model of clinician acceptance of telehealth services in South Australia. Wade's model included seven factors: champions promoting telehealth services, good relationships between providers, positive beliefs about telehealth services, demand, resources, workforce availability, and adequate technology (Wade et al., 2014). A study in Malaysia using similar methods concluded that:

> government policies, top management support, perception of usefulness and computer self-efficacy have a significant impact on telemedicine acceptance by public hospitals in Malaysia. The results also confirmed the moderating role of health culture on the relationship between government policies as well as perceived usefulness on telemedicine acceptance. (Zailani et al., 2014, p. 10)

Limitations of acceptance research have been noted. For instance, the contribution of contextual factors to consumer behaviour “for certain situations, which may be revealed in surveys or focus groups, may not actually play out in terms of actual behaviour during telemedicine encounters” (Turner et al., 2003, p. 104). Other research has proposed to augment the concept of use through the addition of a quality dimension, so that: “use quality refers to the practice of applying appropriate processes and protocols in the use of telemedicine to fulfil the desired purpose of patient care” (LeRouge & Hevner, 2005, p. 9). Acceptance as a concept may also possess deeper meaning. According to van Offenbeek et al. (2013, p. 438) a four-quadrant model comprising acceptance, non-acceptance, support, and resistance provides a better measure of user reactions.

Another attempt to account for the complexity of the interactions between technologies and professional contexts found in the literature was the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). UTAUT provides a complex model of technology use in a given context, focussing on four key variables: performance expectancy, effort expectancy, social influence, and facilitating conditions. Like the TAM, UTAUT methods employ questionnaires and statistical analysis to determine causal correlation between variables and use behaviour. Studies employing UTAUT methods have found that clinicians will use new telehealth services if they believe they will work for them (Kohnke et al., 2014; L. Liu et al., 2015) and if organisations have created the right conditions (Whitten et al., 2010).

All of these contributions to the literature acknowledge that understanding use and acceptance of telehealth services requires a multidimensional analysis of human behaviour and norms, or sociotechnical codes. Norms are formed by an assessment of the risks involved in changing behaviour and the extent to which new (technology-based) practices can be trusted. Trust implies that there exists a relationship between actors where there is an expectation that something (such as a computer program or a service) will execute processes in an expected way.

3.5.2 Managing risks, building trust

My examination of telehealth codes in Chapter 2 identified the importance of risk assessment and trust in implementing telehealth services. Many health professionals are concerned about total dependence on a technology, in case it fails (Mair et al., 2007). Trust between clinicians has been proposed as a factor in technology adoption by paediatricians (Maiga & Namagembe, 2012) and in emergency medicine (Whitten et al., 2000). Social and institutional trust have been identified as precursors for perceived ease of use and usefulness (Su et al., 2013). The threat of a technology or practice failing is a risk which requires management through the creation of guidelines and routines. Lehoux (2002) argues that actors' actions tend to reduce their anxiety and raise their self-esteem through the establishment of social routines. Actors observe, monitor, and reflect upon their own conduct and that of others and, due to this reflexivity, they gradually develop more comfortable social practices (adapted from Lehoux et al., 2002, pp. 891–892). Guidelines are a means of documenting these practices and routines.

An ATA survey of clinical respondents found that guidelines add credibility, standardise approaches, and reduce liability (Krupinski et al., 2013). It was suggested by many writers that guidelines can reduce legal liability, ease clinical accreditation of services, improve patient safety and quality of care, and enable telehealth services to interoperate (Bashshur, Shannon, Krupinski, & Grigsby, 2013; Bhatta, 2013; Canadian Society for Telehealth, 2009; Fitch, Briggs, & Beresford, 2001; Fitch et al., 2001; Garg & Brewer, 2011; Guise, Anderson, & Wiig, 2014; Kolitsi & Iakovidis, 2000; Li, 1999; Pereira, Schuh, & Fife, 1995; Picot, 2000; Stanberry, 2000; Tran, 2015; Vitacca et al., 2009; Wade, Eliott, Karnon, & Elshaug, 2010; Xue & Liang, 2007). In other words, guidelines acting as formal and informal sociotechnical codes have a role to play in resolving conflict and mitigating risks. However, guidelines may not always be effective in reducing liability or risk; for example, a survey of literature on chronic disease management in Europe found clinical guidelines were not being used effectively (Brusamento et al., 2012).

Whitten (2000) suggested that the interplay between relationships, roles, and power occurs "through relationship building, shared constructions of hierarchies and power structures, the development of trust between providers that enables telemedicine activity to actually occur, and the creation of expectations that guide the norms and membership roles" (Whitten et al., 2000, p. 129). The anticipated risk and the actions which could be taken to mitigate risk and build trust form the two sides of a contradiction (Bardram et al., 2005; Lin & Hsieh, 2014). On the one hand, there is the status quo, often perceived as being low risk; on the other hand, there is the new telehealth service, which brings new risks. Changes to roles, redivision of work, and threats to established interests are examples of risks around which conflicts can arise. Issues on which the conflicts are centred will be manifested as risks to the intervention, which can be managed through the use of guidelines to build trust between groups using risk mitigation strategies (A. Taylor, 2015), such as those advocated in the ISO/TS 13131:2014 -- Health informatics -- Telehealth services -- Quality planning guidelines (ISO, 2014). Trust can then be reinterpreted as the acceptance of a risk after steps have been taken to reduce a risk, or as the absence of unresolved concerns, conflicts, and contradictions. At the heart of these concerns are the social relationships between people and organisations participating in healthcare activities.

3.6 When Care is Separated, Relationships Change

Contemporary care is overwhelmingly provided within places, such as hospitals and clinics, where patients consult with health professionals. Separated care takes place when patients and health professionals are not physically located in the same place; it is a distinctive feature of telehealth services. The literature indicates that social relationships between people and organisations, particularly their roles and ability to control practice, can be modified when care is separated.

3.6.1 Care is spatially embedded

Separated care is not a new feature of medical practice. According to Ramos (2010), as long ago as 1764 William Cullen in Edinburgh, Scotland engaged in:

> a flourishing mail order practice.…. Cullen wrote approximately 20 consultation letters per year. This number jumped markedly to almost 200 a year from 1774 till his death in 1790. He had used an amanuensis (a dictation assistant) and an early version of a copying machine to make it quicker and easier for him to respond. If he did not know the condition well, he cautiously avoided making a diagnosis. For the acutely ill, he preferred hospital admission and personal care. (Ramos, 2010, p. 2)

Technologies have evolved from the postal system of 1764 to contemporary telecommunications systems. Despite these huge changes in technological capabilities, present-day advocates of telehealth or telecare are still having to make the case that “the locations at which care takes place are no longer relevant” (Oudshoorn, 2012, p. 122). That this debate is continuing is due to healthcare practices carrying “deeply embedded some very specific spatial assumptions ... [and] .. by altering them, and by affecting in particular the fundamental spatial relationships of proximity and distance, telemedicine produces significant misalignments, tensions, and contradictions” (Nicolini, 2007, p. 914).

One of these tensions is over changes in relationships between the different actors involved in healthcare. Wade et al. (2014) reported that “a clinician operating a service to rural areas mentioned that ‘one of the consistent problems in making the service work is maintaining the cohesion of relationships in the network’” (p. 8). A systematic review by Guise et al. (2014) found that the use of ICT was also seen to have a negative impact on the traditional clinical relationship because “the use of technology adversely affected staff-patient interaction … and hindered good communication … and the process of ‘getting to know’ the patient, making it harder to develop good clinical relationships” (Guise et al., 2014, p. 6). Changes in relationships with patients are often cited as reasons for avoiding the use of telehealth services; however, there are also reports that adjustments of behaviour occur in all parties involved in a remote consultation, and those adjustments do not necessarily prejudice clinical outcomes (Esterle & Mathieu-Fritz, 2013; Guise et al., 2014; May et al., 2001; Turner et al., 2003).

However, what underlies these observations about changing relationships when care is separated? The literature reviewed reveals that changes in the ability of organisations and workers to control healthcare activities are an important consideration. For instance, Linderoth (2014) writes that implementation of a telehealth service could mean that “suddenly hospital care would become a service provider to primary care, which would be a radical re-thinking of roles and relationships” (p. 7). Healthcare workers are impacted because they are required to make “adjustments to their (traditionally perceived) professional roles in order to make the new systems ‘work’, in terms of achieving the best possible outcomes for patients” (Finch, Mair, & May, 2007, p. 525).

Retaining the power to control employment and remuneration in health services has long been of importance to the health profession and has remained so for telehealth services. With the advent of the telephone, an editorial from *The Lancet* of 1883 questioned the wisdom of teleconsultations:

> When people can open up a conversation with us for a penny, they will be apt to abuse the privilege, and that to have a dozen telephone consultations in one day, or conversations that might be thought to supersede a consultation, would be a doubtful addition to one’s advantage or repose. (Aronson, 1977, p. 72)

Returning to the example given at the start of this section of the Scottish doctor managing patients via the postal service, we can see how Cullen retained control over the treatment of his patients through triaging the cases he wished to take on, and how his role as a doctor expanded to include letter writing to patients.

3.6.2 Professional roles adapt

Changes in the roles of providers (and patients) have been observed in situations[9] where tasks previously undertaken by one provider (e.g., the consultant) are taken over by a provider (nurse or general practitioner) who is co-located with the patient (May, Harrison, et al., 2003; van Offenbeek et al., 2013; Whitten et al., 2000). Such changes in roles may add to the workload of some roles and alter the decision-making methods used (French et al., 2013; Lehoux et al., 2002; van Offenbeek et al., 2013). Technology is invariably cited as a causal factor for changes in the healthcare roles, even to the extent that technological monitoring devices are considered to be new members of the family (Correa & Domènech, 2013). Nicolini (2006) observed:

[9] Telehealth services may also offer consultations for patients without a healthcare provider being co-located with the patient.

> a recurrent pattern in the way labor is re-distributed following the introduction of telemedicine. Such redistribution assumes quite often the form of the delegation of clinical tasks to non-medical personnel and artefacts. According to my data, this pattern is strictly related to the nature of the technology (telehealth) itself. (Nicolini, 2006, p. 2760)

Technologies applied in telehealth services are frequently viewed as causing clinicians to give up parts of their established place-based roles (Nicolini, 2007; J. Taylor, Coates, et al., 2015). Additionally, the "tendency of telemedicine to produce a delegation of medical tasks to non-medical personnel" (Nicolini, 2006, p. 2744), or to perform new tasks thereby increasing workloads (Guise et al., 2014), can motivate resistance to the introduction of telehealth services alongside current practice. For example, the establishment of call centres to provide medical advice intended to reduce potential hospital attendances has resulted in role changes for nursing staff who answer telephone queries. The nurses are trained to answer queries using clinical decision-making systems written by doctors, thereby delegating significant professional authority to nurses (B. Russell, Smith, et al., 2015). Importantly, Russell et al. make the point that call centre systems can be designed to either support professional decision-making skills (in Sweden), or to remove those skills (in the UK and Australia). B. Russell (2012) found that conflicts between professional groups (nurses and doctors) and management occurred over the control of these decision-making systems.

3.6.3 Control of care is contestable

Retaining control over new modalities of healthcare has been characterised as the work of aligning the implicit mental models of modified professional practice with "existing institutional arrangements, routines and definition of professional identity" (Pappas & Seale, 2009) or the "outcome of organizational members' interactions and sense giving to a technology" (Linderoth & Pellegrino, 2005, p. 416). These interactions are structured by the role, interests, and power of individuals and organisations. According to Cho et al. (2009), "collaboration and networking among organizations emerge through dynamic interactions between diverse external forces and internal interests and motives" (p. 354). Studies in this literature review agree that negotiation, building of alliances (Nicolini, 2010; van Offenbeek et al., 2013), teamwork (Obstfelder et al., 2007), and cohesive relationships (Wade et al., 2014) are important when healthcare activities are divided by place and separated by distance. In these interactions, groups such as funders, rural healthcare administrators, system reformers, or suppliers must first link the technology and its capabilities of supporting separated care with an acceptable use, aim, or vision.

Linking of technological capabilities and use has been described as a co-construction process in which "diverse influences from the industry, healthcare organisation and practice, health technology assessment and policy interact to produce 'technology identities'" (Ulucanlar et al., 2013, p. 95), or an organisational management tool for “allocating resources, generating and managing enthusiasm, system correction and aligning local practice and national policies” (Andreassen et al., 2015, p. 62). Other authors describe the co-construction process as a contest between “clinicians, technical experts and external evaluators over what kinds of knowledge and practice count in developing a protocol and evaluating a clinical intervention” (May & Ellis, 2001, p. 889). Contests are determined by the relative positions of power held by interest groups. For example, in Japan, Fujimoto, Miyazaki, and Von Tunzelmann (2000) identified four interest groups:

- Central government departments developing and promoting telecommunication technology for the economy;
- Health organisations and doctors wishing to prepare for the ageing society, and improve the quality of healthcare;
- University medical informatics departments wishing to promote telemedicine use; and
- Manufacturers hoping to promote telemedicine products. (Based on Fujimoto et al., 2000, p. 192)

Having power is important, but control as a form of enduring power is perhaps more vital to the alignment of technological capabilities and the future use or stability of a telehealth service. There appear to be at least three key groups which exercise control over telehealth services: medical professionals, especially doctors (Patel & Antonarakis, 2013; Peddle, 2007); technologists (Ruston, Smith, & Fernando, 2012); and patients (Bardram et al., 2005; Mieczakowski et al., 2014). Management and funders (Boonstra & Van Offenbeek, 2010; Menachemi, Burke, & Ayers, 2004) also have considerable influence. Hospital management and clinicians may lobby quite effectively for telehealth services which improve services for isolated areas and reduce risks to patients or liability for local providers (Menachemi et al., 2004; Zanaboni & Wootton, 2012). Telehealth champions -- individuals with a certain amount of organisational influence and motivation to complete the linking of technological capabilities with an aim or vision -- have been seen as essential to the success of telehealth services. Champions exercise power when reconciling new professional practice with existing practice (Al-Qirim, 2007; DuBose-Morris, 2014; Ellis, 2005; Wade & Eliott, 2012). Implicit in the exercise of this power is the recognition that organisational and professional contexts can and do change.

3.7 How Contexts are Changed

There appears to be no set way in which telehealth services proceed within a given context. Cho (2008) suggests that technology used in health services may pass through an adoption, implementation, and commercialisation stage before becoming available to diffuse into the marketplace, or adoption may be mandated by management or others who have the necessary power and control. Several authors argue that an intervention which is successful in incorporation of technologies into normal health services (Bouamrane, Osbourne, & Mair, 2011; May, 2006) will change the organisational context. This process of incorporation is variously conceived as routinisation, normalisation, or adoption. These concepts are linked to the belief that organisations or individuals preference stability over change.

3.7.1 Contexts are dynamic

However, context is not stable; it changes over time. Whitten et al. (2000) described how telemedicine in the US state of North Carolina evolved over time:

> Initially, telemedicine in North Carolina was about doing consults within a prison setting. Suddenly a medical director was hired, and telemedicine was about outreach and education. New sites were established, and telemedicine became a process of scheduling and coordinating. A grant operations manager came on board, and telemedicine became a "GO Team" project. The impending onset of managed care came crashing into North Carolina, and telemedicine became a solution for the financial constraints of medicine. The director of the telemedicine program had a vision for a docking station, and telemedicine became the mechanism to transition medicine into the next century for North Carolina. (p. 128)

Flichy (2007) theorised that the evolution of contexts was linked to the concept of a frame of functioning and a frame of use. The frame of functioning is the social world which produces a technical object to undertake some function. An example might be mobile phone technology standards which are agreed by large industries and technical experts. The frame of use is the social world in which the technical object is actually deployed, which in this example is the commercial market for mobile phones. According to Flichy, cooperation or interaction between the two social worlds is needed to achieve the stability of the technical object. Flichy describes the unity of the two frames as a sociotechnical frame of reference. The concept of sociotechnical frames has earlier roots in interactionist sociology which defined a "technological frame into a combination of current theories, tacit knowledge, engineering practice (such as design methods and criteria), specialized testing procedures, goals, and handling and using practice" (Bijker et al., 1987, p. 164). Both technological frames and sociotechnical frames allow for the influence of groups of people on technological systems and the possible instability of social and technical systems if different frames fail to converge. In this thesis, I treat the concept of frames as roughly equivalent to that of contexts, described in Section 1.2.

Researchers from different theoretical perspectives (such as ANT [Linderoth, 2002] and structuration theory [Lehoux et al., 2002]) can agree that at minimum, there are two phases in the process of technology use: adaptation and subsequent routinisation. However, what happens in and between each phase is uncertain. Does technology adapt to context, or the other way round? Routinisation of telehealth services has been acknowledged as complex (Nicolini, 2010), challenging (Finch et al., 2007), and transformative (Kerleau & Pelletier-Fleury, 2002), but most writers see routinisation as driven by the need to realise clear benefits. For instance, successful teledermatology services “that became normalized were those for which the perceived benefits, for example saving patients’ and/or health professionals’ travelling time and costs, or reducing waiting times, clearly outweighed the effort and commitment required to make the system work” (Finch et al., 2007, p. 523).

The underlying conclusion which can be drawn so far is that the literature does not see the normalisation, routinisation, or diffusion of telehealth services as inevitable, but contingent on social processes. Two of the most important processes discussed in the literature of telehealth services are diffusion and normalisation processes.

3.7.2 Diffusion as cumulative influence

A popular conception of technology adoption is based on a partial interpretation of the work of Rogers (1971). According to this interpretation, technologies are “invented”, and then diffuse through society causing social change. Diffusion is a process “by which a technology spreads across a population of organizations, in contrast to the notion of adoption, which focuses on the uptake of an innovation by a single adopter – whether an individual or organization” (Cho et al., 2009, p. 353). The need to understand diffusion has been echoed by others (Al-Qirim, 2003; Sugarhood et al., 2014).

Diffusion of technology was addressed by Rogers (1971) in his book *Diffusion of Innovations*. For Rogers, the “diffusion effect is the cumulatively increasing degree of influence upon an individual to adopt or reject an innovation, resulting from the increasing rate of knowledge and adoption or rejection of the innovation in the social system” (Rogers, 1971, p. 161). A glancing interpretation of Rogers’s work may superficially support the concept that technologies can, of their own volition, diffuse across an organisation or society. Such an interpretation has led to many commentators promoting technologically deterministic views where the inevitability of technology diffusion (Gartner, 2016) through society is assumed, with little attention being paid to social factors. A closer reading of Rogers’s work reveals that he actually placed the diffusion, adoption, normalisation, stabilisation, and so on of technology squarely on the shoulders of individuals, embedded in social processes, albeit influenced by various candidate factors enumerated by Rogers, within the context of social change.

Several authors have applied diffusion concepts to analysis of health technologies. A model for the diffusion of telemedicine in the US Veteran Affairs health system (Pak, 2013) used regression analysis of questionnaire results to show that the ability of clinicians to test out a technology, rather than just being informed about it, and the compatibility of technology processes with their workflow, were key to acceptance. Other authors have added components from diffusion of innovations theory into their models (Chau & Hu, 2001; T. Davis, 2013; Huang & Lin, 2014). However, the multiplicity of available factors (Rogers suggested a potential 102) which could influence an individual decision to adopt an innovation suggest that this theory has more value as a complex model than as a theoretical explanation. If diffusion of a technology results in its eventual adoption into normal practice, then the relationship between technology and practice should be considered.

3.7.3 Normalisation aligns practice

Normalising technology-based interventions with existing practice has been characterised as one of clinical framing. According to Esterle and Mathieu-Fritz (2013), there are three steps in the clinical framing of a technology. The first involves "technical" framing where the technology is adapted to clinical requirements by ensuring that it can provide the required information or functionality (e.g., clarity of images) using procedures the clinician is able to learn. The second step provided the "social" framing which prepares the remote patient and clinical staff to be ready for a scheduled teleconsultation (confirmation of identities, obtaining consent, and accessing medical records). The third step involves fine-tuning the process of presentation of the clinical issues by remote clinical staff and diagnostic procedures with the patient. There are other essential steps, for instance, ensuring that the organisation will pay for the clinical time expended and that the teleconsultation is framed as a valid clinical activity by peers though the development of guidelines, all of which are preconditions for the successful appropriation of the technology. This sequence of implementation steps aimed at aligning the intervention with current practice is often codified in frameworks or guidelines. For instance, Greenhalgh et al, (2015) developed a framework that provides "quality principles for designing, installing and supporting telehealth and telecare products and services" (p. 12).

Several contextually sensitive evaluation and implementation frameworks have linked the embedding and normalisation of new practice with sustainability. Examples include a framework for sustainable telemedicine systems in developing countries (Mayoka et al., 2012), readiness frameworks (societal, technical, policy readiness; Chipps & Mars, 2012), maturity models covering technology, financial, human, operational protocols, and policy development (van Dyk, Fortuin, & van Zyl, 2011), and technology innovation models where telehealth is considered an information system embedded in a clinical and social context (Kaldoudi, Chatzopoulou, & Vargemezis, 2009).

Another view of the clinical framing process has been contributed by NPT. This theory is based on the investigation of four (generative) mechanisms undertaken by individuals to implement a (telehealth) intervention (i.e., an intervention which includes a technology). There are four mechanisms proposed within NPT (May et al., 2009, p. 7):

- Coherence: Work that defines and organises the objects of a practice;
- Cognitive participation: Work that defines and organises the enrolment of participants in a practice;
- Collective action: Work that defines and organises the enacting of a practice; and
- Reflexive monitoring: Work that defines and organises the knowledge upon which appraisal of a practice is founded.

NPT has now been extended to become a general theory of implementation (May, 2013b). NPT implies that telehealth services become embedded in (clinical) practice as a result of the combined contributions of social agents and these four mechanisms combine to sustain the intervention. Both individuals and collectives are required to work together as social agents to achieve normalisation of an intervention.

3.8 Summary

The research question which this literature synthesis sought to answer was:

> What are the influences on the development of telehealth services as represented in theories addressing this process? (RQ2)

My application of the literature mining approach outlined in Table 7 has identified themes relating to the visions for telehealth services: organisational and professional contexts, the role of technology, the acceptability of telehealth services, changing relationships, and the dynamic of contextual change related to technology.

Three broad streams of academic writing were found: technology acceptance by users, organisational impact of technology, and social change. The dominant theoretical discourse revolved around the factors leading to acceptance of telehealth technology by users based on various psychometric models. A number of authors applied normalisation process and diffusion of innovation theories to case studies.

My analysis of the literature indicates that the visions of telehealth services are closely coupled to perceived needs to improve access to healthcare, to reduce the costs of care, and to support system reforms. Visions have an important influence on telehealth services because when a new service, an “intervention”, is designed, visions are used to express the anticipated outcomes of the intervention. Visions of telehealth service in the literature are strongly influenced by a belief that technologies can solve these problems and underpin changes to health systems. Visions for telehealth services provide the norms which legitimate changes to the processes and practices of healthcare.

The two main sites of influence on telehealth services discussed in the literature were organisational and professional contexts. Context in the literature is often alluded to, but its explicative power is significantly undervalued. Contexts are variously viewed as subject to change or as relatively stable systems. Health professional contexts draw on clinical practices, authority, roles, culture, ethics, and guidelines which, taken together, function as professional sociotechnical codes. Organisational and professional contexts provide the location where norms, processes, and practices -- the sociotechnical codes of telehealth services -- are formed, tested, and operationalised.

Discussion of technology as an influencer on telehealth services in the literature was very limited, but also highly contested. There was agreement that the relationship between technology and healthcare was complex, and that technology had some social component whereby socio-technical codes influence technology design and operation. How to deal with that social component was less obvious. A tendency existed to regard technology as something which had to be tamed, while other views advocated co-design between users and technologists of health technologies as a means of reducing resistance to new technologies.

Modelling of the willingness of people to accept the technologies used in telehealth services dominated the theoretical discourse. However, it was difficult to identify specific variables which influenced acceptance. Connections between acceptance, risk management, and the building of trust remained unexplored by authors, although a number pointed at the influence of guidelines in reducing risks for new services (see Section 2.2.4).

When healthcare that has previously been defined by place is separated across places at a distance, relationships change. Place-based roles and practices continue to exert influence over new or modified roles and practices. Relationships have to be re-formed. In the process, tensions and conflicts between various professional groups may occur over new professional roles, and who has control of healthcare processes and practices.

There is a tendency in the literature to view organisational and professional contexts as a given, not subject to change, and that therefore technology needs to adapt to a given context in order to be adopted or to diffuse successfully through social structures. When practice does change, a process of normalisation of telehealth practices to existing practices in mainstream care contexts is suggested to be necessary. The extent to which contexts influence the development of telehealth services, or telehealth services change existing services, is unclear from the extant literature. If contexts were in fact dynamic then a more reasonable proposition would be that social processes are responsible for changes to both contexts and telehealth services.

In the following chapter, I use the findings of this review to construct a conceptual enquiry model. The chapter then outlines the theoretical framework and field research methods which were designed to search for answers to these questions.

4 FIELD RESEARCH METHODS AND ANALYSIS

This chapter develops a conceptual model of enquiry to guide my investigation, informed by my review of telehealth guidelines in Chapter 2 and the review of the influences of telehealth services in Chapter 3. Arising from this conceptual model, four field research questions are proposed for use in this investigation. The chapter then proceeds to identify the theoretical tools and qualitative methods used to expose the underlying mechanisms which may influence the development of telehealth services. The methods of enquiry and tools outlined in this chapter provide a structure for the conduct of my field research in Australia and Brazil. The chapter concludes by outlining the analytical processes which were applied to to my field data in order to find answers to my research questions. Figure 11 illustrates the organisation of this chapter.

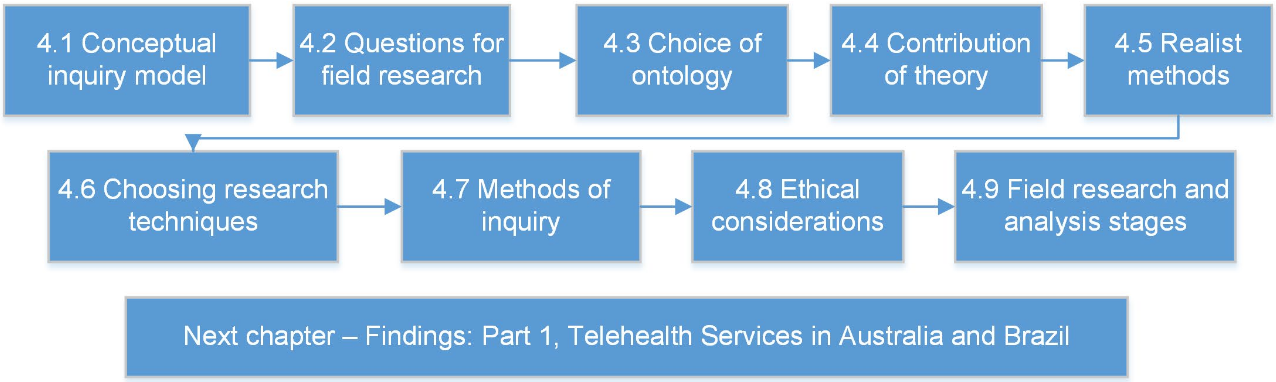


Figure 11. **Organisation of Chapter 4.**

4.1 Conceptual Enquiry Model

In Chapter 2 my preliminary investigation found that guidelines are intended to be used to shape the way in which telehealth services are adopted. A review of the literature presenting the theories about influences on telehealth services in Chapter 3 discovered that the following key influences are thought to influence the development of telehealth services:

- Visons for telehealth services promoting changes to healthcare systems;
- Contexts, particularly organisational and professional contexts, in shaping the development of telehealth services;
- Rules, guidelines, and codes associated with technology;
- Processes of risk assessment and trust building leading to acceptance of modified practices;
- Relationships which mediate the control of healthcare and conflicts between health professional roles; and
- Contextual changes which reflect the normalisation of modified practices.

To provide a guide or a map for my field research, a diagrammatic representation (Figure 12) of these key influences on the development of a telehealth intervention by organisational and professional contexts was developed based on my literature reviews in Chapters 2 and 3. The features of this model were as follows:

- On the left- and right-hand side of the figure are organisational and professional contexts (see Section 3.3) depicted as complex puzzle pieces.
- The telehealth service intervention is introduced in the top centre portion of the figure.
- The telehealth service intervention is composed of people, tools (applications or process), and devices.
- Although not explicitly indicated, the influence of visions (Section 3.2) for telehealth services was assumed to form part of the intervention.
- In the centre of the figure, icons representing control and relationships (Section 3.6) have a yet to be defined role in mediating between the intervention and contexts.
- In the lower half of the figure, icons for trust, risks (Section 3.5), and codes (Chapter 2) are used to suggest their influence on the outcomes of the intervention.
- The arrows directed from the lower part of the figure to the upper portion suggest the existent of feedback processes which act over time to modify the intervention.

The use of puzzle pieces sitting on either side of the telehealth intervention serves as a reminder that interventions and contexts may adjust to fit one other.

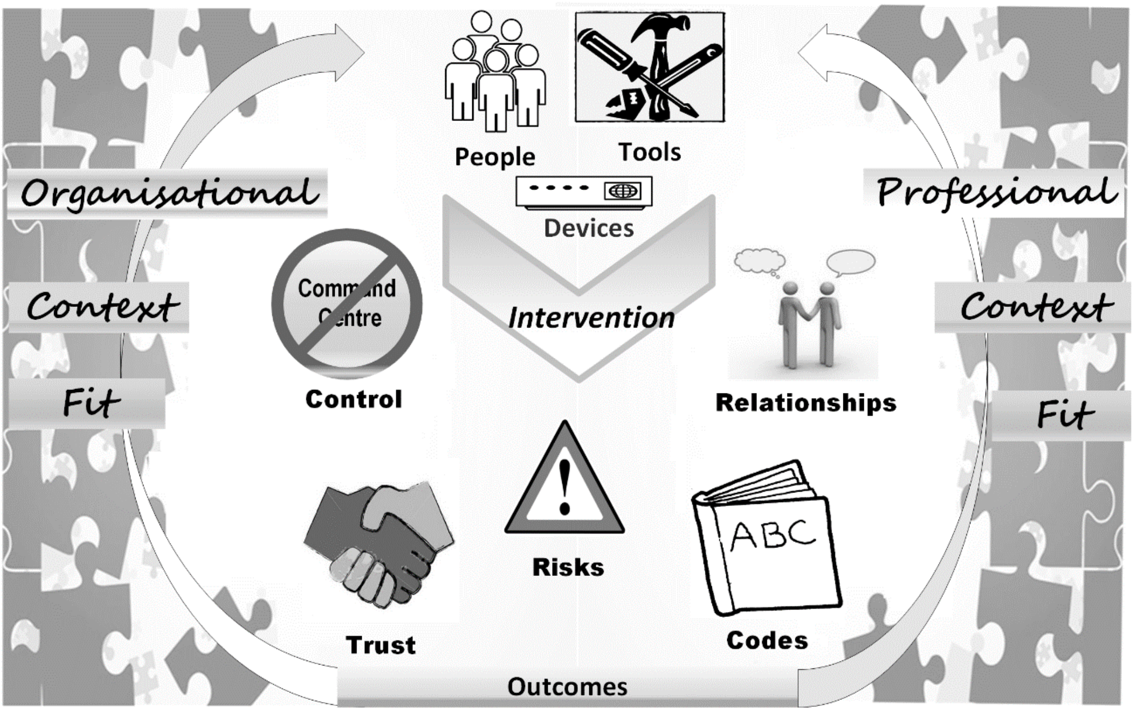


Figure 12. **Conceptual enquiry model of a telehealth intervention pathway.**

According to Maxwell (2012), qualitative methods are essentially inductive and "this inductive strategy means that the research plan itself is constantly changing in response to new information or changing circumstances" (p. 76). Figure 12 represents the final version of my conceptual model which underwent several changes during the development of my research methods as fresh perspectives became apparent. For instance, my information-gathering guide (see Appendix D) contains a version of the model current during the ethical research approval stage. The value of this conceptual model was that it provided an initial hypothesis for how possible influences interact with contexts. The model also provided practical assistance during the interviewing of participants by providing me with visual prompts to explore issues highlighted in the model.

4.2 Questions for Field Research

My third research question asked: How can the development and sustainability of telehealth services, over time and between organisational and professional contexts, be explained? Following the creation of a conceptual enquiry model (Figure 12) I felt that a set of possible explanations could be formulated and tested during my field research. These explanations were centred on the influence of organisational and professional contexts, guidelines (codes), and risk or trust mechanisms. To test these explanations using information obtained from field research, four field research questions were postulated.

Firstly, in order to understand the role of organisational contexts in influencing telehealth services, a derivative field research question asks:

> How may organisational contexts influence the development of telehealth services? (RQ3a)

Secondly, because few studies have examined professional contexts for evidence of conflicts, disagreements, or clash of professional codes, a derivative field research question was postulated to investigate conflicts arising from telehealth service interventions:

> Can the development of telehealth services be understood through the analysis of conflicts which may influence the relationships between people and organisations in the course of a telehealth service? (RQ3b)

Thirdly, because my initial investigations supported the suggestion that telehealth guidelines played a role in design, implementation, and acceptance of new practices, a derivative field research question asks:

How do explicit and implicit guidelines and codes operating in the proposed research settings provide social and technical mechanisms for resolving conflict and mitigating risks which arise during telehealth service interventions? (RQ3c)

Finally, a derivative field research question was postulated to investigate the role of risk and trust in influencing the adoption of new practices:

Do the mechanisms of risk acceptance and trust in the proposed research settings play a role in resolving conflicts over implicit or explicit organisational and professional codes? (RQ3d)

The astute reader may observe that specific field research questions linked to the role of relationships and control of healthcare have not been formulated. The reasons for this are firstly, that too many questions would be confusing to have in the field, and secondly, it is difficult to formulate interview questions on these topics without possibly causing discomfort to participants. However, my interview topic guide (see Section 4.7.2) did include optional questions on these issues which could be posed during semi-structured interviews with participants as appropriate.

As mentioned above, my field research questions underwent several changes during the development of my research methods as fresh perspectives became apparent. My information-gathering guide in Appendix D contains versions of the research questions current at the time of the ethical research approval stage. Subsequently, changes were made to reduce overlap between questions and to remove theoretical ambiguities. In early versions of these questions, the term “sociotechnical frames” was used. On reflection, it was felt that sociotechnical frames as a term was too closely linked to interactionist sociology, as discussed in Section 3.7.1. Therefore, this term was replaced by the more generally understood term “context”[10] as defined in Section 1.2.

Specific questions were not formulated about barriers or factors which had been commonly encountered during my literature review, such as training, education, existence of champions, or beliefs, and so on. This was because my research aimed to undertake a deeper analysis of reality to find the underlying mechanisms behind such barriers or factors. The choice of theoretical paradigm to support this deeper analysis was therefore important.

4.3 Choice of Ontology and Epistemology

[10] In this research, “organisational contexts” are taken as analogous with organisational systems of individuals or social structures and professional contexts are conceived as relating to the thoughts, views, behaviour, and practices of individuals in their professional roles or cultural structures.

The choice of ontological paradigm in research has the potential to influence the type of explanations which are built to explain social phenomena and the methods that are used to build those explanations.

How one thinks about the world, or ontology, guides what may be discovered. How one gains knowledge of the world, or epistemology directs the methods and focus of investigations. Hence the choice of ontology and epistemology are inextricably intertwined. I will begin with an outline of my choice of ontology because in Section 1.3 I indicated that my research paradigm was founded on a critical realist ontology.

There are many ontological belief systems, each with a range of approaches to understanding the world. In contemporary Western sociology, three ontologies are currently influential (Liamputtong, 2019), namely:

1. Idealist ontology, which sees reality as entirely socially constructed, that can be explained though understanding social interactions.
2. An empirical and realist ontology (also known as positivism), which sees reality as an object or experience, that employs empirical observation of events (physical, social, or individual) to determine predictive laws or correlations.
3. A critical realist ontology, which views reality as stratified into different levels of activity and observability, which looks for explanations of changes in reality in the form of generative causal mechanisms.

My review of the literature in Section 3.1.3 identified a variety of different theories that had been used to explain aspects of telehealth service development. The majority of theories were implicitly based on an empirical and realist ontology (e.g. the technology acceptance model) or an idealist ontology (e.g. social construction of technology). In my view the empirically based literature failed to locate proximal influences underlying technological realities and idealist theories reduced technological realities to social phenomena. Therefore I looked to critical realist ontology to support my investigation.

4.3.1 Critical realist ontology

My research rests on a critical realist ontology, described in the literature as critical realism, which I interpret as meaning that there are always further explanations for the changes in the world that we experience. The application of this ontology provided a scaffold for my investigation within which I was able to probe below and around the immediately visible features of telehealth services for deeper explanations of their development. These explanations, termed “mechanisms” in realist ontologies, can take different forms depending on the context being investigated. For instance:

> Structural mechanisms come to the fore if the social scientist is attempting to explain large-scale social transformations. If, however, the researcher is attempting to discover whether a particular fitness programme creates healthier participants, it can be assumed that key outcomes will result from the reasoning and responses of the participants. (Dalkin, Greenhalgh, Jones, Cunningham, & Lhussier, 2015, p. 2)

Writers in the realist tradition refer to generative mechanisms as ones which generate change through the “release of underlying causal powers of individual and communities“(Pawson & Tilley, 1997, p. 215) to distinguish generative mechanisms from “secessionist” mechanisms which focus on variables and “configurational” mechanisms which link causation to arrangements. Implicit in this conception of generative mechanisms is the idea that causation is complex. Critical realism also suggests that reality is complex, that it may be viewed from different perspectives, that it understood to differing extents, and that it is stratified into levels comprising human experiences, events, and underlying mechanisms (Fletcher, 2017). Danermark (2002) elaborates on the nature of complex realities:

> A distinction can be made between three ontological domains: empirical, the actual and the real. The empirical domain consists of experience, directly or indirectly. It is separated from the actual where events happen whether we experience them or not. What happens in the world is not the same as that which is observed. But this domain is in its turn separated from the real domain. In this domain there is also that which can produce events in the world, that which metaphorically can be called mechanisms. (Danermark, 2002, p. 20)

Within the realist and critical realist family trees of social enquiry a number of contributions exist (Pawson in Emmel, Greenhalgh, Manzano, Monaghn, & Dalkin, 2018, p. 207), each of which have differing philosophical and methodological consequences for investigation. Underlying these differences are discussions between proponents of realist evaluation (Pawson & Tilley, 1997) and critical realism (Bhaskar, 1997). For instance, intense internal debate (Brown, 2007; Pawson, 2015; Porter, 2015a, 2015b) within the critical realist paradigm has raised a number of issues..

The first issue relates to the philosophical foundation of realism provided by Bhaskar (1997) which has been labelled critical realism. The “critical” adjective refers to critical theory, which seeks to create knowledge in order to change society. Criticism is seen as a rigorous method for challenging existing thought and argues for social theory to be reflexive and self-critical. In this sense, the use of realist evaluation methods in a critical way should be uncontroversial, although it should be noted that Pawson has since distanced realist evaluation from critical realism by claiming that critical realism “permits the entry of normative preferences into enquiry” (in Emmel et al., 2018, p. 206). The second issues that has been the subject of debate (Porter, 2015a, 205b) is the question of whether social and physical worlds are open, partially open or closed for analytical purposes.

4.3.2 Open and closed systems

In sociology it is often stated that enquiry into the social world, for example comparative case studies, is hampered because the social world is an open system in which no control can ever be exercised over any variable, so it is impossible to identify any event which could reliably be expected to be observed more than once. This question is important to my investigation because it spans the technologies located in the physical world and the use of technologies in the social world. For instance, research into healthcare by medical researchers may strive for experimental closure using methods such as randomised control trials.

My view, based on my career in the physical sciences and engineering, is that many experiments in the physical world of a practical and theoretical nature are actually not capable of closure and hence research efforts in both physical and social sciences face similar difficulties in providing experimental closure. I put this point to the email discussion list Realist and Meta-Narrative Evidence Synthesis: Evolving Standards (RAMESES) in March 2017 (Pawson, R, 2017). One very helpful response was received from Professor Ray Pawson who wrote:

> …. investigations in both physical science and social science confront open systems. Any experimental result will remain provisional awaiting the discovery of your “fudge factors” or, as it is sometimes put, “unknown unknowns”. In short, ALL investigation operates on PARTIALLY closed systems.

It is therefore possible to conceive organisational and professional contexts as partially closed systems. Professor Pawson went on to say:

> there are methodological reasons why the partial closure in natural science is more successful that in, say, program evaluation. It is a matter of institutional memory…. In any physics experiment all the apparatus will have some pedigree as “previously tested theory”. Alas, in social science and especially in program evaluation, this rarely holds. Most of the design features in program evaluation are improvised as each new intervention rolls off the block. (Pawson, R, 2017)

This opinion has been quoted at length, because the “matter of institutional memory” is, in effect, the same concept as a sociotechnical code (which retains institutional memories) that I defined in Section 1.2.

In investigation of partially closed physical or social worlds researchers seek to identify the causes of changes to contexts, thereby resulting in certain outcomes. The production of change implies that the causal factor, or mechanism in the ontology of critical realism has certain powers which requires the researcher to be clear about how power can be exercised, particularly in the social world.

4.3.3 Power in the social world

The third issue raised in debates on realism relates to the concept of power, which underpins the proposition that mechanisms have power in the social world. This issue important for my investigation because my choice of critical realist ontology which views reality as stratified and underlying the empirical world there are structure or mechanisms with powers to influence events occurring in the observable world.

Danemark (2002) and others describe structures, mechanisms (Porter, 2015a; Wynn & Williams, 2012), and contradictions (Fleetwood, 2014) as having powers. Much of this discussion is based on a very limited understanding of, and comparison with, the physical sciences, for instance, the ability of copper to conduct electricity (Pawson, 2013, p. 66). Bhaskar defines power in the natural sciences “as a capacity, ability or potential possessed by a thing to act, to do, to ‘make a difference’ (a ‘liability’ is, conversely, a susceptibility of a thing to have something done to it)” (Bhaskar, 1975, as cited in Brown, 2007, p. 507). In the case of the natural sciences, this definition is unworkable. Copper has properties which give it the ability to conduct electricity. But, according to Wynn and Williams (2012), it has the power to conduct electricity. The reality is that unless an event occurs as the result of natural or human agency, no electricity will be conducted.

The question which then emerges from perusal of this literature is whether structure (organisations, social, cultural, economic, stratified, or as a whole), mechanisms, or contradictions have powers of their own, or are only able to assert power by virtue of the properties arising when individual or collective human agency is exerted? A power may exist without the presence of trigger conditions. In the mechanical universe, a transmission gearbox has potential power, but only once the engine that drives the wheels through it is switched on. In social theory, it is argued that causal powers are already inherent in the “social relationships or structures that people build” (Danermark, 2002, p. 54). Porter (2015a) argues that the generative power of social relationships is:

> one of the basic tenets of social realism, which posits that individuals’ positions in relatively enduring social relations will influence their outlooks, their opportunities, their restraints, and hence their tendencies to act in certain ways. In short, it involves the assertion that generative mechanisms are embedded in social relations. (p. 3)

The sole, but important conclusion that can be reached from these debates about the nature of power is that it is only through social relationships and structures which form parts of organisational and professional contexts, which I have defined in Section 1.2, that mechanisms acquire or exhibit social power.

4.3.4 Epistemology

The choice of epistemology (knowledge of the world) is important. For instance, investigations based on a positivist ontology must put in place highly controlled experimental boundaries (as in randomised control trials). Whereas, other ontologies (critical realist and idealist) consider the context in which experiments take place to be important, and can afford to define experimental or observational boundaries more pragmatically, within a feasible and finite investigative scope.

My choice of a critical realist ontology has other implications. Westhorp et al. (2011) argue that within a critical realist ontology which operates within partially closed or open social or physical worlds, “no final truth or knowledge, but improvement in knowledge is possible” (Westhorp et al., 2011, p. 5). In contrast, Westhorp et al. (2011) suggest that in an empirical realist (positivist) ontology complete knowledge is attainable whereas in an idealist ontology there is no way to decide if an interpretation is correct, implying that knowledge is entirely socially determined.

According to a critical realist ontology, reality is stratified into three ontological domains: empirical, the actual and the real. It is therefore logical to conclude that in a multi-level system knowledge of the world can never be totally complete, or in other words, “there are levels of knowledge below certainty, at all of which we may still be in possession of the truth” (Porpora, 2015, p. 90).

The proposition that there are different levels of reality and knowledge that can be gleaned at each level has other implications for how knowledge is sought or the methods that should be used. In the school of physical sciences in which I was trained, I was taught to always be curious about the world and look below the surface of events. This same school taught me that there is always more than one way of seeing the world. Therefore, I argue for an epistemology which can probe different levels of reality using quantitative or qualitative methods that “serve as both a form of methodological triangulation… and also as a way of generating divergent perspectives, deepening rather than simply confirming our understanding” (Maxwell, 2012, p. 66).

A corollary of my epistemological position and ontological model is the need to consider theory driven methods, techniques and analytical processes that function as appropriate tools for multi-level research (Pawson & Manzano-Santaella, 2012). While any one investigation is unlikely to require every tool “realism must use the available data and tools, both of which are often imperfect” (Williams, 2014, p. 299). Examples of available tools include concept modelling, simulation, numerical and statistical analysis, ethnographic study, surveys, historical analysis, and interviews which can all be used to produce data suitable for qualitative or quantitative analysis.

Fortunately, critical realism and its realist evaluation compatriot place no limitations on the tools or forms of analysis that can be used, nor do they imply that other theoretical approaches have no value (Bergene, 2007; Porpora, 2015; Zachariadis, Scott, & Barrett, 2013), nor require adherence to a particular methodology. The following sections discuss some of these theoretical contributions, methods, and techniques that I consider could be appropriately employed in my research.

4.4 Contribution of Theory

An assessment of the theories and models which have been used by other researchers (outlined in Section 3.1.3) in research on telehealth services was undertaken in order to understand whether use of any particular perspective could inform my analytical methods. This assessment was inspired by a similar assessment of theories by Porpora (2015), which can be found in his book *Reconstructing Sociology*. Four assessment criteria, related to the needs of my field research questions and the feasibility of undertaken field research, were used to assess each theoretical contribution for:

- Contextual sensitivity: Allows the role of contexts to be considered;
- Admission of conflicts: Recognises possibility of conflicts over exercise of control and power;
- Compatible ontology: Associated with an ontology compatible with a critical realist (CR) ontology;
- Research feasibility: Requires field data at a level of detail likely to be obtainable during cross-national field research, that is, suitability for extensive, as compared to intensive, research.

Assessment of theories against each criterion was based on the theoretical contributions found during the literature review in Chapter 3, on wider reading especially in the field of information system and health services (technology) innovation, and on the criteria set out in Table 10.

Table 10.

Assessment of Potential Theoretical Contributions

	Criteria for possible theoretical contribution			
Theoretical paradigm	**Contextual sensitivity**	**Admits role for conflicts**	**Compatible with CR ontology**	**Research feasibility**
Social construction of technology	✓	?	×	?
Actor Network theory[11]	?	?	×	×
Diffusion of innovations	✓	?	?	✓
Structuration theory	✓	?	✓	×
Acceptance models and theories [12]	×	×	×	×
Activity theory[13]	✓	✓	✓	×
Normalisation process theory	✓	✓	✓	×

Note. Meets criteria = '✓'; Does not meet criteria = '×'; Unclear if criteria met = '?'.

Summarising Table 10, most theories appear sensitive to the influence of context on telehealth services, with the possible exception of acceptance models, such as TAM and UTUAT. Not all theories (social construction of technology [SCOT], Actor Network theory [ANT], diffusion of innovations, Structuration theory (ST), Acceptance models and theories) would naturally highlight mechanisms of control and power. Some of the limitations of constructivist and deterministic analysis of telehealth services using SCOT, ANT, and Acceptance models are rooted in the philosophical roots of idealist and empirical worldviews or ontologies which are difficult to reconcile with a CR ontology.

My assessment indicates that AT (Coleman & Coleman, 2013) and NPT (May et al., 2009) may offer useful insights for my research. NPT has been described in Section 3.7.3 and despite elements of social constructivism, has synergies with realist ontologies including the common

[11] Actor Network theory assigns the same causal powers to humans and objects, which makes it difficult to assess in this framework (Elder-Vass, 2008).
[12] E.g., Technology acceptance model and the Unified Theory of Acceptance and Use of Technology.
[13] There are several strands to Activity Theory.

recognition of the importance of context, the search for generative mechanisms, and the need for human activity to achieve outcomes. In the literature on telehealth services, AT has been infrequently applied. In the course of the literature synthesis the work of Nicolini (2007), which was based on AT, stood out as being particularly sensitive to contextual factors. Activity theory considers systems of work processes built out of subjects, tools, and objects, where:

- the subject is the person(s) on whom the activity is concentrated;
- the object is the output of the activity or problem being investigated; and
- the tool is the device or technology which is central to the activity.

An activity system includes the explicit and implicit rules and codes of the community, the community itself, and the division of labour and power between community members. Activity theory has been applied at small scale in case studies to analyse the impact of technology (Bardram et al., 2005; Lin & Hsieh, 2014; Nicolini, 2007). Application of NPT has occurred in the in-depth analysis of telehealth services through case studies of individual interventions (French et al., 2013; May, Harrison, et al., 2003; D. Morrison & Mair, 2011). However, both NPT and AT were considered difficult to apply to a large cross-national investigation because detailed information required on individual interventions was unlikely to be obtainable.

Consequently, my investigation was not embedded in a particular theoretical paradigm. Instead, I have sought to rely on realist methods which are situated within a critical realist ontology, while acknowledging the value of extant theories in providing further explanations.

4.5 Realist Methods

In search of further explanations of the development of telehealth services, the intent of my investigation was to probe through the empirical domain to deeper levels of reality to identify mechanisms or explanations for the events which occur at the empirical, observable level of reality. In Chapter 3, my literature review found three broad streams of explanation for the development of telehealth services. Firstly, on technology acceptance by users; secondly, on organisational impact of technology; and thirdly, on adoption of technologies by users and organisations within broad social contexts. The dominant discourses concerned the factors leading to acceptance of telehealth technology by users that were based on various empirical psychometric models. Other, less dominant, discourses related to socially constructed normalisation processes and diffusion models of the practices used by telehealth services.

Realist methods can assist in the search for explanations beyond those found in the dominant discourses because “evaluators need to penetrate beneath the surface of observable inputs and outputs of a program” (Pawson & Tilley, 1997, p. 216), such as a telehealth intervention in healthcare. Two methods have been used by researchers in the realist tradition: firstly, analysis of the relationships between contexts, mechanisms, and outcomes (CMOs) of social interventions, and secondly, morphogenetic analysis of changes in contexts over time.

In the first method, analysis of CMOs aims to find answers to the question of “what works for whom in what circumstances?” (Pawson, 2003). This investigative tradition seeks to uncover the causal mechanisms introduced into a particular context by an intervention which produces observed outcomes. In shorthand nomenclature, this investigative process is labelled CMO, representing C (Context) + M (Mechanism) = O (Outcomes).[14] An elaboration of this process explains:

> realism itself is committed to an explanatory framework which acknowledges and incorporates (a) pre-existent structures as generative mechanisms, (b) their interplay with other objects possessing causal powers and liabilities proper to them in what is a stratified social world, and (c) non-predictable but none the less explicable outcomes arising from interactions between the above, which take place in the open system that is society. (Archer, 1995, p. 159)

In the second method, morphogenetic analysis proposed by Archer (1995) links explanation of the social world with her ontological conceptions of structure, culture, and agency. Morphogenetic cycles simply posit that change takes place over time and in stages. In the first stage, structural conditioning sets the conditions for human agency. In the second stage, social interactions occur, followed by structural change, when agents transform structures (morphogenesis) or, in the case of maintenance of the status quo, morphostasis. According to Archer, morphogenetic cycle(s) exists for both social structures and culture. Implicit in the concept is the assumption that human agency undergoes a cycle of group conditioning, group interaction, and group elaboration (when groups bring about changes in structures). Another way of understanding this process would be to consider conflict and struggle as it occurs over time. The morphogenetic approach requires a substantial amount of time-bounded data. Authors applying the morphogenetic cycle approach may undertake longitudinal studies. One such case study reviewed the history of information systems development and organisational change during the 1990s in British local government (Horrocks, 2009).

Morphogenetic analysis has mainly been applied in intensive case studies. Realist evaluation has most often been applied in program evaluations. The common feature of both methodologies is the

[14] The C + M = O analogue need not be unique. Complex interventions will depend on multiple mechanisms. For a discussion of complexity in realist theory see Clark (2013) for a useful taxonomy for analysing the mechanisms of complex interventions.

recognition of contexts and mechanisms as underlying social forces. My choice of research technique has drawn on both of these realist methodologies.

4.6 Choosing Research Techniques

Analysis of social change does not, and may never, employ one set of techniques. For instance, realist methods have been allied to discourse analysis, identity research, grounded theory, interview techniques, ethnography, case studies, comparative case studies, action research, historical methods, mixed methods, literature synthesis, and quantitative methods (Edwards, O'Mahoney, & Vincent, 2014). For my field investigation, it was important to compare phenomena in the Australian and Brazilian healthcare contexts, to identify possible mechanisms, and to explain contextual changes. The research techniques considered most suitable for my research included comparative case studies (C. Williams & Karahanna, 2013), realist evaluation (Pawson & Tilley, 1997), and explanatory research (Danermark et al., 2019).

4.6.1 Case comparison

My research sought to understand how contexts influence the development of telehealth services in Australia and Brazil. Therefore, case studies in each setting, and comparative research techniques, were relevant. In a case study of coordination mechanisms in IT governance, C. Williams and Karahanna (2013) analysed two case studies through an analysis of the mechanisms that were linked to critical events. This analysis is extremely rigorous, so their approach is described in some detail. Their outline design is shown in Table 11.

Table 11.
Comparative Case Study Research Design

Stage	**Comparative case study research design (adapted from** C. Williams & Karahanna, 2013, p. 937; Zachariadis et al., 2013, p. 12)
1	Identification and description of the critical events, which delineate the phenomenon of interest
2	Identification of the social structures and context which are potentially causally relevant to the observed events. Analysis of the events and analysis of the structure occur simultaneously and iteratively
3	Retroduction by proposing probable explanations or mechanisms relating to the observed events
4	Confirmation of the existence and validity of the explanations or mechanisms through empirical corroboration with field research findings and test for other explanations
5	Triangulation and conclusion using other theories and methods

C. Williams and Karahanna (2013) identified critical historical events and important properties of the social contexts followed by theory-driven template coding, combining open and axial coding. Their analysis of the events sought to identify “key points in each coordinating effort indicative of substantive changes in the structure, or the broader organizational environment, as perceived by the primary actors” (p. 939). In a retroductive step, they sought to connect small-scale mechanisms (individuals) with higher level unit and enterprise mechanisms. In comparative case studies, the final stage of analysis is the most important. Simple empirical comparison contributes little; instead, it is necessary to compare “how the structures were manifested and how the mechanisms operated in the different cases … (and) move between theory and data across cases with a view to abstracting the internal and necessary relations” (Bergene, 2007, p. 25).

4.6.2 Realist evaluation

Realist evaluation is a research method (which has been discussed in Section 4.5) and a research technique with roots in the realist ontologies discussed in Section 4.3, which has been applied to the evaluation of social interventions. According to Pawson, Greenhalgh, Harvey, and Walshe (2004), an intervention is a theory or theories about how a social relationship, for instance, health status, can be changed in favour of a social group. An intervention requires people to act in a particular way, according to the theory of the intervention, to change a social relationship and provide an outcome. Realist evaluators look for generative mechanisms which explain “how” the outcomes were caused and what difference context makes.

Realist evaluation can use any combination of qualitative and quantitative methods. Because of the programmatic nature of the C + M = O analogue (CMO), case studies, underpinned by mixed methods, are often favoured. The methodology has been used in the health sector to evaluate small- and medium-scale interventions. One large evaluation of note used realist evaluation to identify the mechanisms in play during a health service modernisation program in London, UK (Greenhalgh et al., 2009). According to these authors, “realist methodology cannot be expressed simply in technical or sequential terms (first do X, like this, then move on and do Y, like this)” (p. 396). Astbury (2013) points out that “complex multi-mechanism interactions, composite and comingled mechanisms, and linked chains and hierarchies of CMO configurations” (p. 390) are possible.

Perhaps because any simple analogue can lack interpretive context, enhancements have been suggested. One such suggestion makes the role of program mechanisms and agency more explicit by proposing the analogue:

> Contextual Mechanisms + Program Mechanisms + Agency = Outcome (CM + PM + A = O), indicating that the evaluative process should involve the generation and testing of hypotheses about the mechanisms embedded in the extant social context (CM); a similar process to identify the mechanisms embedded in the intervention designed to countervail against what are identified as program mechanisms in the social context (PM); and an examination of how agents interpret and respond to these mechanisms (A). (Porter, 2015a, p. 12)

Other authors have suggested adding multiple mechanisms, M1, M2, and so on, to the CMO analogue, or specifically adding in the role of human agency (Porter, 2015b). Dalkin et al. (2015) proposed adding in reasoning and resources as specific components of the CMO analogue.

As with other methods, realist evaluation is implemented in phases, commencing with mid-range theorisation about possible mechanisms, moving onto the generation of hypotheses, which are confirmed or otherwise through observations. Conclusions can then be fed back into the design of social programs. Realist evaluation has been mainly applied to case studies of social interventions. While telehealth services can be described as an intervention, my investigation extends over multiple instances of telehealth services. Some of the intensive methods used in realist evaluation case studies which explicitly build detailed causal chains do not scale for use in cross-national contexts, unless sufficiently comprehensive information on individual interventions is obtained.

4.6.3 Explanatory research

A technique for realist research proposed by Danermark (2019), known as “explanatory research”, is more suited to large-scale comparative investigations. Explanatory research uses a five-stage iterative and cyclic process, employing comparison, retroduction, and abduction to identify mechanisms. According to Danermark, these stages comprise:

1. Description: focused on the objective of investigating some concrete event, dilemma, or situation for further analysis. Description may, on occasion involve an exploratory study to identify the objects of interest.
2. Analytical Resolution: concerned with identifying the important components, aspects, or dimensions of the issue under study.
3. Abduction/Theoretical Redescription: consisting of “redescribing” the components and aspects of interest based on theories about structures and relations, as well as conceptual thinking, a process known as abduction.
4. Retroduction: asking oneself how the components and aspects of interest may have arisen, that is, what causal mechanisms might result in such observations. This involves considering, “What might be happening which could, in some way, provide an adequate explanation?”
5. Retroduction and contextualisation: of the mechanisms identified in Stages 3 and 4 found to be operating in different contexts in order to assess their explanatory value. (based on Danermark et al., 2019, p. 130)

Dobson, Jackson, and Gengatharen (2013) applied an earlier version of this methodology in examining the adoption of broadband technology in a regional Australian town. Interestingly, they represent their results both as a collection of context–mechanism and outcomes at the regulatory, organisational, and community level together with a structural morphogenetic cycle, which indicates that the various critical change analysis methods discussed here can be used in conjunction with each other. Dobson et al.’s study has some similarities to the research agenda for this thesis in that it is a longitudinal case study, which looks at contextual changes over time.

When combined with case comparison, explanatory research methods provided the greatest potential for a large-scale longitudinal, comparative investigation of telehealth services. In the next section, the methods of enquiry which have been selected for application in my investigation are outlined.

4.7 Methods of Enquiry

This section reviews some of the tools and methods which can be deployed to delve into reality and provides processes to manage issues that may occur during my investigation.

4.7.1 Instrument selection

Critical social change analysis methodologies are agnostic about the type of information which should be collected, and how it should be collected. The emphasis in this study was on obtaining information that could assist with explanation of underlying mechanisms which may be operative, so qualitative and quantitative observations and collection of documentary evidence were all employed. Two instruments were considered for the collection of information from health professionals: interviews and surveys. Interviews are an important tool for the collection of information. It has been suggested by C. Smith and Elger (2012) that there are three approaches to interviewing: active interviewing, ethnographic interviews, and explicitly theory led interviewing for realist evaluation of programs.

Active interviewing is a collaborative activity between the interviewer and interviewee where the former "brings the research agenda to bear within the interview in a light and non-directive fashion" but, arguably, from a realist perspective "does not go far enough" (C. Smith & Elger, 2012, p. 9). Ethnographic interviews, according to C. Smith and Elger (2012), address a deeper level of information to obtain accounts which:

> provide access to both "information" – knowledge about events and processes that we wish to analyse – and "perspectives" – concerns, discursive strategies and cultural frameworks (where) the interviewer's research agenda may warrant probing questions, such as asking the respondent to discuss specific incidents, offer further details, comment on alternative accounts, or respond to the interviewer's attempts at précis or explanation. (p. 11)

The realist interview builds on ethnographic interviewing by being theoretically driven. It recognises the active role of the interviewer and the informant in drawing out insider understandings of social mechanisms, but goes further by placing the researcher's provisional theoretical models of context, mechanisms, and outcomes at the centre of discussion between the teacher, who is the informant, and the learner, who is the interviewer (Pawson & Tilley, 1997). Interviews commence with showing the interviewee "the particular program theory under test" and then "the respondent, having learned the theory under test, is able to teach the evaluator about those components of a program in a particularly informed way" (Pawson & Tilley, 2004, p. 12). Consequently, "the roles of teacher and learner are not static, but become interchangeable between the interviewer and the interviewee during the process of thinking through the complexities of the program" (Manzano, 2016, p. 3).

An extension of the realist interview is the realist survey (Schoonenboom, 2015). Implementation of a realist survey proposed by Schoonenboom is a very specific case intended to extend the generalisability of realist interviews by supplementing quantitative survey results with a realist level of evidence. In the specific implementation described by Schoonenboom (2015), the results of quantitative correlational models derived from surveys is taken as a starting point. Correlations between variables, such as those provided in the Technology Acceptance model, are taken as a summary at a group level of possible mechanisms (e.g., “ease of use causes intentions”) (Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh, Speier, & Morris, 2002; R. Ward, 2013).

A realist survey takes a statement about a mechanism and presents it to respondents to agree or disagree with. Due to the complexity and diversity of telehealth services in the chosen settings, and practicality issues in selecting and contacting survey respondents, surveys were not used as a primary research instrument in my research. For similar reasons, I have not used focus groups or ethnographic observations as a primary research instrument for logistical reasons (difficulty of scheduling groups and the time and ethical permissions required for detailed observations).

4.7.2 Interview design

I designed the interview technique to be consistent with the critical application of realist methods and techniques, by seeking to elucidate participants’ thoughts about the propositions being investigated (Maxwell, 2012, p. 104). The chosen interview format combined all three interview approaches described above. Interview questions were based on the conceptual model I have developed, and they therefore tested that model in a theoretical sense. Interview questions and process allowed for the gleaning of insider understandings of telehealth services, in the ethnographic sense, but were not intended to capture the full range of interaction with a participant which a pure ethnographic interview may do. The program theory under examination with participants was my conceptual enquiry model, interpreted through the questions posed. With a few participants during the first phase of interviews, the conceptual model was directly exposed towards the end of the interview. In most cases, this exposure did not generate any new insights (although there were a few affirmative comments), so this practice was not pursued.

There are several implications arising from a decision to use interviews as a research instrument, the most important of which are summarised here, drawing on Manzano (2016):

- Proposed number of interviews to be carried out, mentioned in research proposals, is only an approximate plan because the realist process of theory-testing is unpredictable, unstable and uncertain. A rough idea of sample size can be clarified soon after fieldwork commences. Realist sampling should be designed to test the contexts that matter within the hypothesis (Manzano, 2016, p. 7).
- Practitioners have specific ideas on what is within the program which works (mechanisms) because they are likely to have broad experience of successes and failures, and some

awareness of people and places for whom and in which the program works. The imperative is to work with a broad range of program stakeholders who must be purposively selected based on evaluator's hypotheses (Manzano, 2016, p. 8).

- Realist interviews are generally semi-structured, containing exploratory questions based on the program evaluated, but acting as instruments to draw out the propositions of the general enquiry. It is also possible to begin with more structured questions as long as respondents are given space to explain their initial responses. Exploring differences in implementation might trigger hypotheses about different mechanisms and outcomes (Manzano, 2016, p. 11).

Manzano (2016) suggests that to be able to build explanations, an iterative process of data collection should be designed which includes the possibility of revisiting respondents and repeating interviews (formally or informally) with the same participants (or sub-groups) at a later stage of the investigation. This longitudinal element is different from standard longitudinal qualitative research because, although it involves returning to interviewees, the objective is not to explore changes, which occur over time in participants' lives, but to explore and further develop evaluators' theories. Although this option was left available, there was insufficient time available for parallel development of theory and undertaking of interviews. However, tacit development of theory with some participants did take place over time, especially in Brazil where close proximity to participants working in telehealth centres allowed specific issues to be revisited, sometimes more than once, to gain understandings which were more complete.

My interview structure followed that proposed by Manzano (2016) and used three interview phases: theory gleaning, refinement, and consolidation, with the addition of an introductory "ice-breaker" phase which elucidated some interesting personal accounts from some participants. With other participants, this was not required or could not be used because insufficient interview time was available.

Subject to the need to obtain consistent information, the semi-structured interview allows for some degree of interview customisation. For instance, it may or may not make sense to ask a specialist clinician for their opinion on a specific information security protocol or, on the contrary, to discuss the role of a clinical protocol with an information technology specialist. The interview topic guide summary that I used with Australian participants is shown in Table 12. Appendices D and E provide copies of interview guides used in Australia and Brazil respectively.

Table 12.

Interview Topic Guide Summary for Australian Participants

TOPIC	LOGIC	PHASE
1. Can you please tell me a little about your role and responsibilities in the organisation?	Ice breaker	Introduction
2. With which telehealth initiatives have you been associated?	Checking for role and knowledge	Screening
3. What have been the professional (medical, allied health, information technology) issues you have come across in your telehealth work?	Invited to channel the professional context	Theory gleaning
4. Could telehealth replace face-to-face services or is that too simplistic a view?	Are there potential conflicts?	Theory refinement
5. In (specify the telehealth services) what risks were envisaged, how were they managed and by whom?	Looking for resolution of problems and more information on these	Theory refinement
6. What sort of codes, protocols or guidelines have been useful in developing telehealth services or managing risks? Why?	What are the manifestations of sociotechnical codes?	Theory refinement
7. Looking at (a specific telehealth service), what action or resource could, would or can make a difference to its operation?	Looking under the bonnet for hidden mechanisms	Theory consolidation
8. Now telehealth services have been practised for some time are they seen as routine, or still perceived as risky? Why?	Have perceptions changed, and through what mechanisms?	Theory consolidation
9. How important is cooperation between different roles in (the telehealth service) provision? In what way? Between whom?	Checking for a mechanism. Is the mechanism still active?	Theory consolidation
10. Have professional practices, roles and interactions changed when telehealth is practised?	Looking for relationships	Theory consolidation
11. What sorts of agreements, understandings, protocols or guidelines have you found most valuable? Who is involved?	Are certain relationships needed to solidify certain codes?	Theory consolidation
12. Is a telehealth service any different from other forms of healthcare?	Checking for mechanism	Theory consolidation
13. Have you any other comments? Would you be willing to be contacted again? Thank you very much?	Opportunity to add further information	Conclusion

The topic guide for Brazilian participants (Appendix E) was based on a translated Portuguese version of Table 12. I conducted all interviews except one in Brazil, in Portuguese. Brazilian participants were not asked Question 4 because, in general, Brazilian telehealth services provide support for distant physicians and do not provide direct doctor-to-patient care as will be seen in Chapter 5. Not all questions were asked of all participants. Often participants would quickly jump ahead on their own initiative to talk about issues relevant to other questions. In some cases, specific issues, which were not anticipated in this topic guide, became the focus of an interview; for instance, the educational role of telehealth services. I tested these research instruments during the first tranche of interviews in South Australia. Instruments were translated and customised for use in Brazil. Subsequent amendments were submitted for ethical approvals.

4.7.3 Study population

The study population comprised employees of health services, government, or professional bodies associated with the delivery of telehealth services. Within this population, I sought participants whose experience and role enabled them to inform the research questions based on their understanding of how a telehealth service is promoted, managed, or delivered. Inclusion criteria were that participants are or had been:

- employees of health services, government, or professional bodies associated with the delivery of telehealth services; and
- working in managerial, specialist, medical, nursing, logistical, information technology, or similar roles associated with the delivery of telehealth services.

In their designated role, it was assumed that they had a certain level of understanding of how a telehealth service is promoted, managed, or delivered.

No particular potential participants or groups of participants were excluded from my research. In total, 135 participants were interviewed. Table 13 provides a breakdown of participant characteristics by location, profession, and organisational area.

Table 13.

Characteristics of Participants

Location	No.	Profession[15]	No.	Organisational area	No.
Australia - Queensland	38	Allied Health	4	Central Management	22
Australia - South Australia	31	Coordinator	20	Clinical Department	19
Australia - Victoria	5	Management	29	Community Clinic	12
Australian Aged Care	2	Nurse	7	Hospital	37
Australian GPs	8	Other	2	Insurer	1
Brazil - National	9	Physician	46	Other	3

[15] In Australia, primary health doctors are called general practitioners (GPs). In Brazil, the term used is “medico”. Table 13 uses the term “physician” as a general descriptor for all medical doctors, including those with specialist training.

Location	No.	Profession[15]	No.	Organisational area	No.
Brazil - Rio Grande do Sul	16	Researcher	7	Sole Practitioner	9
Brazil - Santa Catarina	14	Specialist	4	Telehealth Centre	24
Brazil - Sao Paulo	12	Support role	9	University	8
		Technologist	7		

The number of interviews varied considerably according to location. This variety was due to several factors. Firstly, "saturation", where successive participants began to tell similar stories, was achieved more rapidly in some locations than in others. Secondly, the time available limited the number of interviews I could conduct in most locations (with the exception of Queensland where I reside). Thirdly, additional interviews were conducted with participants from Victoria, aged care organisations, and general practitioners to test whether these groups were expressing significantly different views.

It should be noted that qualitative research is inherently an elastic venture and that "realist hypotheses are not confirmed or abandoned through saturation obtained in a double-figure number of qualitative interviews but through relevance and rigour" (Manzano, 2016, p. 6). My experience in one of these settings, the Flinders University Telehealth in the Home project, indicated that between 10 to 20 interviews across a range of professions and roles were undertaken before strong, repetitive themes began to emerge from the accumulated information (Wade, Taylor, Kidd, & Carati, 2016). In most of the settings investigated, such themes emerged after about 15 interviews had been completed. In South Australia and Queensland, due to the scale and diversity of telehealth services in these states, a larger number of interviews was undertaken to ensure adequate representation of different telehealth services from within a larger number of health service organisations.

4.7.4 Participant recruitment

Initially, participants were identified through assessment of their publications, public research, professional profiles, and reports on telehealth services in each state. Email details present in these public sources were combined with my personal address and business card book of colleagues and former colleagues. In keeping with the realist investigative methodology which was proposed, further participants were identified through a purposeful snowballing technique by asking participants to recommend other potential participants (performing any of the roles listed in Table

13) who could be approached to participate in the research. The complete list of participants, their roles and country of residence is shown in Appendix M.

Participants were initially contacted via email to request an interview. The email contained a letter of introduction, an information statement, and a consent form. Where more than one participant in the same location agreed to be interviewed, they were combined into a group interview comprising no more than three participants (in a small number of instances). In some instances, participants invited me to view telehealth facilities or to observe non-clinical professional activity, such as scheduling or technical support.

4.7.5 Participant consent and withdrawal

Participant information statements, consent forms, and withdrawal forms were customised for the Australian and Brazilian contexts (Appendices F and G) and approvals obtained from research governance units in Australia and the Federal University of Santa Caterina in Brazil.

Participants were contacted by email using a standard letter (Appendices H and I). Participants completed the appropriate form to indicate that they agreed to be interviewed. I ensured that participants understood the nature of the research and their role in it before signing the consent form.

Participation in the research was voluntary. Participants were told they could state “no comment” or refuse to answer any questions and were free to withdraw from the interview at any time without effect or consequences, although no participants took up any of these options. Participants were advised that, unless directed otherwise, data collected up to the time a participant withdraws contributed to the findings of this study.

4.8 Ethical Considerations

4.8.1 Participant considerations

Risks to participants from participation in my research were negligible. There was a small possibility that a participant reading sections of my published thesis could associate text with their comments made during an interview. This was a low-risk event, which was minimised by anonymising comments and aggregating participant views where possible. All of the participants have been associated with the development, implementation, and operation of telehealth services. Therefore, the risk of any discomfort to participants, particularly regarding the time required for their participation in my research, was directly counterbalanced by the contribution my research may make to how telehealth services are viewed and implemented within the health sector. To minimise disruption to the working day of participants, requests for their involvement in the research stated that any interview could be held in or close to their place of work, at a date and time convenient to the participant and their employer.

It was envisaged that the research, coincidentally, might recruit participants who were pregnant, in existing dependent or unequal relationships, people with a cognitive impairment, an intellectual disability or a mental illness, or Aboriginal and/or Torres Strait Islander peoples. I did not identify any such participants and my working assumption was that all participants had the same potential contribution to make to the research. In all cases, all participants were afforded identical consideration to ensure that participants were subject to no discomfort, embarrassment, or harm of any kind.

The sustainability of telehealth services is currently a significant topic of debate within the discipline of telehealth services; however, the concept of sustainability is not well defined or understood. Understanding how telehealth services do or do not become sustainable, or indeed, whether the concept of sustainability is a useful one, is important for healthcare organisations and those who work in telehealth services. My research contributes a broader perspective to these issues, which may lead to the adoption of improved strategies for the implementation of telehealth services. I indicated to participants that if there were sufficient interest in co-authoring a publication during the investigation or following publication of my thesis, then such collaboration would be welcomed. The findings of my research are not identifiable to a specific participant, and a summary will be reported to all participants by email following publication of the thesis on the open access thesis repository of Flinders University, via an email notification.

4.8.2 Data management and storage

Interview recordings and transcripts were given identifying codes and a country of origin label, for example p0003-Au, or p0100-Br, and stored on an academic research data server (password protected) located in Australia (the Australian Academic Network, CloudStor service). No personal information was used in the identifying codes. CloudStor encrypts all data in transit between the client and the CloudStor environment. This includes data sent via the web browser.

Digital electronic audio recordings were made of almost all interviews with the permission of participants. One interview was conducted via email. One interview conducted by phone was not recorded, but written notes were made of the conversation. Written field notes were made following interviews. Documents relevant to the operation and establishment of telehealth services, such as guidelines, codes of practice, and legislation, were provided in electronic or paper form by some participants. All information, including such documents in a digital electronic form, upon receipt was stored on a password-controlled device such as a personal computer. Following completion of the research, information will be removed from my personal computer and stored on a password-protected academic research data storage service located in Australia (the Australian Academic Network, CloudStor service). Written information has been physically stored in a lockable filing cabinet at my place of research.

No participant information has been associated with a participant name. Across the whole study, there were 135 participants. Where information provided by participants has been quoted in the thesis, this information was de-identified by location to reduce the chance that any particular information could be attributed to a participant. For instance, an IT specialist would be one of 135 participants, of which 10 could be IT specialists, located across two countries and several states. Notwithstanding the above measures, care was taken over the manner in which potentially sensitive (for whatever reason) information is used in the published thesis.

Additionally, no information which might enable individual participants to be identifiable by other individual participants was provided to any participant. Information collected will be stored for 7 years following publication of my PhD thesis. This period has been chosen because many public health jurisdictions require information collected from its staff for the purposes of research to be stored for 7 years following its use in a publication. Access to the academic research data storage service located in Australia (the Australian Academic Network, CloudStor service) is retained while I am permitted to access Flinders University electronic services. If I cease to be associated with Flinders University, the information will be archived to a secure Flinders University repository. At the end of the data retention period, written information will be disposed of using a secure paper disposal service. Electronic information will be deleted from the secure electronic data storage service.

4.8.3 Research in Brazil

Research in Brazil was made possible by receipt of an Australian Government Research Fellowship from the Endeavour Program. Throughout the research in Brazil, I complied with regulations from this program and from Flinders University for health, safety, and travel. In Brazil, I undertook research in the Brazilian states of Santa Catarina, Rio Grande de Sul, and Sao Paulo. Additional interviews of participants from other locations in Brazil were undertaken using videoconferencing.

Throughout the research in Brazil, Professor Paul Ward of Flinders University acted as my Principal Supervisor. In Brazil, local academic supervisors were arranged at the Federal Universities of Sao Paulo, Santa Caterina, and Rio Grande do Sul. Research in Brazil was conducted in the Portuguese language, including interviews, information sheets and consent forms.

4.8.4 Ethical approvals

The following ethical approvals (Appendices J, K, and L) shown in Table 14 were granted:

Table 14.
Ethical Approvals

Southern Adelaide Clinical Human Research Ethics Committee (SAC HREC EC00188)
OFR Number: 113.17. HREC Reference Number: HREC/17/SAC/196. Project Title: Sustainable Telehealth Services. Duration: 11/7/2017 to 11/7/2020. Including amendments of the 7/11/17 and 27/12/2017
Bolton Clarke Human Research Ethics Committee, NHMRC Registered Committee Number EC00349
Approved From: 01/03/2018; Approved Until: 01/03/2019. Approval Number: 170010, Project Title: Sustainable Telehealth Services. Project No: 192
Brazilian Ministry of Health and the Federal University of Santa Caterina
Título da Pesquisa: Sustentabilidade de serviços de Telessaúde. Versão: 1, CAAE: 80481717.6.1001.0121, Submetido em: 28/11/2017. Número do Comprovante: 141349/2017

Research governance approvals (to conduct interviews with employees) were also obtained from the following organisations: Southern Adelaide Local Health Network, Northern Adelaide Local Health Network, Central Adelaide Local Health Network, Country Health Local Health Network, Central Queensland Hospital and Health Services, Children's Health Queensland, Department of Health, Queensland, Metro North Hospital and Health Services (RBWH and TPCH), Metro South Hospital and Health Services, North West Hospital and Health Services, and Townsville Hospital and Health Services.

Research governance applications made to three other Hospital and Health Services in Queensland were not proceeded with due to their onerous contractual requirements relating to approval of publications arising from the proposed research.

4.9 Field Research and Analysis Stages

The design of my field research and subsequent analysis lies somewhere between an explanatory research analysis (Danermark, 2002) and a comparative case analysis (C. Williams & Karahanna, 2013), as outlined in Section 4.6. In such research designs, combinations of intensive realist evaluation and historical research respectively are typically employed, together with analytical processes of abduction and retroduction. The field investigation process and subsequent analysis followed a number of interlinked stages:

- Exploration of the chosen field research setting commencing with an initial review of the literature relevant to each setting, selection of participants, testing of research instruments, and use of my conceptual enquiry model during field research.
- Enquiry in the chosen research setting comprising collection of all types of literature relevant to each setting and semi-structured interviews with participants.
- Analysis of the Australian and Brazilian healthcare contexts and telehealth services, the findings from which can be found in Chapter 5, and the analysis of interview transcripts, the findings from which are structured into the themes presented in Chapter 6.
- Comparison and explanation of the influence of contexts and the development of telehealth services over time presented in Chapter 7, and the operation of mechanisms in Chapter 8.
- Reflection on the limitations of my research and validity of my findings, in Chapter 9.
- Conclusions and presentation of my main findings presented in Chapter 10.

Illustrated in Figure 13 are my field research stages of exploration, enquiry, analysis, and comparison, which are further described in this section. Also shown in Figure 13 are the reflection and conclusion research stages which overlapped with, and followed, the previous field research stages, and which are described in Chapters 5 to 10.

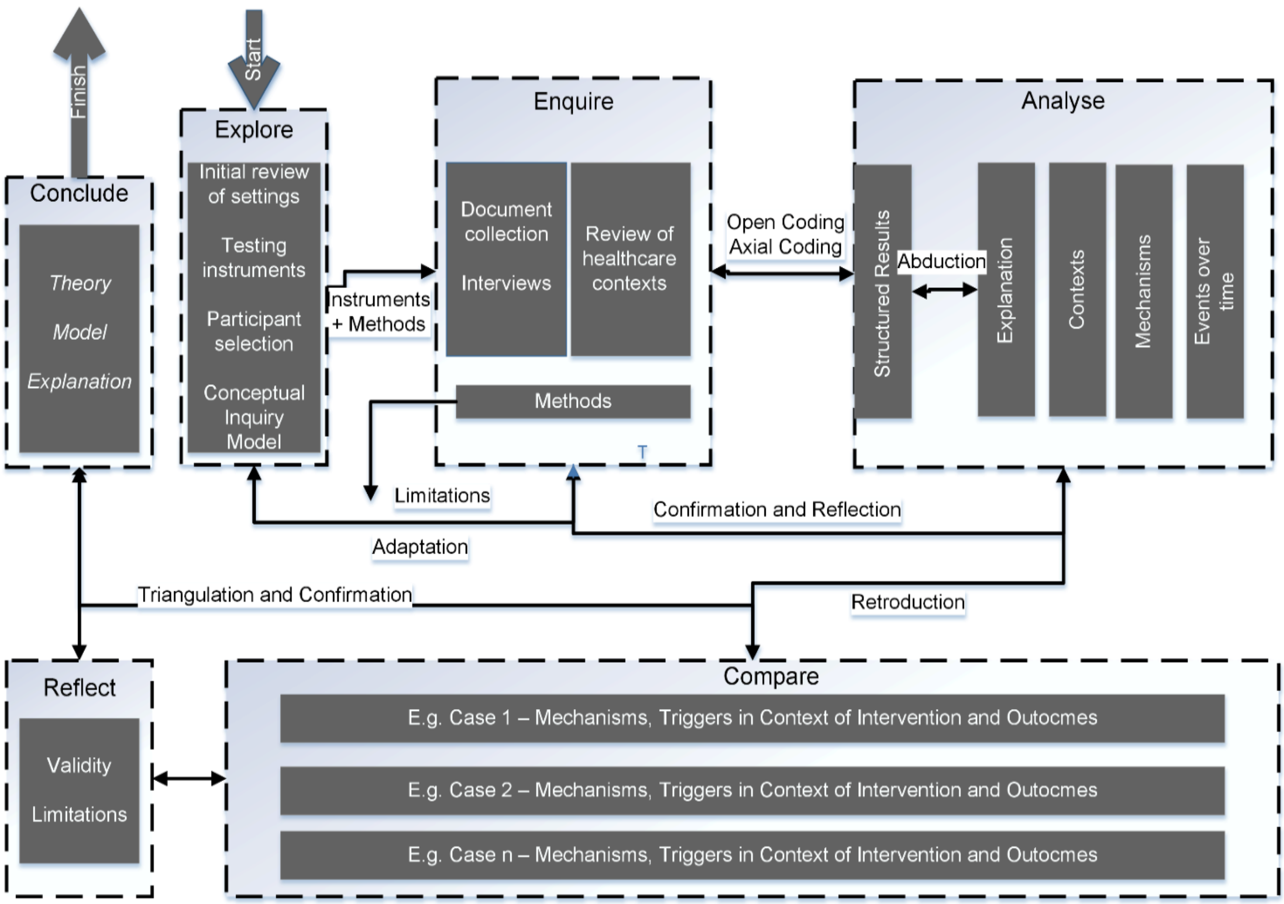


Figure 13. **Field research investigation and analysis process.**

4.9.1 Exploration stage

The chosen research settings were the healthcare systems of Australia and Brazil. Both countries have federal political structures, and both countries have several states with developed telehealth services. In other respects, they are very different. Brazil has a larger and more powerful private health sector than Australia. Brazil has inherited a significant portion of the culture of Portugal, the former colonial power, including the language (Portuguese), and is arguably less developed than Australia by infrastructure measures. When choosing the states within Australia and Brazil, a key criterion was the likelihood that I could access information on telehealth services. Field research was undertaken in the Australian states of South Australia and Queensland and the Brazilian states of Sao Paulo, Santa Catarina, and Rio Grande do Sul.

Access to a range of literature was obtained to differing degrees across all the settings. Some of this literature was pre-collected prior to undertaking field research in each context, while other literature was discovered during the enquiry stage of my research in the field. This literature included refereed publications, so-called grey literature, in-house publications, reports, submissions, contracts, guidance, standards, protocols, legislation, and regulations from national or state governments, health services, and professional organisations. Initial reviews using this literature were prepared describing the telehealth services in each setting with the intent of identifying avenues of investigation in order to:

- understand the broader contexts of each research setting;
- classify telehealth service activities and services;
- identify candidate telehealth services for further research;
- obtain contacts in candidate telehealth services who could facilitate access for research;
- search for possible mechanisms related to the initial conceptual model of a telehealth intervention pathway; and
- prepare for interviews with participants.

Logistical difficulties of undertaking research across two continents were significant. Field research commenced in four South Australian health services, which served as a test bed to confirm the conceptual model and research instruments; it then progressed to Queensland for a more in-depth investigation of a large telehealth service system, and then transferred to Brazil with the intention of comparison with the findings obtained in Australia. In each health service, between two and three health specialities which use telehealth services were chosen for study. Criteria for these choices were drawn from a review of the relevant literature for each of these health services, my knowledge of each setting, the potential for access to each organisations or services, and the level of maturity or functioning of each service and the availability of participants for interview. A complete coverage of all existing telehealth services in each setting would not have been possible within the timeframes of this study. Telehealth services which were completely defunct were not investigated because information would be difficult to obtain. Hence, the choice of settings and services at best provides a snapshot over a defined period of time of the history, experiences, and form of each telehealth service.

Purposeful snowball sampling was used to choose organisations, services, and participants. The focus of the research questions was on organisational structure, sociotechnical codes, and the people who work within those organisations. No patients or healthcare clients were participants in my research. The focus of the research was on understanding the activities of participants with clearly defined roles within a health service or associated organisation including managerial, specialist, medical, nursing, allied health, logistical, and information technology roles.

4.9.2 Enquiry stage

Building on the exploration stage, the enquiry stage of my research was concerned with the collection and review of a wide range of documentation which could be used to identify, confirm, or negate any of the mechanisms relevant to the research questions in each context. Enquiry commenced in South Australia between August and October 2017. Interviews in Queensland commenced in September 2017 and were completed in March 2018. Interviews in Sao Paulo took place during April and May 2018, followed by Santa Caterina from June to July 2018 and Rio Grande do Sul from August to September 2018. I conducted the majority of interviews in person and the remainder via telephone or videoconferencing.

Effectively, the exploratory and enquiry stages overlapped because time between interviews was used to complete initial reviews of each setting in preparation for interviews in subsequent settings. Additional literature was collected during the course of enquiry in each setting, through referral or snowballing from citations in existing literature and from documents provided by participants and telehealth services. Information provided by this literature enabled the adaptation of the conversations within semi-structured interviews to the local contexts. This literature then formed the basis for analysis of the Australian and Brazilian healthcare contexts and telehealth services presented in Chapter 5.

In Brazil, I was hosted within facilities that provided telehealth services. This generous hospitality provided opportunities for interactions with staff and researchers and facilitated the arranging of interviews with participants. The sampling strategy was both pragmatic (do what is possible, within the time available) and purposeful (seek out organisations and people who are most likely to provide relevant information). In pursuing this strategy, there was a clear risk that only information which supports a particular hypothesis will be obtained. Maxwell (2012) argues that the best defence against bias is reflexivity on the part of the researchers. My research clearly can be viewed as having a biased selection of participants because interviews were not undertaken with people who were not involved in telehealth services. Further, most participants were supporters of telehealth services. Recommendations for potential participants were largely provided by staff from within these centres and by participants during interviews. While an effort was made to seek out other potential participants in an attempt to triangulate different perspectives on telehealth services, this strategy was only partially successful. In one case, a potential participant who had ceased to be involved in a telehealth service refused to be interviewed because they did not want to say anything "bad" about the telehealth services with which they had been involved. It also proved difficult to arrange interviews with practising clinicians as opposed to staff involved in running operations, and to interview nurses as opposed to physicians.

During the enquiry stage, transcription of interviews occurred. In Australia, where interviews were undertaken in English, I transcribed the audio recordings, sometimes with the help of an online transcription service "TRINT" (www.trint.com). Interviews recorded with a lower audio quality were transcribed by a professional transcription service. Interviews undertaken in Brazil, in Portuguese, were transcribed by a commercial Brazilian transcription service into written Portuguese.

Funding for transcription of interviews was available. Use of automatic online transcription services helped to reduce transcription costs but required manual correction. Translation of complete interviews from Portuguese into English was avoided because interview transcripts were coded directly into NVivo qualitative software. I have only translated extracts from interviews in Portuguese into English for use in this thesis.

4.9.3 Analysis stage

Interview transcripts gathered during the enquiry stage were analysed in a sequential manner. Interviews were subject to preliminary coding, organisation, and schematisation employing open coding within the principal themes of the conceptual model, followed by axial coding techniques. NVivo qualitative analysis software was used to hold interview transcripts and develop themes (known as nodes in NVivo terminology).

My initial reviews of Australian and Brazilian healthcare contexts were coded using the principal themes of the conceptual model within NVivo qualitative analysis software. Other documentary data collected during the enquiry stage, including paper and digital texts and audio media relevant to my analysis of the Australian and Brazilian healthcare contexts, was categorised and coded manually in their original formats or digital text files. The results of this analysis were also used to support the analysis of telehealth services within the Australian and Brazilian healthcare systems presented in Chapter 5.

The initial conceptual model had been developed based on a review of telehealth codes and published literature, including theoretical propositions. That model posited a process of interventions adjusting to people and organisational contexts through resolution of contradictions, development of relationships, and the evolution of trust, risks, and codes related to the intervention. Initial interviews in South Australia employed the following preliminary categories: the intervention, people and organisational contexts, power, mechanisms, and sustainability. Mechanisms included questions of trust, risk, and codes. Over the coding process, these themes expanded to 51 sub-themes. For instance, within relationships, evidence in the interviews was discovered relating to leadership, cooperation, social networks, and similar themes. Initial open coding of South Australian interviews took place in February 2018. A second version of the coding scheme for these interviews was developed and applied to interviews from Queensland in March 2018. This second iteration coding structure was then successfully applied to interviews undertaken in Sao Paulo, Brazil during September 2018 and then repeated for other settings. Interviews transcribed into Portuguese were coded without translation, although the themes used were in English. Up to this point, a process of open coding followed by axial coding was used to generate theoretical themes grounded in data as described by Creswell (2013):

> In open coding, the researcher forms initial categories of information about the phenomena being studied by segmenting information. Within each category, the investigator finds several properties, or sub-categories and looks for data to dimensionalise, or show the extreme possibilities on a continuum of the property.
>
> In axial coding, the investigator assembles the data in new ways after open coding. This is presented using a coding paradigm or logic diagram in which the researcher identifies a central phenomenon … explores causal conditions … specifies strategies … identifies the context and intervening conditions … and delineates the consequences … for this phenomenon. (Creswell, 2013, p. 57)

Following the coding of interviews from all settings, a review of the codes highlighted the need to align the discovered themes more closely with the research questions and theoretical concepts. This was achieved by increasing the granularity of some themes and by moving sub-themes into more appropriate major themes.

Prominent themes, particularly funding and technology availability which did not fit well under the initial categories, were included under a new major theme heading of “resources”, in part inspired by a discussion of “mechanisms” as a key concept in realist evaluation in Dalkin et al. (2015). Commencing again with the South Australian case, a major recoding of interviews (the third iteration of coding) based on an approximation of the realist context, mechanism, and outcomes sequence, resulted in 118 distinct sub-themes under the major themes, shown in Appendix N.

A further refinement of the scheme was undertaken (the fourth iteration of coding) to reduce the number of overlapping themes to 98 sub-themes. This last step was essentially abductive, in which “empirical data are re-described using theoretical concepts” (Fletcher, 2017). According to Edwards et al. (2014), abduction:

> re-describes the observable everyday objects of social science … in an abstracted and more general sense in order to describe the sequence of causation that gives rise to observed regularities in the pattern of events. It involves combining observations, often in tandem with theory identified in the literature review, to produce the most plausible explanation of the mechanisms that caused the events. (pp. 17–18)

Given the large number of participants, some statistical tests were considered feasible. This is an example of a situation in which quantitative techniques can be used to enhance a qualitative process as discussed in Section 4.3.4. In particular, a test of differences in the number of participants commenting on a theme or sub-theme who were Australian or Brazilian was possible when sample sizes were large (greater than 30 participants). The statistical two-tailed Z-test was used to determine whether two population means are different where the sample size is sufficiently large. Although the selection of participants had not been random, populations were assumed to have a normal distribution within the targeted participant groups. The test determined whether the differences between the number of Australian and Brazilian participants commenting was statistically significant for a probability value less than 0.01 (1%). These quantitative tests were used to identify particular themes where responses across different groups of participants were sufficiently different to justify further qualitative analysis.

4.9.4 Comparison stage

Up to this point, empirical interview data from each setting were treated in isolation as an individual NVivo file, although care was taken to ensure that the thematic scheme as it developed remained compatible and appropriate to each setting. To enable comparison, each setting in the form of an NVivo file was merged into one NVivo file containing all 135 interviews linked to NVivo classifications using participant characteristics, such as location, organisation, and profession. Additional recoding of some themes (a fifth and final coding iteration) resulted in an increase to 161 sub-themes under nine major headings (see Appendix N). The number of participants responding to each of these themes is shown in Table 15.

Table 15.

Major Themes and Number of Responding Participants

Major theme	Number of participants responding
Organisational Contexts	65
Professional Contexts	74
Adaptation of Organisational Contexts	98
Adaptation of Professional Contexts	110
Changing Behaviour	109
Codes	116
Resources	120
Relationships	89
Changing the Normal (contexts)	120

The variation in the number of participants contributing to each theme is a reflection of the concerns of participants and the questions posed to them. It should be noted that the qualitative coding process was one of the successive dis-assembling and reassembling of the information provided by participants within an evolving analytical structure. Assembly and re-assembly of this information continued throughout the analysis stage of my research, particularly concerning subsidiary themes where it was found that a sub-theme was more relevant to a major theme other than the one to which it was originally coded. Not all coding resulted in dis-assembly. Some participants related compelling accounts of their personal experiences and the development of telehealth services which, if broken down, would have lost their meaning. Such accounts were preserved in their entirety and separated off for possible use as personal stories or case studies.

Given the number of interviews in the empirical data (135), and the number of sub-themes discovered, it was necessary to apply numerical and simple statistical methods to identify the themes of most concern to participants. This is an example of a situation in which quantitative techniques can be used to enhance a qualitative process as discussed in Section 4.3.4. To undertake this analysis, queries counting of the number of “sources” (participant interviews) responding to each theme were undertaken in NVivo software and exported to Excel software.

Additional queries counting the responses of different groups of participants were executed and exported to Excel software and analysed to check if participants concerned about a particular theme were also concerned about other themes.

Examination of these queries showed that a large number of themes were found to be informed by a small number of participants (see Figure 14). A small number of themes were informed by a large number of participants. Figure 14 was derived by weighting themes coded according to number of participants raising those themes, normalising the resultant theme weight by dividing by the total number of participants (135), and then calculating a cumulative distribution response as a function of the number of responding participants.

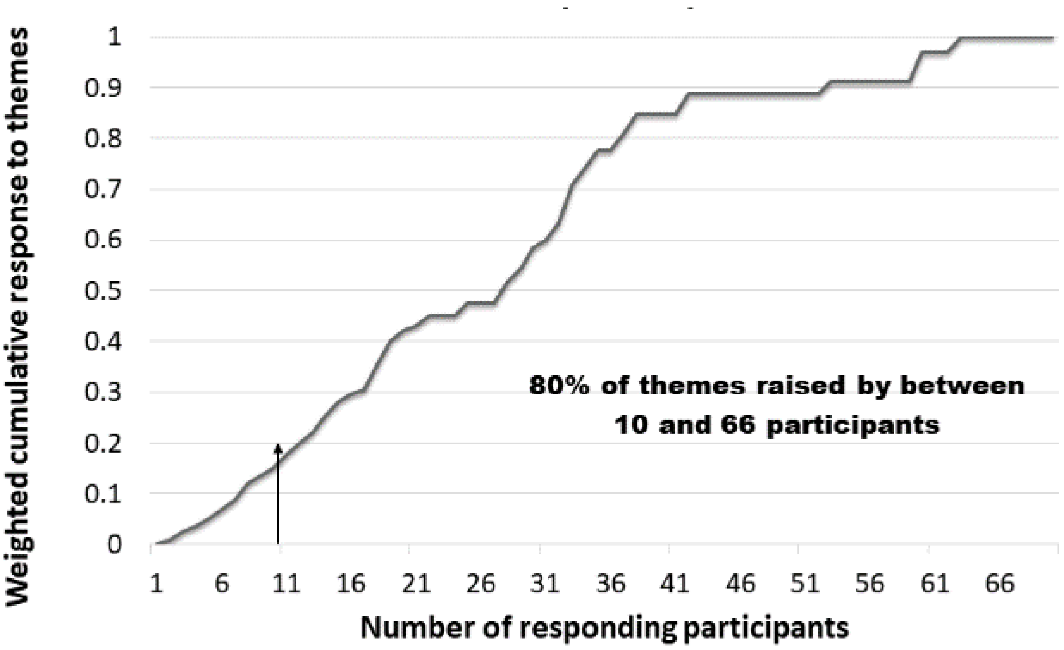


Figure 14. **Weighted response to sub-themes by number of participants.**

As illustrated in Figure 14, more than 80% of weighted participant responses are contained in sub-themes informed by 10 or more participants. Therefore, in analysis, preference has been given to those sub-themes with responses from more than nine participants. Themes generated by fewer than 10 participants have been ignored in my analysis. However, in some cases sub-themes with fewer responses have been grouped together during the analysis or given special consideration.

This reduced set of 101 themes (Appendix N) was used in the identification, selection, and confirmation of patterns (demi-regularities in realist methodology) which point to mechanisms that may be relevant in a particular setting or across settings. The aim of this comparison was to understand the necessary and sufficient conditions for the behaviour of the mechanisms which have been identified. Some mechanisms may not be present in all situations or may be inactive. For instance, the theme of funding is prominent, but concerned Brazilian participants more than

Australian participants. However, contextual evidence shows that despite the relatively lower funding of health services in Brazil than in Australia, telehealth services in Brazil seem to have received more funding than their Australian counterparts and to operate at a larger scale. In this example, the existence of funding may well be a universal mechanism, but other moderating mechanisms may exist which act differently in different settings. My analysis examined funding and the outcomes which are linked to funding. The inverse procedure was used in instances where funding as a mechanism does not appear to exist. For instance, several telehealth services appear to operate quite satisfactorily without "funding". This process of testing conjectured mechanisms against empirical observation in different settings has been described by Edwards et al. (2014).

Drawing on my analysis of the documentary data collected during the exploration and enquiry stages of my field research, the following chapter provides an abbreviated contextual analysis of the universal healthcare systems and the development of telehealth services in Australia and Brazil.

5 FINDINGS: PART 1, TELEHEALTH SERVICES IN AUSTRALIA AND BRAZIL

This chapter provides a comparative analysis of the ways in which the different contexts for telehealth services in Australia and Brazil have influenced the mechanisms associated with the development of telehealth services. It is based on analysis of the documentary data collected during the exploration and enquiry stages of my research project, described in Section 4.9, supplemented by data obtained during interviews with participants. During my fieldwork, participants and the telehealth services with which they were associated provided unpublished and published data on their services and the healthcare systems within which these operated. In many cases, participants or the telehealth services for which they work have authored or published the documentary data I collected or were able to facilitate the location of supporting information.

The first six sections of this chapter describe the contextual influences on telehealth services in Australia and Brazil, commencing with an outline of their universal healthcare systems, the organisation of healthcare, access to healthcare, the availability of human resources, financial arrangements, and the ICT available to telehealth services, in order to provide the reader with a high-level understanding of the influence of the contexts within which telehealth services have been operating for each research setting.

In order to identify how contexts and changes in context have enabled or impeded mechanisms for the development of telehealth services, this chapter concludes by presenting an abbreviated historical analysis of the development of telehealth services over the last 30 years in Australian and Brazil, focussing on the Brazilian state of Santa Catarina and the Australian state of Queensland. In both countries, the development of telehealth services has passed through several phases, often marked by events which many participants identified as significant markers of contextual change. Figure 15 illustrates the organisation of this chapter.

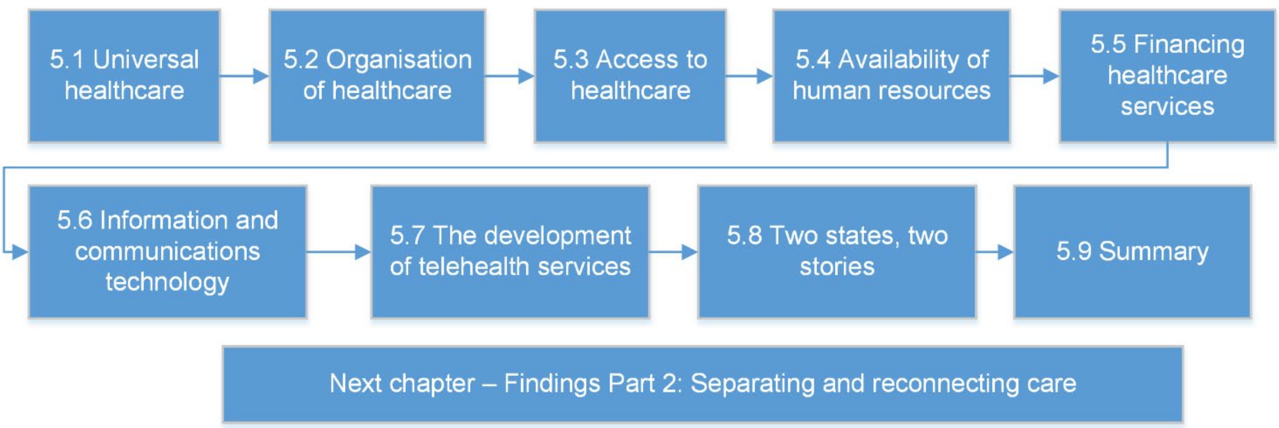


Figure 15. **Organisation of Chapter 5.**

5.1 Universal Healthcare

Reform of the Australian and Brazilian healthcare systems towards the end of the 20th century aimed at providing universal access to healthcare at minimal cost. Brazilians have a constitutional right to free healthcare provided by the Brazilian universal healthcare system (SUS) which, in practice, is limited by geographic variability in access to health services and the limited resources of public health services. In Australia, the health system aims at providing equitable access to care, also limited by geography and the cost of "out-of-pocket expenses". The strategic aim of Brazilian health services has been to improve the capacity of primary healthcare. By contrast, primary health services are well established in Australia and the focus for public health is managing disparities in access to higher levels of care for regional populations.

Although healthcare in Australia and Brazil is notionally available universally, in practice, health service provision is defined by state boundaries, regional catchments, municipal boundaries, or hospital localities. The basic unit of healthcare organisation is still defined by an area or place with geographical borders which define the catchment area for patients. Geographical boundaries are particularly challenged by the deployment of telehealth services because health services can then be provided outside patient catchment areas.

5.2 Organisation of Healthcare

In both countries, healthcare is devolved to regional entities: in Australia, 146 local health networks coordinate primary care and 136 hospital networks coordinate acute care. In Brazil, more than 5,000 municipalities with an average size of 36,400 people (Organisation for Economic Cooperation and Development, 2018) provide primary care and hospital care. Democratisation of Brazilian state structures following the end of the former dictatorship led to a hugely increased role for municipalities in delivering healthcare (Fleury, 2014, p. 16).

Australian states provide public hospital services, as do some Brazilian states. Australia has 1,331 hospitals of which a majority (52.16%) are public. According to the Australian Institute of Health and Welfare (2017b), in 2015-2016 these provided a total of 94,000 beds of which 65% were in public hospitals.

The Brazilian public health sector is much larger than Australia's, commensurate with the larger population. There are 438,243 hospital beds in 6,810 hospitals of which a majority (64%) are privately run (Ministério da Saúde, 2018b). Brazil relies heavily on the private sector to host public patients. Part of the challenge of public healthcare infrastructure for Brazil is the sheer number of health facilities. There are more than 46,000 health posts, or primary health facilities, in Brazil compared with around 7,000 Australian general practices (Swerissen, Duckett, & Moran, 2018). In the Brazilian primary health facilities which I visited during my field research, it was clear that there the most pressing need was the improvement of physical infrastructure, with the installation of information technology equipment a lower priority.

5.3 Access to Healthcare

Both Brazil and Australia are large countries intensively settled in coastal regions. Population densities in large coastal cities in Australia vary from 2,000 to 8,000 people per square kilometre (Australian Bureau of Statistics, 2014). Absolute population densities in Brazilian coastal regions are lower than in Australia, reflecting the larger geographical size of Brazilian cities; however, population densities in coastal regions of Brazil can exceed 500 people per square kilometre (Brazilian Institute of Geography and Statistics, 2010).[16] In the case of Brazil, a significant proportion of the population lives in inland areas with much lower population densities, ranging from 10 to 50 people per square kilometre (with the exception of Amazonas where densities are even lower). Reflecting the concentration of population on the coast in both countries, major hospitals are located in coastal capital cities.

Notwithstanding a number of "hospital in the home" services in Australia, when healthcare activities are separated by distance the majority of care still takes place within the walls of a health facility and patients travel to the facility to receive healthcare. Geographic inequity of health service availability has major implications for people living in inland cities and settlements who may have to travel large distances for treatment. Mapping of this movement of patients in Brazil, particularly for medium- and high-complexity treatments (Fiocruz, 2010), shows that vast numbers of patients attend hospitals in the coastal cities every year, using patient transport services provided by the Brazilian health system. The situation is not so different in Australia states such as Queensland, where subsidised patient travel cost $75 million in 2014 (Bryett, 2015).

Regional residents tend to fall into lower income brackets, so the cost of healthcare and travel becomes important. Since the commencement of Medicare in Australia, erosion of access to healthcare has largely taken the form of a failure to index the subsidies given to patients for consultations, with rising fees leaving patients with a co-payment. The amount of this co-payment may range from $10 to $40 or more for a consultation to several hundred dollars for a consultation with a private specialist in a metropolitan area who is in high demand (Duckett, 2015, 2018; Harris, 2012; Lewis, Willis, & Franklin, 2015; Macri, 2016; Money, 2017; P. Thomas, 2012).

In Brazil, similar linked forces are at play, limiting access to healthcare. For high-income earners or workers who have private health plans through their employment (Gragnolati, Lindelow, & Couttolenc, 2013, p. 90), the key issue is the cost of services, the amount of co-payment, and the

[16] No upper limit is given in the data source.

coverage provided by the plan. For those who cannot afford private health plans or cannot use them for the type of care they require, the alternative is the Brazilian Universal Health System (Massuda, Hone, Leles, Castro, & Atun, 2018). Waiting lists for treatment are extensive (e.g., for dermatology, see Ribas, 2017; Von Wangenheim & Nunes, 2018) and access to specialist services for regional dwellers requires long journeys to centres in big cities.

Private health insurance take-up in Brazil increased between 2000 and 2014, reaching 24.8% of the population, but has since declined to 22.8% as incomes declined following the recession of 2014. An increasing number of health insurance policies limit coverage for procedures and have reduced reimbursements (Massuda et al., 2018). This trend is mirrored in Australia where, according to the Australian Medical Association (AMA), private health insurance membership for hospital admission has fallen from 50% in 1984 to 47.4% in 2015 and 46.5% in 2017 (AMA, 2018; Briggs, 2017). Indications are that for regional populations in both Australia and Brazil with reduced income levels, their options for accessing healthcare are reducing.

5.4 Availability of Human Resources

The health workforce is an essential resource for the delivery of telehealth services, so it is worth understanding how it is composed and distributed. Comparison of workforce compositions between Australia and Brazil is difficult due to the different job classifications used. Brazil has proportionally fewer numbers of health professionals than Australia, although the difference is not huge. More important is the geographical distribution of the workforce. In each country the medical workforce clusters around their workplaces; in the main part, hospitals, located in larger population centres (Santos et al., 2018; Scheffer, 2018). In Australia, 72% of general practitioners are concentrated in the major cities (Australian Government Department of Health [DoH], 2018). The major employers of specialists and nurses are the big hospitals in Australia's coastal cities. The picture in Brazil is similar, but more differentiated. For instance, the number of surgeons in Brazil varies between 1 and 2.6 surgeons per 1,000 population, with the main concentration occurring in the south and south-eastern states (Alonso et al., 2017).

Uneven distribution of health workforce, particularly specialists, is associated with differential access to health services and facilities for the general population. Australian telehealth service models attempt to reduce patient travel to specialist centres by diverting patients to peripheral facilities, which then host remote consultations. The Brazilian telehealth service model reduces patient travel to specialist centres by retaining patients in primary health facilities, providing advice to local clinicians (described as family doctors) on how to manage conditions. Thereby, the need is reduced for additional administration or nursing time directly linked to a remote consultation. At the primary health level, about 50% of the Brazilian population is served by 42,999 family health teams covering about 73% of the country (Bousquat et al., 2017; Ministério da Saúde, 2018b). It is these teams which are required to manage patients locally within primary care, rather than referring them to specialist centres. In Australia, primary care is provided by private practitioners, operating as general practitioners funded federally through the Medicare Benefits Schedule (MBS) by time- and complexity-based fees. Patients requiring specialist opinions or treatment are referred to the public, state, and federally funded sector, or directly to the private sector. In Brazil, the referral process from primary to specialist is similar, but primary care doctors are salaried staff funded by municipalities. In some states, advice to these family doctors is provided by dedicated advice teams located in large cities, which in turn must be resourced appropriately.

In both Australia and Brazil, the difficulty of managing or treating regional patients is compounding the difficulties of retaining staff. Recruitment to primary care can be difficult. For instance, there were only 5,486 family and community specialists registered in Brazil in 2018. To ameliorate this shortage, the “More Doctors (Mais Médicos) Program” supports family health teams with more than 18,000 additional doctors, mostly from Cuba (Massuda et al., 2018). In regional areas, for those health professionals who work in rural and remote communities, there is limited access to education, training, and ongoing support, as well as lack of peer support.

5.5 Financing Healthcare Services

Australian states fund about 50% of hospital costs. Brazilian states and municipalities contribute fixed percentages of their revenues to fund primary and secondary care. In both systems, the states retain some responsibilities for distributing healthcare resources across their territories.

Total Australian health expenditure as a percentage of GDP was 10.3% in 2016. In 2015–16, the estimated per person expenditure on health averaged $7,096, totalling $154,671 million (Australian Institute of Health and Welfare, 2017a). Total Brazilian health expenditure as a percentage of GDP was 9.1% in 2016. In 2015, the estimated per person expenditure on health averaged AU$1,068, totalling AU$218,453 million at historical exchange rates (Rodrigues, 2015). In practice, due to the higher local purchasing power of the Brazilian currency, these figures are worth about 80% more in real terms (World Health Organisation, 2018), but are still below the per capita health expenditure in Australia. Australian state and territory governments contributed 26.6% of total funding, while Brazilian states and municipalities increased expenditure from 22.3% and 25.5%, to 27.0% and 32.2%, respectively, between 2003 and 2016, although there are signs that this contribution is now falling (Massuda et al., 2018).

About $56 billion of total Australian health expenditure was spent on primary healthcare in 2014–15 (Australian Institute of Health and Welfare, 2016). This is 35% of total health funding, similar to spending on hospital services (39%). Primary healthcare in Brazil is more difficult to quantify due to the different system and expenditure classifications used. In 2014, basic primary health expenditure, including dental care by government, was about 11% of overall expenditure, with emergency and urgent care in primary care accounting for an additional 4%. A conspicuous feature of Brazilian healthcare is the large number of patient transport buses which can be seen around the city hospitals bringing patients from the interior for appointments; one of the fastest growing budget items for federal, state, and municipal expenditure is patient transport, which in 2014 exceeded 0.4% of total health expenditure (about AUD$880 million) (Ministério da Saúde & Fundação Oswaldo Cruz, 2018).

In summary, health expenditure in Brazil is lower than in Australia, and total private sector expenditure accounts for a greater proportion than in Australia. There are three levels of government financing in Brazil instead of two in Australia, and funding of primary health appears lower, although like-for-like comparisons are problematic. Within this broad envelope of healthcare funding, Australian and Brazilian telehealth services draw on funds from state and federal governments for healthcare activity, for servicing incentive payments, and for block funding in the form of grants for research and infrastructure.

5.6 Information and Communications Technology

During the first decade of this century, the need for electronic health records began to dominate national health information agendas. In Australia, a review by the Boston Consulting Group positioned telehealth services as a low-priority item (Boston Consulting Group, 2004). The National Electronic Health Transition Authority (NEHTA) was established in 2005 by the Australian Commonwealth, State, and Territory Governments to develop the foundations for electronic health records, including clinical terminologies and patient and provider identifiers.

The Brazilian Ministry of Health established an eHealth program in 2007 and has an eHealth strategy (Ministerio de Saude, 2016). The strategy recognises some of the similarities between the Australian and Brazilian health contexts and the recognised challenges of constructing an eHealth system in a staged approach. The strategy had aimed to lay the basis for the long-term implementation of eHealth systems and suggested that telehealth services should promote the use of eHealth platforms.

Within both countries, substantial resources ($1.26 billion in the state of Queensland alone) have been devoted to developing electronic health record (EHR) systems. According to the Queensland Audit Office (2018), the stated aim of these investments has been to “build the foundation for accessing and sharing medical records across the health system” (p. 64). Major benefits of these systems are anticipated to be a reduction in adverse drug events and in staff time spent accessing information. No direct benefits from the sharing of medical records were identified by the Queensland Audit Office. In part, such benefits will take many years to realise because these large systems are implemented over a number of years, hospital by hospital. In addition, because these systems were design for use in hospitals, care outside the walls of major hospitals is not directly supported by the access to electronic medical records.

Electronic health information systems in the settings studied have grown in scale, scope, and expense during the same period during which telehealth services have been developing. By 2018, a survey of 1,762 Australian general practitioners found that 87% are completely digital and maintain no paper records (RACGP, 2019). In comparison, an annual survey by the Brazilian Internet Steering Committee (Martinhão, 2017) of health facilities' computer, internet, and electronic health record use found that clinical information was maintained in an electronic format in 33% of public health facilities and in 61% of private health facilities.

Telehealth services and eHealth share a dependence on evolving ICTs. However, eHealth has in the main focused on improving the level of automation and access to information in healthcare, while telehealth services are largely concerned with improving access to care. In Australia, an early agenda of using technology to improve access to healthcare has become dominated by an eHealth agenda which aims at delivering improved quality, efficiency, and safety. For instance, in 2019 the Australian Digital Health Agency, despite having developed a strategy that referred frequently to telehealth services, was unable to fund any initiatives and was instead concentrating on national eHealth systems. The dominance of the eHealth agenda appears not to have been examined in academic research, which largely considers the problems with its implementation and benefits (which are mainly still to be realised).

At the turn of the 20th century, the perception was that care at a distance was limited by the available technology, particularly the ability to transmit information electronically over modern telecommunications infrastructure (National Health Information Management Advisory Council, 2001, p. 19). In Australia, the National Office for the Information Economy (NOIE) argued that "The major impediment to the more widespread use of broadband in the health sector was consistently identified as availability at an affordable price" (National Office for the Information Economy, 2002, p. 4). Access Economics (an Australian consultancy firm) was then commissioned by NOIE in 2003 to write a report on the economic impact of broadband in hospitals. Although the report methodology was unclear, it was calculated that a net benefit of more than $190 million over 10 years would arise from broadband connectivity to large and medium hospitals (Access Economics, 2003, p. 4).

Between 2002 and 2009, the Australian Department of Communications, Information Technology and the Arts (DCITA) administered broadband communications enhancement projects under the Coordinated Communications Infrastructure Fund (CCIF), worth AUS$23 million, and the National Communications Fund (NCF) worth AUS$50 million. Together, these funds supported eight projects (National Broadband Strategy Implementation Group, 2005). By 2010, the health plans of the newly created Local Health Networks (LHNs) (Government of South Australia, 2010, 2011a, 2011b) were able to refer to telehealth services because in the same year another Commonwealth program badged as Digital Regions had provided AUS$2.5 million for the South Australian Digital Telehealth Network (DTN), which installed about 100 new videoconferencing units connected through upgraded Telstra (a major telecommunications company) broadband services (Schrader, 2013).

In an annual randomised survey of 100 health facilities by the Brazilian Internet Steering Committee (Martinhão, 2017), connectivity to the internet and limited computing infrastructure also appeared as key problems. Table 16 shows that, of the faculties surveyed, 35 had download speeds between 1 Mbps and 10 Mbps and 24 did not know the connection speed.

Table 16.
Brazilian Health Facilities' Internet Download Speeds

Brazilian health facilities' Internet download speeds (*N* = 100)						
> 100 Mbps	10 Mbps to 100 Mbps	1 Mbps to 10 Mbps	256 Kbps to 1 Mbps	< 256 Kbps	Do not know	No reply
6	21	35	10	4	24	1

Data from the same survey show that about 80% of health facilities in Brazil have an internet connection, but this varies by state (Sao Paulo, 96%; Santa Caterina, 98%; Rio Grande do Sul, 85%). In Santa Catarina, the vast majority of primary health facilities are connected to the internet using ADSL technology with speeds less than 10 Mbps.

5.7 The Development of Telehealth Services

In Australia, telehealth services are largely promoted by federal and state governments. The federal government funds telehealth services under the MBS. States fund consultations within their public hospital systems using activity-based funding frameworks. Primary healthcare networks do not fund telehealth services directly but are investing in infrastructure and support for general practitioners. At the state level, Queensland Health (the state department of health) was entirely responsible for telehealth services in that state until many of its functions were devolved to 17 regional hospital and health services in 2012. Queensland Health retained overall responsibility for ICT and telehealth service infrastructure following devolution, and regional services now operate their own telehealth services for outpatients and hospital inpatients using this infrastructure. In South Australia, the Department of Health was devolved into Local Health Networks in 2008, and one of these, the Country Health Local Health Network, became responsible for outpatients and hospital inpatients' telehealth services across the state. The Australian states studied, Queensland and South Australia, run internal state health department telehealth service video networks which are now gradually opening up to use by primary care practitioners. The Queensland system is by far the largest and oldest dedicated telehealth system in Australia.

In Brazil, telehealth services are provided by federal and state governments. Firstly, a national educational network operated by higher education institutions supports national discussion groups (Special Interest Groups [SIGs]) and the online open health university (UNA-SUS). Secondly, state-based telehealth centres are funded by federal and, in some cases, state grants. Telehealth centres operate in Rio Grande do Sul and Santa Catarina, and one telehealth centre covers the city of Sao Paulo while a second covers the state.

Telehealth centres in Brazil draw on a range of federal, state, and philanthropic funding to provide telehealth services into each municipality. The federal, state, and municipal governments all provide hospital and primary health services, although the majority of services are run by municipalities. In general, municipalities do not fund, or are unable to fund, telehealth services directly, and rely on federal funding, sometimes with state support.

Australia and Brazil now have well-developed but contrasting telehealth services. In both countries, telehealth services grew out of the need to support regional health professionals. In Australia, telehealth services are almost synonymous with videoconferencing-based consultations between hospital-based specialists and patients in regional areas who present as hospital in- or out-patients. Initially, educational use dominated, followed by administrative and an increasing proportion of clinical use (Kennedy, Blignault, Hornsby, & Yellowlees, 2001). Subsequently, as a proportion, educational use has declined while clinical use has increased. Telephone-based services are focused on providing advice directly to the public. Asynchronous services for regional populations have been slow to develop or exist under the banner of eHealth services providing diagnostic information between clinicians.

In Brazil, telehealth services explicitly aim to support primary healthcare of patients in any location through synchronous and asynchronous advice services. Specialists in primary care are based in urban areas and practitioners manage patients from family health centres and basic health clinics. Videoconferencing has not been the technical medium of choice. Asynchronous services support exchange of diagnostic information between health professionals.

5.7.1 Australia

Telehealth service development in Australia can be traced through several distinct phases (see Figure 16). These phases can be roughly classified into:

- Pilot projects in several states aiming at improving access to healthcare for regional populations (1995 to 2000);
- Development of a national plan for telehealth services (1995 to 2000) by the Australian and New Zealand Telehealth Committee, which was then disbanded;
- Building communications infrastructure able to support telehealth services (2000 to 2009);
- Prioritisation of health information systems over telehealth service development (2002 ongoing);
- National accreditation of health practitioners from 2010 (DoH; Health Workforce Division, 2019);
- Initiation of the National Broadband Network (NBN) and national telehealth pilot projects using the NBN (2011 to 2015);
- Creation of funding items under the MBS for a limited range of consultations (2011 ongoing); and
- Growth of state-funded telehealth services (2000 ongoing) in all states.

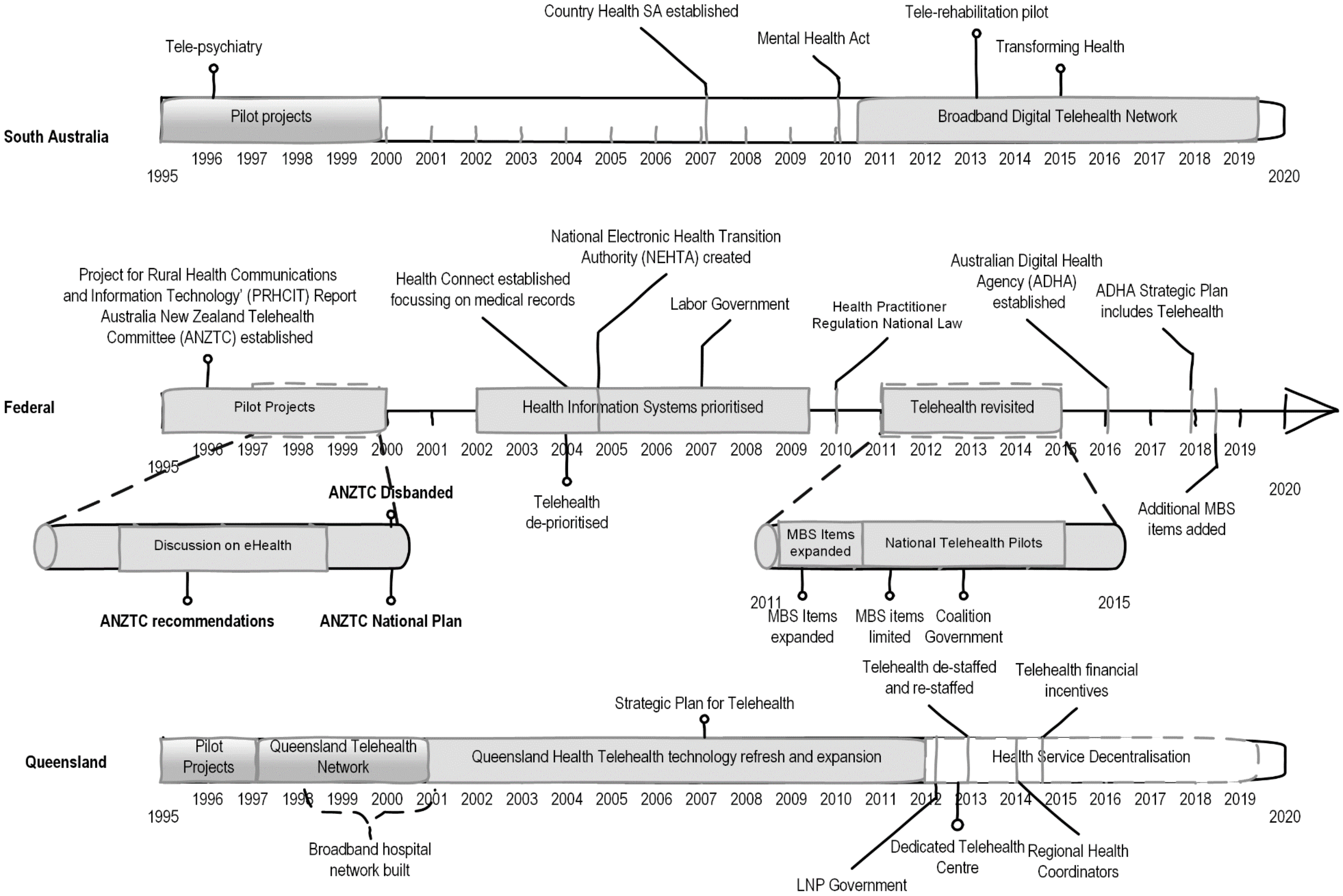


Figure 16. **Development of Australian telehealth services.**

Each phase in the development of Australian telehealth services is marked by commencement of programs, key reports, recommendations, changes in legislation, or changes in governments, which are described in the following paragraphs.

In 1995, the Australian Federal Department of Human Services and Health produced a report known as the Project for Rural Health Communications and Information Technology. That report argued for greater support for regional health professionals using technology (Australian Rural Health Research Institute, 1996). Subsequently, support for telehealth services has been ambiguous at the federal government level and, at the beginning of this century, the Australian federal government was criticised for:

> [taking a] back seat in the telehealth process, and is perhaps best described as a rather cold, distant parent that is uninterested in its telehealth baby. As such, it has not adequately resourced the National Telehealth Committee, has not provided any support despite requests for the development of professional national bodies in telehealth, has made few attempts to integrate the various state programs, and has pursued a deliberately slow policy on the creation of MBS item numbers for reimbursement for telehealth. (Yellowlees, 2001, p. S2:30)

As early as 1998, a report commissioned by the Australian federal Department of Industry Science and Technology warned that the lack of a national approach to telemedicine meant that:

> Telemedicine is currently a fragmented, immature industry in Australia. If it is to develop and to influence the delivery of health care services in Australia, and to live up to its potential, it will need to be integrated with mainstream IT in health care. (J. Mitchell, 1998, p. 5)

In 2001, the Australian and New Zealand Telehealth Committee developed a national plan which called for the following: promote telehealth services within the health workforce; encourage greater consumer involvement; establish predictable funding; develop clinical, national, and international standards; and respond to gaps in the telecommunications infrastructure (summarised from Australian National Telehealth Committee, 2002). Surprisingly, later in 2001, this committee was disbanded (National Health Information Management Advisory Council, 2001). In 2009, the National Health and Hospitals Reform Commission made copious recommendations to fund telehealth services, such as "email, telephone, telehealth (e.g. video conference) – that do not involve physical presence of patient. Payment for these services may be part of episodic payment or grant payments" (Australian Government Department of Health and Ageing [DoHA], 2009, sec. 4.3.1). Subsequently, a limited number of videoconferencing-based services were funded. Not until 2011 did a replacement body emerge in the shape of the ACRRM National Telehealth Advisory Committee which produced a standards framework (ACRRM, 2012).

In 2007, a new Australian government promised to build the National Broadband Network (NBN) based on an optical fibre telecommunications network. The NBN was planned to provide broadband access to 93% of the Australian population at 100 Mbit/s, with rural areas to be provided broadband access through fixed wireless and satellite. Construction began in Tasmania in 2010 and is continuing into 2020. In order to establish the potential of telehealth services on the NBN, the DoHA, in cooperation with the Department of Broadband Communications and the Arts, initiated a AUS$20.6 million NBN Telehealth Pilots Program (Bulletpoint, 2013; DoHA, 2012a) in 2012. Nine projects were established across the country where early rollout of the NBN was anticipated. Projects aimed at developing and delivering telehealth services to broadband-enabled homes with a focus on aged, palliative, or cancer care services, including advance care planning. Reports from these projects have not been made publicly available, although several articles have been published (Al Quran, Khader, Ellauzi, & Shdaifat, 2015; Banbury et al., 2014; Bradford, Young, Armfield, Herbert, & Smith, 2014; Celler, 2015, 2018; Collier et al., 2016; Crotty et al., 2014; Maeder, Poultney, Morgan, & Lippiatt, 2015; Tieman, Morgan, Swetenham, To, & Currow, 2014).

The Australian Government (federally) currently (in 2020) supports a limited range of payments to specialists for video-based consultations as part of the MBS and public telephone advice services. Between 2012 and 2019, telehealth MBS items have been subject to only minor adjustments (DoH, 2019a) but, as Figure 17 demonstrates, use of these items has steadily increased.

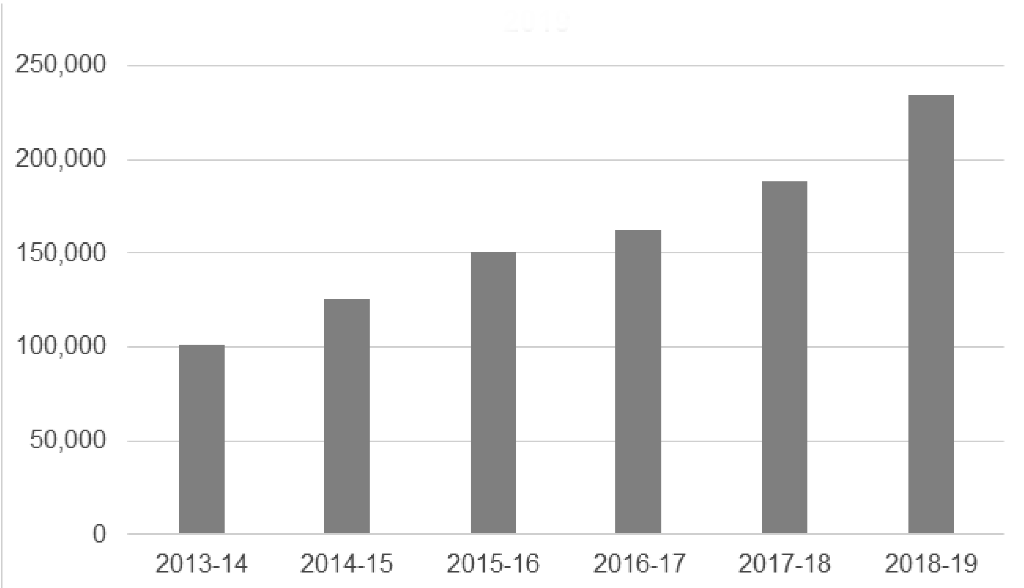


Figure 17. **Australian MBS usage of/occasions of telehealth service, 2013 to 2019 (Australian Department of Human Services, 2019).**

In 2018, the Australian Digital Health Agency published a strategic plan for digital health which called for “widening access to telehealth services, especially in rural and remote Australia” (p. 6) in its strategic plan, although it remains to be seen what concrete actions will be taken.

5.7.2 Brazil

Telehealth service development in Brazil can be traced through several distinct phases (see Figure 18). These phases can be roughly classified into:

- Pilot projects in several states aiming at improving access to healthcare for regional populations (2000 to 2006);
- Initiation of the Brazilian Telehealth Network by the Brazilian Ministry of Health (2007 ongoing);
- Creation of the University Telemedicine Network (RUTE) and the Open Health University (2007 ongoing);
- Regulations from the Brazilian Federal Medical Council (CFM) restrict telehealth services to the provision of second opinion services with no direct patient consultations permitted; Tele-diagnostic services are permitted with some restrictions;
- Expansion of the Brazilian Telehealth Program to include telehealth centres in the majority of states (2012 ongoing); and
- Many states enacting regulations requiring primary care doctors to consult specialists prior to referral of patients using tele-advice services operating from state-based telehealth centres (2015 ongoing).

Each phase in the development of Brazilian telehealth services has been marked by commencement of programs, key reports, recommendations, changes in legislation, or changes in governments, which are described in the following paragraphs.

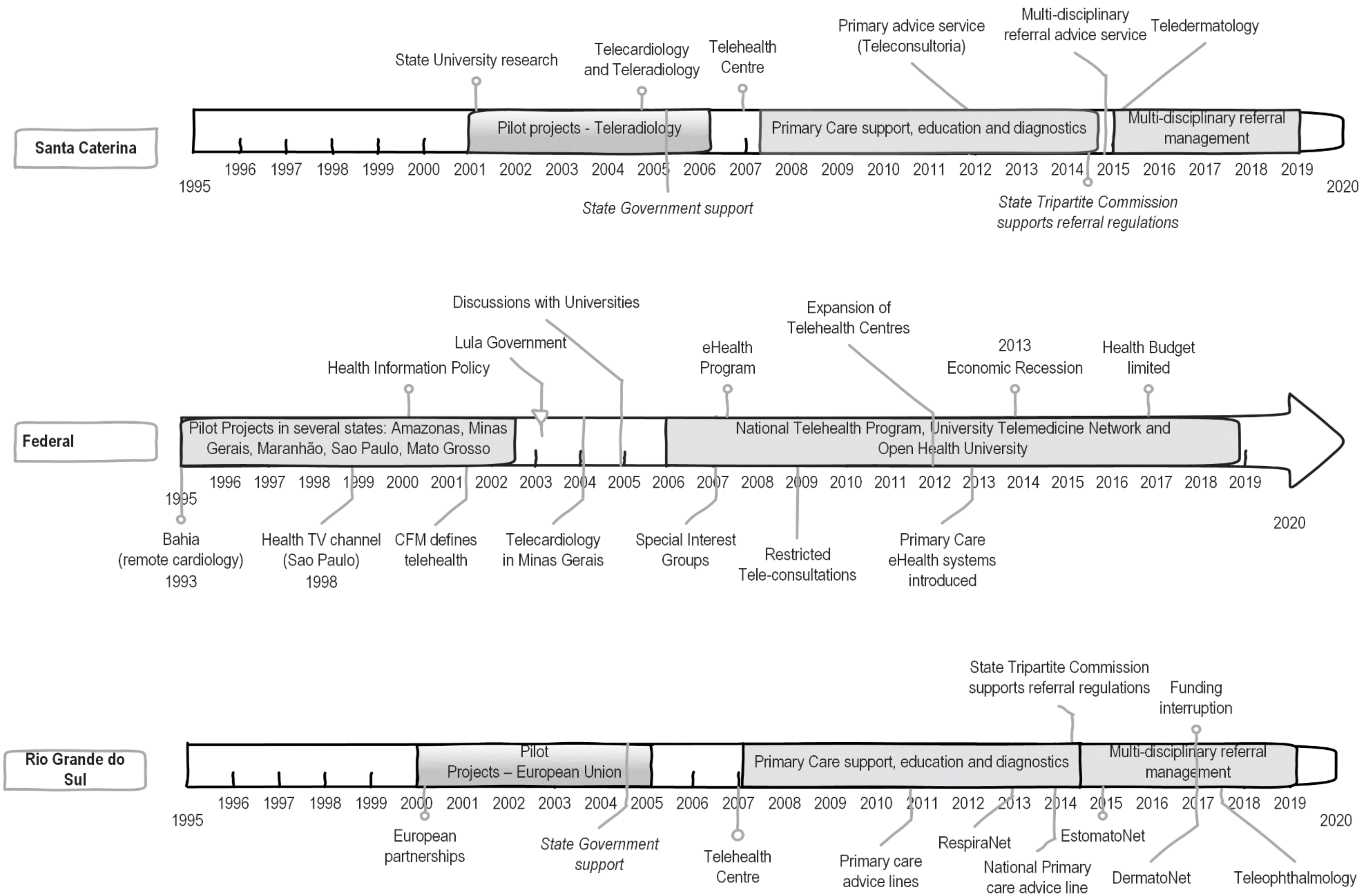


Figure 18. **Development of Brazilian telehealth services.**

Following some initial pilot projects in the states of Amazonas, Belo Horizonte, Minas Gerais, Maranhão, Sao Paulo, Mato Grosso, Santa Catarina (tele-radiology), and Rio Grande do Sul (Medeiros, 2009), the Brazilian Ministry of Health provided $R13 million of funding to nine universities (subsequently increasing to 12 universities). In 2007, nine Telehealth Centres were established as part of a National Telehealth Program (renamed in 2011 to the Brazilian Telehealth Network) (Messina & Filho, 2013; Ministério da Saúde, 2011a; A. Silva, 2017) for teleconsulting, tele-diagnosis, and provision of second opinions. In the Brazilian context, teleconsultation does not generally take place in real time or use videoconferencing; rather, it is an advice service available online to all health workers for medical, management, and patient referral matters.

Brazilian telehealth services have the following components (Harzheim, Katz, Ferri, Fernandes, & Barbosa, 2018):

- Inter-professional teleconsulting – responding to questions from primary care workers about a clinical case, procedure, or decision;
- Tele-diagnosis – reporting for cardiology and radiology;
- Tele-education – professional training for health professionals and primary care workers; and
- Second opinions – generation of good-quality, evidence-based practice useful to primary care workers.

The initial phase of these services was driven by educational objectives. By 2010, the RUTE project had points of presence in 19 federal and state university hospitals (Silva & Moraes, 2012, p. 1215). As of 2018, the National Telehealth University Network had 133 points of presence in all 27 Brazilian states, although work continues to improve the physical connectivity of the network in many states (RNP, 2018). SIGs use this network to hold regular discussions using videoconferencing specialities involving both academic staff and students. RUTE now supports more than 57 SIGs in many medical specialities and other topics, with 3,176 participants in 2016 (Lima Verde Brito, 2016).

During this period (2007-12) the Virtual Health Library (BVS) and the Virtual Health Campus (CVSP) online resources for an open university in health (UNA-SUS) were developed to support the family health program (Haddad, 2012). UNA-SUS is a collaborative network of 25 tertiary education institutions. Courses are designed and updated to be relevant to solving current health issues. Students can choose courses based on their experience and interests and can enrol at any time in their careers. Educational material is available as text, audio, video, or e-books on computers or mobile devices (Ministério da Saúde, 2018a).

The Brazilian federal Government provides block funding for state-based telehealth services supporting primary care and makes some volume-based payments to municipalities for diagnostic services. In 2011, a tripartite commission comprising representatives from Federal Government, the States, and Municipal governments was established to manage the National Telehealth Program (Ministério da Saúde, 2011a). Several pieces of federal government legislation required Telehealth centres to:

- be responsible for teleconsultation services, tele-diagnostics, and second opinion services;
- create and maintain a team of specialists to respond to issues raised in teleconsultations;
- promote the training of specialists providing teleconsultations;
- provide annual activity reports to the Ministry of Health;
- comply with and support interoperability of systems (separate legislation; Ministério da Saúde, 2011b) and to establish protocols to be used to implement interoperability between electronic health information systems across the public and private health sectors;
- promote the development of protocols which support the triage of patients requiring referrals to secondary and tertiary care centres, or emergency treatment;
- evaluate the performance of teleconsultation services in order to improve the experience of patients; and
- develop education programs relevant to regional needs and national health priorities.

While a formal national strategy document for Brazilian telehealth services is lacking, a significant publication, A Telehealth Manual for Primary Healthcare (Ministério da Saúde & Universidade Federal do Rio Grande do Sul, 2012), provides a comprehensive guide to the organisation, activities, and referral processes for teleconsultations and management of telehealth centres. Some states incorporate telehealth services into state healthcare strategies (Governo do Estado do Rio Grande do Sul, Secretaria da Saúde, 2017, p. 88), but currently (in 2020) the national picture is confused. There was significant federal support for the Brazilian Telehealth Program until 2015 (Haddad, Silva, Monteiro, Guedes, & Figueiredo, 2016), but that support diminished with changes of government. According to Maldonado and colleagues (2016),

> … organisation and regulation of telemedicine in Brazil is generally fragmented, characterised by diverse laws, decrees, regulations, standards, instructions, protocols, resolutions and codes from different organisations with distinct interests. (Maldonado, Marques, & Cruz, 2016, p. S8; author's translation)

Brazilian telehealth is regulated by the CFM (see Section 6.3.1). The regulations the CFM provides effectively limit the practice of telehealth because direct doctor-to-patient teleconsultations are prohibited, although these regulations do not have the full status of government legislation

(Botrugno, Goldim, & Fernandes, 2019). Other professional bodies exist, for instance, psychology and nursing, which issue regulations for their members. The CFM first defined telehealth in Brazil in 2002 (CFM, 2002). Subsequently, several regulatory instruments adjusted the scope of application of telehealth technologies, including the prohibition of direct consultations with patients using technology such as videoconferencing, in 2009 (CFM, 2009). More recently, some of these restrictions have been liberalised with the use of messaging technologies between doctors becoming allowable. Recent reform proposals in 2018 from the CFM for more extensive liberalisation of the use of communications technologies in patient care have proved controversial.

Two of the Brazilian states studied, Santa Catarina and Rio Grande do Sul, run high-volume synchronous and asynchronous advice, education, and diagnostic telehealth services for primary care practitioners from large telehealth centres funded by a mix of federal, state, research, and philanthropic health organisations. Sao Paulo, the most populous and richest state in Brazil with a large urban centre, has been late in developing telehealth centres and these have yet to achieve large volumes. By 2018, there were 26 telehealth centres active in 24 out of the 27 Brazilian states. Many telehealth centres offer specialist services: radiology reporting (4), cardiology and electrocardiograms (8), tele-ophthalmology (2), tele-stomatology (3), tele-respiratory (2), and tele-dermatology (3). All offered teleconsultation and education services and were connected to the RUTE network; eight centres were active in creating formative second opinions; five centres were linking telehealth services to a triaging process to reduce waiting lists. Telehealth centres providing triaging services for referrals to specialist waiting lists have experienced significant growth in activity (Figure 19).

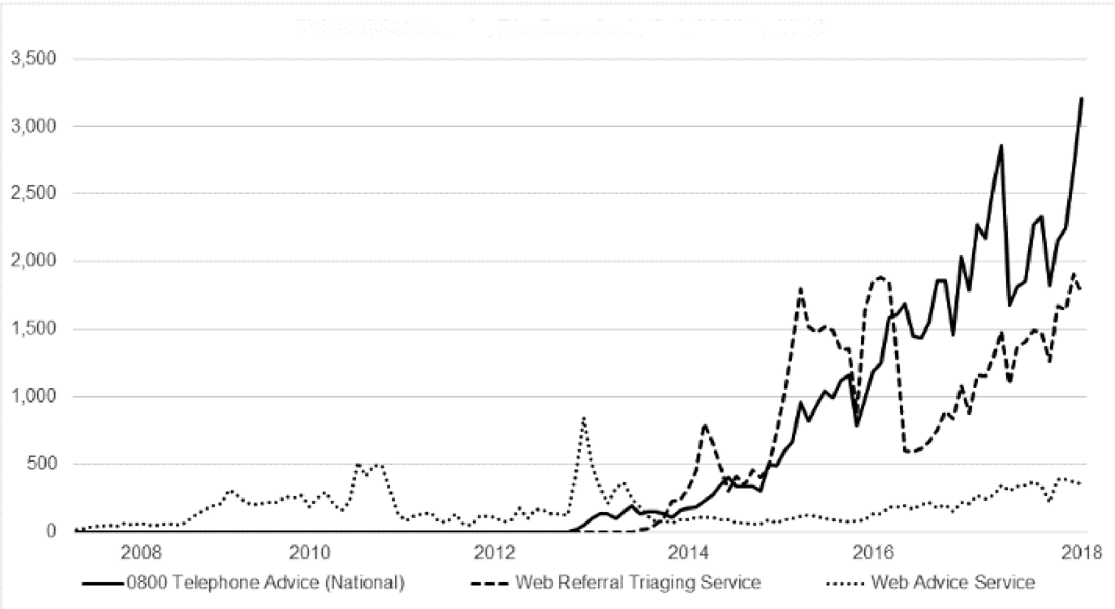


Figure 19. **Tele-advice events, Rio Grande do Sul, 2008 to 2018 (Adapted from A. Taylor, Calvo, Meurer, & Von Wangenheim, 2018).**

In some states, “specialist” telehealth services have developed, such as tele-ultrasound in Espírito Santo (Messina & Filho, 2013), paediatric cardiology in northeast Brazil (Mattos et al., 2015), paediatric radiology in Rio de Janeiro and Porto Alegre (Hospital Moinhos de Vento, 2018); and stomatherapy in Rio de Janeiro (D’Souza, Hustig, & Montgomery, 2001; Monteiro, 2010; Monteiro, & Neves, 2015).

Greatest growth in activity has been in national telephone advice via a 0800 free call number provided to primary health doctors (except for a dip in 2017 when federal funding was temporality withdrawn). An online web-based service to primary health doctors in Rio Grande do Sul providing triaging advice increased its activity since regulations were introduced in 2015. These regulations require primary health doctors to request advice from the service as part of the triaging process for patient referral to some specialists with long waiting lists.

5.8 Two States, Two Stories

The Brazilian state of Santa Caterina and the Australian state of Queensland host some of the most developed telehealth services in their respective countries. The following two sections provide a brief historical overview of the development of telehealth services and their current usage in each state.

5.8.1 Santa Catarina

Santa Catarina is a southern Brazilian state with an estimated population of 6,727,148 (Brazilian Institute of Geography and Statistics, 2016) in a land area of 95,703 km sq. The most distant city is located 783 km from the capital. There are two major population centres: Florianópolis, situated on Santa Catarina Island (population 880,000 in 2010), and Joinville in the north (population 540,000 in 2010) (Brazilian Institute of Geography and Statistics, 2016). These cities also host the majority of higher acute care facilities.

Telehealth services in Santa Catarina developed from a research project at the Federal University of Santa Catarina (UFSC) which developed networked systems for transmitting and storing radiology images (Patient Archiving and Imaging Systems – PACS) between 2001 and 2006. Systems were developed to work over the low network bandwidths available at the time, using web-based technologies. The state government funded initial implementation of a tele-diagnostic network in 2005 to four municipalities, including for electrocardiograms and radiology (Maia, Wangenheim, & Nobre, 2006; Nobre & Von Wangenheim, 2012). The basis for telehealth services in Santa Catarina was the purchase by the health department of medical resonance equipment for several hospitals and digital electrocardiogram equipment for primary healthcare centres (Maia et al., 2006) which were linked to a network using a converter developed by UFSC. This step marked the beginning of a long period of collaboration between the state government and the university. In

2007, the Santa Catarina Telehealth Centre joined the RUTE network, connecting six universities in the state. By 2018, telehealth services were available in all 295 municipalities of the state.

Tele-cardiology examinations grew to 200,000 exams per year in 2016 (Giuliano, Barcellos, Von Wangenheim, & Sergio, 2012), significantly reducing waiting times and patient travel costs (Piccoli, Amorim, Wagner, & Nunes, 2015; Ribas, 2017). Figure 20 shows the number of diagnostic exams in radiology, tele-cardiology, and pathology for the years from 2014 to 2017. The total number of examinations across eight modalities managed by the Santa Catarina telehealth service network has increased from 531 exams in 2005 to 929,459 exams in 2016 across eight modalities (TelessaudeSC, 2017).

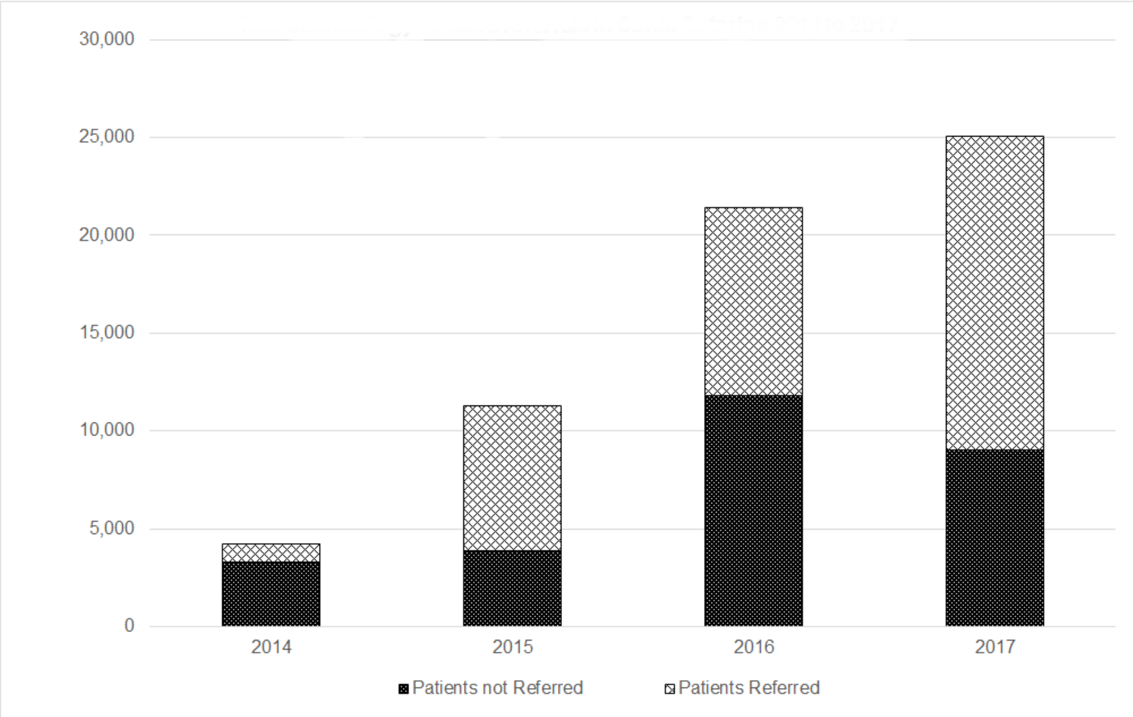


Figure 20. **Tele-diagnostic examinations in Santa Catarina, 2014 to 2017 (Adapted from A. Taylor et al., 2018).**

An online advice service has been available since 2012. Prior to 2015 fewer than 4,000 responses were recorded annually to questions posed by users on this service. In 2015, it became compulsory for primary healthcare facilities to use the teleconsultation system when wishing to refer patients to secondary or tertiary care for dermatology, orthopaedics, rheumatology, endocrinology, wounds, mental health, ophthalmology, nutrition, and audiology services. Figure 21 shows the impact of this change in policy on patient referrals for dermatology treatment, which led to large numbers of patients being managed at the primary care level, instead of travelling to see a specialist.

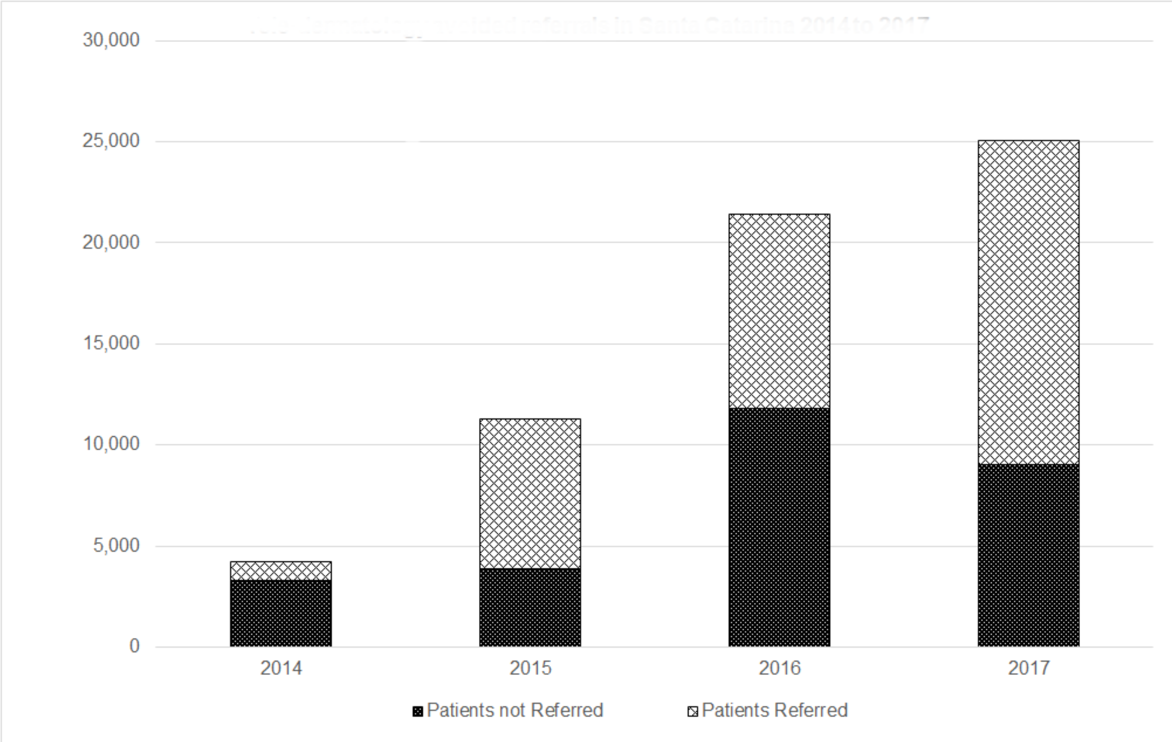


Figure 21. **Tele-dermatology avoided referrals in Santa Catarina 2014 to 2017 (Adapted from A. Taylor et al., 2018).**

In specialities other than dermatology, more than 15,000 teleconsultations were requested during 2016 in Santa Catarina (Savaris & Von Wangenheim, 2017, p. 46). The Santa Catarina Telehealth Centre (TelessaudeSC, 2019) is based at two locations, the Federal University of Santa Catarina (UFSC) and the State Health Secretariat. A substantial staff (more than 20, full- and part-time, including postgraduate students) manage teleconsultations, publicity, reporting of diagnostic imaging, and administration. A large amount of medical reporting, including electrocardiograms, is done remotely by doctors. The Cyclops research group and the Laboratory of Telemedicine (Federal University of Santa Catarina, 2019) provide technical support, development research, and maintenance of user and technical documentation.

5.8.2 Queensland

Queensland is less centralised than other Australian states, covering a total land area of 1,850 square kilometres with a population of 4.78 million people in a land area stretching 2,500 km from north to south and 1,800 km from east to west. At June 2015, the population of Brisbane (the state capital city) was 2.31 million people, which accounted for 48% of the state's total population, followed by the Gold Coast with 570,000 people, Cairns with 67,000 people, and Townsville with 52,000 people (Australian Bureau of Statistics, 2014). These cities also host the majority of higher acute care facilities.

Telehealth services commenced with educational use of videoconferencing to support critical care, alcohol and drug education, general medical education, and support of rural and remote practitioners (Watson, Gasser, Blignault, & Collins, 2001, p. 117). Grand rounds using videoconferencing connected regional facilities to a presentation broadcast from Brisbane over videoconferencing to explore best practice in a range of clinical disciplines (McCrossin, 2001).

In 1996 the Queensland Telehealth Network (QTN) was established with funding from Queensland Health (Kennedy et al., 2001). As in South Australia, the first major use of videoconferencing was for mental health services (Kennedy & Yellowlees, 2000; Trott & Blignault, 1998). Other clinical uses followed, including foetal ultrasound (Chan et al., 1999), intensive care (Bailey, Bryant, Hayes, Jensen, & Whiting, 1998), neonatology, obstetrics and echocardiology (Whitehall, Bliganault, French, Carson, & Patole, 1998), genetics counselling (Gattas, Macmillan, Meinecke, Loane, & Wootton, 2001, p. 122), ophthalmology (Blackwell, Kelly, & Lenton, 1997; Rosengren, Blackwell, Kelly, Lenton, & Glastonbury, 1998), pathology (Faogoli, 2001, p. 127) and paediatrics (A. Smith et al., 2016, p. 136). Two early projects laid the foundations for the future of telehealth services in Queensland: firstly, an intensive care unit (ICU) telemedicine project based at the Royal Brisbane Hospital (Crowe & McDonald, 1997), and secondly, a remote foetal ultrasound diagnosis initiative by the Kirwin Hospital in Townsville (Chan, Soong, Watson, & Whitehall, 2001; Chan et al., 2002, 1999). These experiences informed the development of the Queensland Health Service Delivery Network, implemented in 2003, which set out to renew the Queensland Health telecommunications system by deploying a broadband network to reduce the costs of carrying video traffic for telehealth services, to increase quality, and to carry key applications, such as radiology imaging (Taylor, 1998). While implementation of the Service Delivery Network was valuable for larger health facilities, it did nothing to help rural and remote sites. Fortunately, a succession of federal funding initiatives improved telecommunications infrastructure (Taylor, 2005), and enabled expansion of high-quality videoconferencing to smaller regional facilities (Carroll, Anderson, Oliver, & Sim, 2011; Mathews, Elcock, & Furyk, 2008; B. Russell & Taylor, 2011).

According to Kyle, Aitken, Elcock, and Barneveld (2012), “use of telehealth for an expanded range of patient referrals to the retrieval service was beneficial in either changing the decisions of medical coordinators, or confirming the decisions already made” (p. 150). By 2014, 109 facilities were equipped to participate in consultations supporting stabilisation and aeromedical retrieval of critical patients (Elcock, 2008). During this period a dedicated telehealth centre was established at the Princess Alexandra Hospital, Brisbane to assist telehealth services across the entire hospital, concentrating on geriatrics, cardiology, dermatology, and endocrinology. Initially,

> the policy of the centre was to encourage the hospital clinicians to conduct their telehealth activities in the centre. This was mainly intended to provide the clinicians with confidence to

include telehealth in their routine practice ... staff encouraged the development of services appropriate to clinical need of various departments of the hospital. (Martin-Khan et al., 2015, p. 11)

Figure 22 shows that the use of telehealth services in Queensland has been increasing steadily for many years. In the year 2017 - 2018, there were 94,788 non-admitted patient events, 23,808 mental health consultations, and 10,531 emergency department consultations.

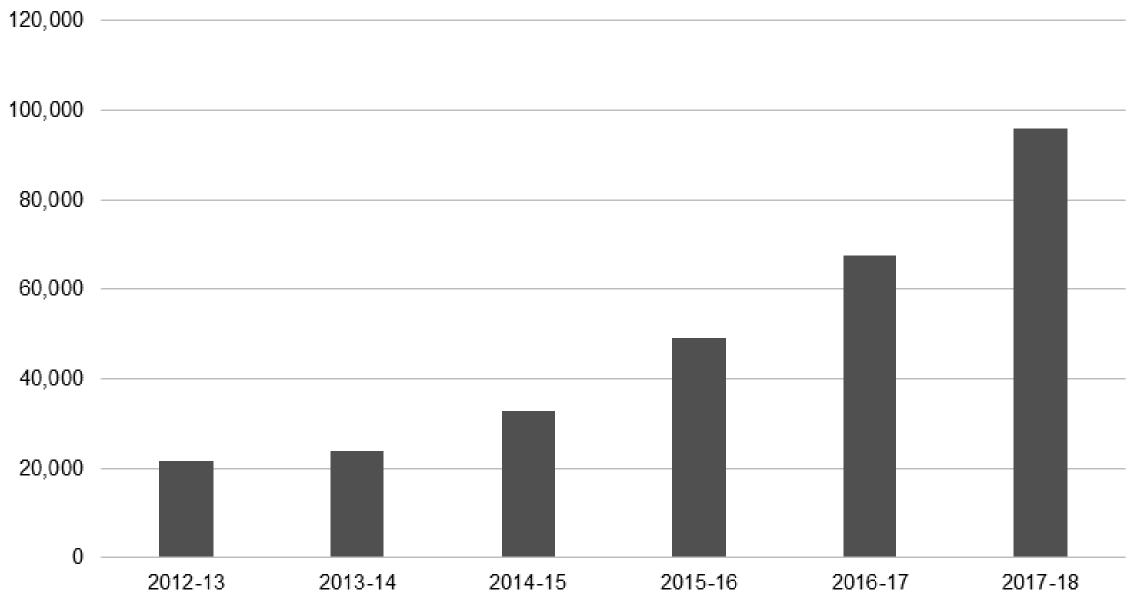


Figure 22. **Queensland Health non-admitted patient telehealth services events, 2012 to 2018 (Adapted from Gray, 2019).**

5.9 Summary

The provision of universal healthcare is a fundamental principle of the Australian and Brazilian healthcare systems. In practice, health service provision is defined by state boundaries, regional catchments, municipal boundaries, or hospital localities. In both countries, healthcare is decentralised, particularly in Brazil, which has devolved healthcare to a large number of municipalities.

Access to care in Australia and Brazil is in part determined by residence. Inhabitants of highly populated costal and metropolitan areas have greater access than regional or rural inhabitants. The affordability of private health insurance is also a factor limiting timely access to care. The uneven distribution of health workforce, particularly specialists, who mainly work in metropolitan areas, is associated with differential access to health services and facilities for the general population.

Per capita health expenditure in Brazil is lower than in Australia, and private sector expenditure accounts for a greater proportion in Brazil than in Australia. This places particular limitations on the ability of patients to access the Brazilian public health system. The comparatively lower level of health expenditure in Brazil has delayed the growth in the use of ICT in healthcare, including the use of electronic medical records.

In both countries, the development of telehealth services has been marked by periods of strong federal or state government support, which has not always been sustained. Telehealth services in both countries support regional health professionals. In Australia, telehealth services are almost synonymous with videoconferencing-based consultations between hospital-based specialists and patients in regional areas. In Brazil, telehealth services explicitly aim at supporting primary healthcare of patients in any location through synchronous and asynchronous advice services between specialists and practitioners, managing patients in family health centres and basic health clinics.

The most advanced states in terms of service volume and use by a variety of clinical specialities are Queensland in Australia, focussing on videoconferencing consultations within the public hospital system; and Santa Catarina in Brazil, where the emphasis has been on diagnostic services, advice services, and education for primary healthcare.

The following chapter, Chapter 6, reports on themes and issues raised by participants, technologists, managers, and health professionals delivering telehealth services in the Australian states of Queensland and South Australia; and the Brazilian states of Santa Catarina, Sao Paulo, and Rio Grande do Sul.

6 FINDINGS: PART 2, SEPARATING AND RECONNECTING CARE

Over the last 20 years, changes in the organisational and professional contexts of healthcare In Australia and Brazil, outlined in Chapter 5, have shaped the provision of telehealth services and in turn have been shaped by the development of telehealth services as a modality of care. Ways in which contexts shape telehealth services, as reported by participants, are described in this chapter.

The presentation of these results is based on the key components of my conceptual model of enquiry developed in Chapter 4. My original model highlighted the introduction of a telehealth intervention into organisational and professional contexts, and the roles of control, relationships, trust, risks, and codes in influencing the outcomes of an intervention. However, analysis of my results and the resulting themes which have been identified have led to conceptual changes in my understanding of how telehealth services interact with and change contexts. Firstly, I consider participant views on the influence of organisational contexts on telehealth services. Secondly, I present the conflicts in professional contexts which were identified by participants, and lastly, four themes or processes which influence the use of telehealth services derived from analysis of participant interviews are explored, namely:

a) Legitimisation of telehealth practices through the explicit and implicit codes employed by organisations or professions, specifically the rules, norms, and values for controlling and distributing resources for telehealth services;
b) Changing professional behaviour to accommodate healthcare activities separated by distance;
c) Building or re-building relationships between organisations and individuals during the adoption of telehealth services; and
d) Providing the resources to support separated healthcare activities including infrastructure, human resources, education, and funding.

The views of participants in Australia and Brazil on these interactions between contexts and telehealth services and the extent to which reconnected care using telehealth services has become routine, embedded, or normalised within reconstituted contexts, are reported in this chapter. Figure 23 illustrates the chapter's organisation.

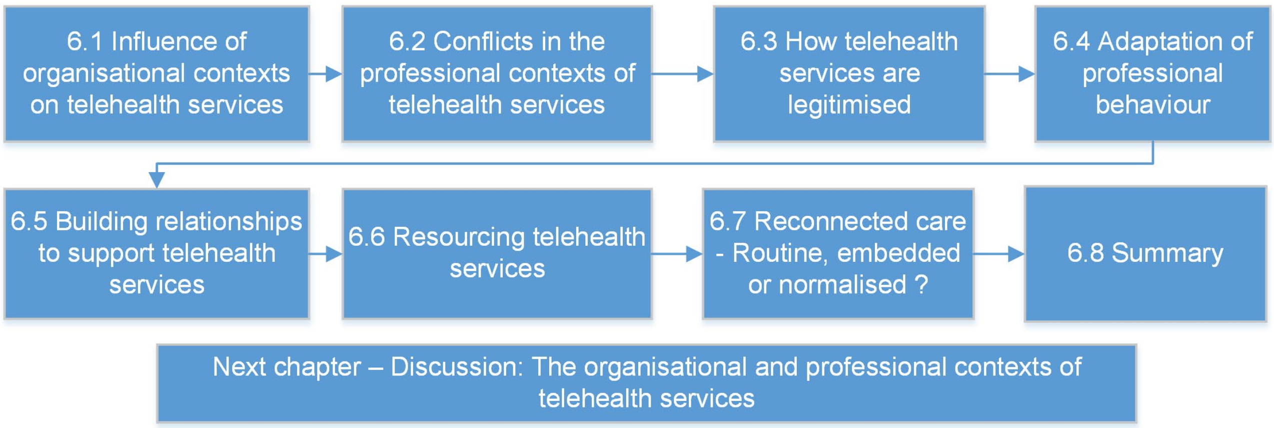


Figure 23. **Organisation of Chapter 6.**

6.1 Influence of Organisational Contexts on Telehealth Services

This section explores organisational contexts and how these contexts influence, and are influenced, during the development of telehealth services. The subsequent section examines professional contexts. A number of themes (see Appendix O) relevant to the influence of organisational contexts on telehealth services emerged from participant interviews. Among these influences are organisational priorities, the organisational structures used to distribute healthcare, the difficulties of accessing healthcare, distributing health information, and the boundaries placed on services.

6.1.1 Setting healthcare priorities

Healthcare priorities are derived from government policies, which in turn depend on political support. We have seen how in Brazil, from 2006 until 2015, there was significant federal support for the Brazilian Telehealth Program (Haddad et al., 2016). Subsequently, that support fell away when a change of government led to the replacement of Ministry of Health staff and to changes in health policies. One manager observed, "*when the government changed from Lula*[17] *to Dilma*[18]*, they completely changed the health department … for example the person that became the coordinator for primary care prohibited mention of the previous coordinator's name*" (p0151-Br) and currently the turnover of personnel in the Ministry of Health is such that "*the director can change three or four times. So each time this happens we have to go to Brasilia* (the capital) *and explain what we do* (in telehealth)" (p0151-Br).

Political decisions have influenced the resourcing of telehealth services in Australia and Brazil. In 2011, austerity measures in Queensland resulted in "*a major cost cutting phase … so as soon as*

[17] Luiz Inácio Lula da Silva, popularly known as Lula, was President of Brazil from 2003 to 2010.
[18] Dilma Vana Rousseff was president of Brazil from 2011 until 2016.

you do anything … deemed to be an added workload for them we get knocked back" (p0032-Au). In another Queensland hospital, "*the cuts came in and it all got decimated, for a while tele-health was at stand-still. … There was no new initiative until 2014*" (p0064-Au). Brazilian telehealth centre workers felt that the impact of austerity measures "*is so great that Telehealth is just another service that will be dismantled and to fight, you will fight for other things … in the context that we live today, that is a threat to the system*" (p0135-Br). Health professionals and managers recognised the importance of gaining political support for the resources they need and have learnt to attract political attention when bidding for resources. A South Australian clinician knew that:

> *the election was new wins. Yes state elections in February. So everybody knew that we had to have the project up and running this year … the minister liked it so he understood it. He liked it and he kept talking about it.* (p0011-Au)

The need to maintain political support for recurring funding was most acute following a change in governments. A Brazilian telehealth centre explained that they invited the new health minister to visit and discuss: "*well, the situation we have here is this, but we need the agreement that was signed last year with the previous government to be maintained. He saw that it was viable and had outcomes and said 'OK let's play'*" (p0145-Br).

A greater number of Brazilian telehealth service management and telehealth coordinators (n = 42 participants) expressed concerns about political issues than Australian participants (n = 17) (statistically significant using a two-tailed Z-test, N = 135, $p < 0.01$). For instance, a Brazilian telehealth service which could track patient referrals thereby supported wider health reforms such as "*who receives priority for the referral for some hospital and so on. And with the telemedicine we could document all of these things"* (p0137-Br). Existence of a transparent patient tracking service meant that politically motivated favouritism for the referral of patients from certain municipalities could be easily exposed. Also of concern to six of the 51 Brazilian participants was the need to appoint competent management to state and municipal health services without political influence playing a role.

6.1.2 Structuring healthcare

Decentralisation of healthcare took place in Australia from 2010 (Bennett, 2013) and in Brazil between 1990 and 2001 (Fleury, 2011, p. 1724), aiming to strengthen local control of health organisations and, particularly in the case of Brazil, to increase democratic participation in health management. Participants were concerned about the capacity of organisations to resource telehealth services, the difficulties in dealing with decentralised autonomous organisations, and the division between primary and acute care. Ways in which healthcare provision is organised, structured, and delivered have shaped the development of telehealth services. Participants linked difficulties in the operation and provision of telehealth services to the decentralisation of healthcare organisations into smaller units.

Larger facilities seemed to have greater difficulties in allocating resources for telehealth services than smaller ones. A telehealth coordinator reported that in "*some of the larger centres … where we have not even been able to make inroads into their EDs [Emergency Departments] to provide the support for their rural facilities. They're like, no, we're way too busy*" (p0070-Au). Yet, a nurse in a small facility indicated that smaller facilities also faced difficulties resourcing telehealth services, "*You've got two hours to prep this clinic. It might take two hours, it might take an hour. But if we were then to add two telehealth patients about 20 minutes each, we've blown that out of the water"* (p0036-Au).

In Brazil, decentralisation of healthcare resulted in the creation of many small municipalities, referred to in Section 5.2. One unintended consequence of decentralisation was that it gave "*significant autonomy to management that had little capacity to manage*" (p0142-Br). There have also been unintended consequences of decentralisation of Australian health services to independent regional entities because "*the idea of central state run coordination of (telehealth) services has really taken a bit of a hit because each one sort of functions as its own little feudal fife"* (p0039-Au). A technologist reported that now:

> *due to the decentralised nature of Queensland Health now. I've got 17 CIOs [Chief Information Officers] each with their own roadmaps, their own agendas, their own policies and it's very hard to please all of them.… So I would say that decentralisation is one of our largest challenges out of our control … it was far easier to provide a state wide ICT service when everyone was buying the same thing.* (p0080-Au)

The high-level structure of healthcare shapes the way in which patients traverse the system for using in-person services or telehealth services. In Australia, primary care is provided by general medical practitioners who are funded federally through the MBS with fees based on the duration and complexity of consultations. Patients requiring specialist opinions or treatment are referred to the public, state, and federally funded sector or directly to the private sector. In Brazil, the referral process from primary to specialist is similar. When the structures of the health system create boundaries, the ability of services to provide care across the acute and primary care sectors exposes a contradiction between the purposes for which funding is provided to both sectors, because "*Doing any of this effectively requires involvement of primary care and general practice and we have suddenly crossed state federal divide, state federal funding divides, state federal responsibility and suddenly the patient misses out agai*n" (p0073-Au).

In both countries, a transfer of responsibility for care of the patient occurs when they are referred to a specialist or hospital generally located in another place. Because "*if we do primary healthcare good, if we do general practice … that has a flow on effect in general wellbeing … of decreasing the amount of unnecessary hospitalisation, that decreases a stay in hospital"* (p0100-Au). Brazilian telehealth services have to date avoided this dilemma because telemedicine has been conceived as an aid to "*improve primary healthcare. It has not sought to assist regional hospitals which are an important part of the health system*" (p0151-Br). Local specialists in hospitals "*cannot connect with telehealth centres. Only those who are in primary health clinics can connect*" (p0156-Br). However, in Australia when local hospitals are funded by states to provide telehealth services,

> *they forget about the GP and they send everybody to the local hospital. It's probably turned out to be a bit of a perverse driver, where it's increased outpatient service usage at the hospital.… It's just one of the constant barriers that you see between GPs and hospitals.* (p0103-Au)

Participants in my research have made it clear that the organisation of the health system, particularly decentralisation and the divisions between primary and acute care, creates boundaries across which it can be difficult to operate telehealth services.

6.1.3 Service boundaries

Interview participants were concerned about the impact of geographically based organisational structures and payment rules, and the division of responsibility for training and education between the education and health sectors. Geographical rules based on boundaries are particularly challenged by the deployment of telehealth services. In Australia and Brazil, the availability of health services is defined by state boundaries, regional catchments, municipal boundaries, or hospital localities. A telehealth service manager argued that:

> *We need to create an environment that is very easy for the clinical workforce to operate within. So yes there are challenges that are represented through the establishment of the HHS [Hospital and Health Services in Queensland] that has to do with catchments and referral flows, what patients belong where and around cross HHS funding arrangements. So again you know you start talking about all Metro North's [a Queensland Hospital and Health Service] no longer going to provide a service and it's going to be delivered in Roma.* (p0063-Au)

A children's telehealth service manager commented, "*there's some areas are a bit contested around where those patients should go and what happens when they show up to another hospital*" (p0101-Au). Some specialities in major hospitals provide telehealth services across an entire state. At every level, organisations decide if they will pay for patient treatment outside of their notional catchment area. Nevertheless, telehealth services can cross catchment areas. An Australian private operator suggested that "*you might see dermatologists in Brisbane servicing Hobart and then you would see lower prices for patients in Hobart … and that would help with your private health insurance refugees who are dropping onto the government funded system*" (p0098-Au).

Geographical boundaries can be reinforced by financial rules. Although the Australian MBS has national coverage for video consultations, payment is only permitted beyond a line set by "the distance by road between a specialist, consultant physician, or consultant psychiatrist of 15 km" (DoH, 2017). The patient must reside outside of a major city (with some exceptions). Before 2012 the 15km criteria did not exist and outer metropolitan areas were eligible (Wade, 2014, p. 528). The impact on telehealth services of this change was significant: "*there was a psychiatrist working for me in Brisbane, she was seeing patients on the Gold Coast and the Sunshine Coast. So for those patients it's around a four hour round trip.... So they all instantly became ineligible [because the patient lived in a major metropolitan area]*" (p0098-Au).

Similarly, legal structures were built to reflect geographical boundaries. In the state of Queensland, when 17 Hospital and Health Services (HHS), each a legal entity, replaced the state Department of Health (Queensland Health) in 2011, there were unintended consequences for telehealth practice:

> *it was that [if] you're a specialist within your own HHS, you were credentialed to provide that state by tele-health. Along came the establishment of independent statutory authorities and suddenly it was "you're no longer credentialed outside of your own HHS".* (p0063-Au)

Boundary changes in health systems can provide an opportunity to redesign services to improve continuity of patient care. In regional South Australia, prior to 2006 health services were fragmented, with each of the 64 country hospitals having their own boards. Once "*Country Health SA was created as an entity it meant that the CEO [Chief Executive Officer] of that service could sit around the table with the metro CEOs and have an equal place at the table* (p0025-Au.)[19] This participant recalled that:

> *in the latter part of 2006 the then CEO of Country Health SA asked me to lead an initiative looking at the needs of people travelling to access health services from anywhere in country South Australia. We called it the patient journey initiative…. Out of that, our then chief medical adviser … and I created what was then called the culture and innovation committee for Country Health SA. He was really interested in covering off some of the gaps that he saw in terms of country health services and access to*

[19] In 2019, Country Health SA was broken up into six Regional Local Health Networks.

country health services and really understanding how technology could be an answer. (p0025-Au)

The subsequent decentralisation of Country Health SA into six Regional Local Health Networks in 2019, following a change of state government, illustrates the temporary nature of geographically based organisational borders.

6.1.4 Accessing healthcare

Despite the erosion of Medicare reimbursements for patients in Australia, and the difficulties of accessing timely public healthcare in Brazil, equitable, universal access to health services is still perceived as an important design principle for public health systems. Demand for telehealth services is driven in part by a desire to improve access to healthcare for rural and remote communities who cannot access the same level of specialist health services enjoyed by urban communities. For those health professionals working in rural and remote communities, there is limited education, training, and support. In the Brazilian state of Santa Catarina, there are:

> *very few dermatologists wanting to work in the public health sector with SUS [the Brazilian universal healthcare system], because it pays a lot less and we absolutely don't find dermatologists who want to go upstate because there is so much patients in the big cities. So the only way you can take dermatology upstate is by doing tele-dermatology.* (p0137-Br)

In Brazil, the need to travel for medical treatment has major implications for people living in inland cities and settlements who may have to travel more than 500 km to reach a medical facility, particularly hospitals, in many cases using patient transport services provided by the Brazilian universal healthcare system (SUS) (Alonso et al., 2017). A health manager related:

> *What convinced me was travelling round the state seeing all the poverty, minimal access to healthcare. I saw one patient travel 500 km by taxi, 9 or 10 patients in a taxi, like tinned sardines, to have cancer treatment in Florianópolis, chemotherapy and on the way home they had to stop 5 or 6 times so people could … [be sick].* (p0138-Br)

Broader economic pressures compound the impact of travel for patients. One hospital-based telehealth coordinator observed, "*the patient travel was increasing because people are getting sicker as the private health is increasing in price. People are getting out of it and therefore there's more demand on public services*" (p0070-Au). Even when travel is subsidised, a clinician reported that for his rural patients coming into the city for treatment:

> *What I've found is that there's no nostalgia at all much out west for getting on that train, bus or private car and coming to the city and then being put up. Even if it was all at the*

expense of the state, they weren't coming here and then taking advantage of going [shopping]. (p0039-Au)

Other system boundaries influence access to healthcare. Health services are not homogenous organisations, but actually are divided on the basis of professional speciality. Such divisions can result in patients with different health conditions having to access different health services in different locations because not all health services offer access to the same range of specialities. A telehealth coordinator observed that:

within the health service each service each is like lots of different businesses. So you have got your hospitals your paediatrics hospital and your oncology hospital and then within that you have the division of medicine division of surgery and then you have your neurology and neurosurgery and they all do their own thing and somehow vaguely crossover in some parts, sometimes. (p0085-Au)

Integrated patient care aims at involving multiple professions in the care of patients. Because integrated care focussed on patient needs requires approaches to be coordinated across professional, department, organisational, or geographic boundaries, integrated care challenges the existing practices of medical specialities. Within a tertiary hospital, it was observed that:

We get a lot more response and support from the chronic disease or the medical area than we do from the surgical area because it is very old school, it's very paternalistic. The way that surgery is run, it's very acute … we've got chronic issues and we need to be dealing with a different strategy than what we are doing with the bring them in, cut them open, cut it out and get rid of them client approach which doesn't work. (p0036-Au)

When different professions work within an integrated care team, professional categories are questioned. A Brazilian dentist felt that the policies of professional medical associations did not help because "*they think that only a doctor can work with a doctor or a nurse with a nurse or a dentist with a dentist*" (p0115-Br), whereas integrated care enables "*work within a team, learning the limits of their knowledge, because the nurse is alongside [the doctor], the dentist technician and technician is there*" (p0115-Br).

Two factors, a shortage of specialist health providers prepared to work outside metropolitan areas and the distance patients have to travel for appointments with specialists located in metropolitan health services, combine to limit access to healthcare. Because the exchange of health information is key to maintaining continuity of patient care, the design of health information systems can facilitate or restrict continuity of care.

6.1.5 Accessing information

Healthcare information is increasingly hosted within electronic information systems; to support care, professionals use devices such as computers or smartphones to access information repositories or systems. Systems have evolved within the boundaries of hospitals and organisations and have been designed to serve the needs of healthcare activities within those boundaries. But now, technology-supported care at a distance has the capacity to extend health services outside the physical walls of health facilities and needs to be designed to exchange information across places; "*a shared record was almost a prerequisite to anything that was done … at a distance … or telehealth between facilities ... and that is one of the fundamental building blocks*" (p0073-Au).

Participants expressed concerns about the difficulties of accessing information and systems outside of these boundaries in order to share information between repositories (which requires the systems to interoperate), the communications networks which were available, and the devices they had at their disposal. Many more Australian interview participants (n = 29) than Brazilian participants (n = 1) (statistically significant using a two-tailed Z-test, N = 135, $p < 0.01$), indicated concerns about the limits imposed by technology design on the delivery of health services.

Older communications technology still requires manual intervention, paper records, and dedicated devices such as facsimile machines. One participant highlighted the "*bizarre situation where in the 21st century we're doing this fancy telehealth thing, but we're still faxing clinical records back and forward"* (p0023-Au).

The exchange of information between healthcare providers and the boundary between acute and primary care was important for many participants (n = 25). When information on patients could be shared it was highly valued: "*I can look up any of their records and know what their history and what was done on a Tuesday of 2:00 o'clock. It's brilliant"* (p0001-Au). However, this was not always the case for everyone: "*We're now faced with how do we operate in an environment where there are siloed implementations of [an electronic record]. It's going to be a significant amount of time until we're on a state wide electronic medical record*" (p0063-Au).

Exchanging healthcare information across multiple facilities is difficult. In Brazil, of the 48,000 health facilities, only about 58% have some form of electronic health record. Municipal health departments are able to decide what systems to use in their facilities and how they should connect with other systems. Some Brazilian health organisations are opting to create their own local interoperability between systems (Ministerio de Saude, 2018c). A participant described how:

> *last year we have acquired our own software, we opted for it. So we started, replacing the E-SUS system [an electronic medical record] of the Ministry…. Today, our primary*

care network is integrated with the mental health network, the CAPS, so we already see the same chart … we will have a unique medical record in our network for primary care, hospital, emergency or mental health. (p0136-Br)

In Brazil, even in hospitals which had an electronic health record, "*they are not integrated. Only last year we acquired our own software … to substitute a Ministry system (that was not interoperable) in order to develop a tool that could interoperate*" (p0136-Br). In Australia, according to one manager:

different jurisdictions use different systems … the data goes to the central repository of that system and I think there's eight or nine primary care systems in place in Australia. It's ridiculous. You can't get consistency in data collection because not only did the systems not talk to one another. The systems themselves are set up to gather different information slightly differently. A child health check might have different age thresholds for different things. (p0078-Au)

Communications networks are designed to service organisational needs. So, when the devices used by health professionals for telehealth services are outside network boundaries, continuity of care becomes more difficult. A South Australian telehealth service reported that their devices "*sit outside the SA Health network. I suppose the problem is like because they are patient use devices, technically we can't connect them to an SA Health network*" (p0013-Au).

Maintaining connectivity between organisations can be challenging. Internet-based networks are considered insecure, in some cases causing organisations to build their own networks -- as in Queensland -- which other healthcare organisations cannot use. Since the internal networks of health services, if they exist at all, connect facilities owned by that organisation, cross-organisational communication supporting telehealth services becomes difficult because "*once you go outside of the digital telehealth they're going to try and bridge into those other networks over the open Internet it is just hopeless. It was. It drove me crazy of trying to do it. Connection problems*" (p0012-Au).

Connectivity of video-based telehealth services depend on devices, applications, and networks which are often specific to an organisation and supplier, and do not interoperate with other systems. Interoperability concerned Australian participants (n = 18) more than Brazilian participants (n = 0). In one Australian state, the lack of any state-based guideline or power to enforce a guideline on independent health services meant that:

people … go off and use Jabber, in La Trobe and Cisco hardware in Loddon Valley they can't say that's not, that won't work within your region … you know Bendigo goes

"Come in here", and we will sit you in front of a Cisco piece of hardware and I go "that's really not going to work with what I have". I mean I have Polycom which does connect but not in the right places. (p0088-Au)

Some organisations do try to interoperate with partners. In South Australia, "*the infrastructure that SA Health use for their DTN* (Digital Telehealth Network) *was a key consideration in our selection of technology*" (p0037-Au). Others base decisions on cost: "*one particular HHS [Hospital and Health Service] looked at our products and went, 'I think it's a bit expensive' and they bought a closed source Philips video system which doesn't integrate [with the rest of the state]"* (p0080-Au). Within technical teams there are influences stemming from differing commercial commitments. A manager told how they had "*a phone team that are constantly badgering me because they want to enable Alcatel video which I've said, 'That's fine, just make sure it talks to our stuff'*" (p0080-Au).

6.1.6 Summary

The common theme running through participant accounts is that organisational contexts influence telehealth service provision. Interaction between political policies and organisational priorities has been highlighted as fundamental to the provision of resources for telehealth services. However, it is the divisions which exist within healthcare systems that determine how those resources can be used. Divisions are reflected in boundaries between organisations, decentralisation of care, the splitting of care between primary and acute care provision, geographically determined access to acute care, uneven capacity to exchange health information between providers, and geographically derived rules about patient access to care.

6.2 Conflicts in the Professional Contexts of Telehealth Services

This section explores the often-contradictory influences of professional contexts on telehealth services as reported by participants. Professional contexts encompass the attitudes, motivations, practices, skills, roles, and structure of the health professions. The subsequent section examines how professional practice changes are legitimised during the development of telehealth services. A number of themes (see Appendix P) relevant to the professional contexts of telehealth services emerged from participant interviews. Table 17 shows that health professionals were mostly concerned with clinical issues. However, some clinicians (who often had management roles) highlighted management issues and managers were concerned about a broad range of issues. Technologists were mostly concerned with technology issues.

Table 17.

Key Concerns of Interview Participants

Theme issue	Technologists (*n* = 16)	Clinicians (*n* = 68)	Managers (*n* = 49)
Clinical issues	31.3%	72.1%	73.5%
Management issues	12.5%	45.6%	36.7%
Technology issues	50.0%	23.5%	30.6%

Among these themes were the motivations of participants for supporting healthcare activities at a distance, their concerns about supporting healthcare activities at a distance, how inherited place-based practice can be adapted to provide separated care, the difficulties they had encountered in using technology in healthcare, and responses to changing professional roles when healthcare activities are separated.

6.2.1 Professional motivations for change

Four motivations for establishing telehealth services were apparent among health professionals: a desire to educate the workforce, the need to improve access to healthcare, the quality of patient care, and the experiences of patients. The desire to formally educate health professionals has led to systemic reforms in Brazilian medical training:

> *my department was … responsible for 80% of the secretariat's budget for actions and programs related to [education] … it was a work that had an impact throughout the country. We worked with changes in undergraduate [courses], in the training of doctors, nurses, dentists - there are 14 professions that we consider health in Brazil - … because we knew that there was a gap.* (p0116-Br)

Telehealth services provided an opportunity for informal on-the-job training during consultations:

> *It's a great teaching experience … you have a nurse at the other end you have nurses and you have a patient sometimes you have the patient's family you have you may have a registrar in the room or a doctor in training or a nurse in training and you can discuss the case so there's opportunities to educate as well.* (p0083-Au)

Secondly, there was a desire to improve access to healthcare, often arising from professional experiences. One manager reflecting on their work to establish a telehealth service explained the motivations which led a colleague to implement telehealth services:

I think he was, he's a physician … and I think he had some social side. He was in India like me for a long time. We worked there. And I think he just saw a reality that's much worse than ours. And he wanted to make things better and … because he was ... superintendent for special services and all long distance travel went through his office and he saw how much money that could be used in healthcare was being thrown away in patient transportation. And so he wanted to change this. (p0137-Br)

Thirdly, the specific aim of many telehealth services is to improve the quality of patient care. Participants in my research indicated that telehealth "*is I think, a great tool, with the potential to improve basic healthcare, primary healthcare, and as a result the health system as a whole"* (p0109-Br). Within that aim, improved access for regional populations is a key focus "*because … there is a societal need to improve the rural health because the disparity in access*" (p0069-Au). A telehealth coordinator reflected that:

I'm not doing this because I'm going to get more money for my service. I'm doing this because it means more efficiency, it means my doctors are working more efficiently, it means my nurses can see more patients and it means that means there's more beds for actually sicker patients. (p0060-Au)

Another telehealth coordinator argued that "*with the help of telehealth [the doctor] is able to improve his clinical reasoning, reduce the range of diagnostic hypotheses and will request less examinations*" (p0125) and a primary health doctor recounted how in "*a small municipality that has two doctors, one doctor from one [political] party and one doctor from another party … I have to maintain a clear philosophy. Our focus is to help and support patient care*" (p0127-Br).

Fourthly, participants discussed their experience of reconnecting practices that have been split between places, and the consequent need to consider patient experience. In the minds of participants, place is never far from the surface as an influence on healthcare. For example, when:

you have a … metropolitan hospital … [and] try and help a group of people who are based in rural and regional Queensland. It's not simple and that is frustrating for someone who together with his team is purely interested in improving care. (p0083-Au)

It is not just regional locations where cultural and service isolation may influence the desire to receive care via telehealth technologies. According to participants, consumers in metropolitan centres have reacted well to the telehealth proposition: "*consumers are starting to leverage technology more so this is the most exciting thing I've been involved in in my career. Because when you go to talk about the possibilities people want it they're not pushing back against it*" (p0006). However, when providers of healthcare are separated from patients it can be challenging to design services to support patients’ needs. The concept of patient-centred care influenced the clinical practices used in telehealth services:

> *Well clinicians aren't known for wanting to do things differently.… For some people it was about a change in clinical practice and being hesitant about changing the way that they actually physically practiced. And then for some people it was a personal culture around what's in it for me as a clinician.… And that's changed because there's an overarching culture change in this district around driving a patient-centred service.* (p0032-Au)

Health services in Brazil face different challenges and see consideration of the patient experience almost as a luxury. For instance, a Brazilian health worker thought that:

> *If I look at the scenario of hundreds of low quality public hospitals with poor infrastructure, which very often are struggling to do the basics, where the experience of the patient is a distant vision.… First we need medications, a doctor in emergency, beds because the emergency department is full, people are sleeping in the corridors … so if we look at the whole system there are basic necessities to be attended to.* (p0114-Br)

Despite such reservations, participants believed that telehealth services in both Australia and Brazil are improving patient experiences and continuity of care by providing care which would not otherwise have been available to patients who must travel long distances for a consultation.

6.2.2 Connecting care across places

Splitting of the care role between two places and its reconnection using telehealth technologies is just one facet of the disruption caused by this physical dislocation. Re-working of etiquette between health professionals and patients and the exchange of clinical information are other aspects. For instance, introductions between doctors and patients using videoconferencing technology become “*a bit more formal and you can't actually shake hands but you shake hands as such verbally and I always spend perhaps a few more minutes settling the patient and making them feel comfortable, explaining the technology*” (p0026-Au). Even when patients are co-located with clinicians in the same room, the presence of technology has to be considered:

> *we had to change where people sit in the room because now we had two screens and the doctors need to type because generally if you've got notes on the desk you can write this way but you can't do that so I had a barrage of complaints for about eight or nine months.… The doctor didn't look at me. They didn't talk to me.* (p0036-Au)

Introduction of technology to reconnect care raises questions about the ability of clinicians to gather information. Where video technology has replaced telephone conversations, information quality has improved because "*examples of what someone is describing on the phone and what you walk around the corner and see as a clinician are two very different things"* (p0079-Au). On the other hand, a participant felt that video-based consultations:

> *will never be as good as a real time consultation. Because it will never quite give you the ability to look at a lesion on a head or a face or something like that with exactly the same clarity as you might have as if I got up and had a look at the thing on the cheek.* (p0014-Au)

This concern was most evident in the Australian research settings where videoconferencing is the dominant mode of telehealth provision. Opinions differed, depending on the speciality and consultation type. Only three participants felt that the information obtained through videoconferencing technology was inferior to that obtained in person "*because you don't get as good verbal cues ... a visual cue, I think that you don't read their body language quite as well*" (p0095-Au) or that some specialists did not establish good communications with patients: "*they're typical specialists. It just was a very individual thing. Some of them are better general rapport than others*" (p0096-Au). For some situations, telemedicine was not appropriate:

> *Talking on the telemedicine medium about bad things in terms of health is very tricky. Because you can't really do the usual empathy things, you can't touch a patient you can't do the Kleenex … to show the patient that you're feeling their pain and their distress.* (p0016-Au)

Several participants (*n* = 8) who were all responsible for delivering telehealth services, felt that they were able to obtain sufficient information to care for their patients, or had modified their information-gathering practices (p0012-Au, 0084-Au). An orthopaedic surgeon commented, "*I can say hi give me a high five please, he'll give me a high five with the unbroken arm but I'll then say no I want the other one*" (p0097-Au), while another specialist relied on additional information from an electro-cardiogram and felt that not much had changed "*apart from the fact that I can't examine them. But that's why we do the ECG and we do the basic observations"* (p0012-Au). Some health professionals (six out of 46 physicians) were more comfortable with telehealth consultations when another health professional was available to assist at the distal end, because "*somebody has to take their blood pressure, feel their belly, listen to their chest*" (p0074-Au). Others insisted on "*seeing the patient for the first time face to face and then doing the follow up or subsequent appointments by telehealth*" (p0003-Au).

6.2.3 Conflicts over inherited practices

Adaptation of inherited or usual place-based clinical practice to accommodate separated healthcare activities was reported by participants but required changes in established routines. Participants felt that many of these routines were manifestations of a conservative approach to medicine which included resistance to use of new devices, such as computers or videoconferencing in medical practice.

Thirteen participants (principally Australian specialists) reported that health professionals adjusted their practices and habits to make telehealth consultations work. Changes to medical practice inevitably require changes to routines. A video advice service for emergency departments (p0079-Au) tried to convince clinicians to rely less on telephone calls because "*what someone is describing on the phone and what you walk around the corner and see as a clinician are two very different things*". Some practices are hard to change and required additional effort. A Brazilian telehealth advice service reported that doctors took the time they needed out "*of direct patient care, because the computer was consuming more time, but they did not take time out of the coffee break*" (p0117-Br).

The extent to which patients should be seen in person remained an issue among clinicians. While this concern was not expressed often by practitioners of telehealth, it is certainly of concern to the wider medical profession, although perceptions do seem to be changing as younger doctors enter the workforce.

> *The staff physician's not keen on telehealth. Much prefers to sit in with the patient, see the patient, touch the patient and prefers to do outreach and go and visit the outlying sites, as opposed to there are patients that could quite easily be seen by telehealth. There's somebody that we just chip away with. As we get new younger doctors that are very - they're not technologically phobic [laughs] - either, they encourage the older…* (p0089-Au)

Telehealth coordinators felt that dealing with an unwillingness to change and clinical conservatism led to *"battling with clinicians who have always done things one way and not seeing the reason why they would change. And that's still happening and that's still the biggest battle"* (p0001-Au).

A psychiatrist noted that "*there's no doubt that for 90 percent plus of physicians, high quality practice means having a one-on-one with the patient in some form or other. And that's what they've been brought up with and they genuinely believe"* (p0049-Au). That change in these entrenched beliefs is required at both the organisational and professional levels is unsurprising. However, considerable scepticism prevails about the ability of the medical profession to change views which are seen as inherently conservative and designed to protect existing roles. A Brazilian family doctor (p0153-Br) felt that "*we have an extremely conservative medical class, especially the people who are in the position of coordinating the medical councils and such. So we argue, for example, paediatricians who say that a family doctor cannot care for a child*". Similar opinions were expressed by an Australian doctor, "*your big problem if you want me to push this ... is the conservatism of the medical profession and it's worse than that. It's ... a threat and it threatens what they're doing. You know we've always done it*" (p0010-Au). The roots of this conservatism are complex. Learned attitudes are one factor:

> *You know the people that go into medicine are different … and they're not necessarily as a group best communicators they're very good at what they are which is how they actually get into it. So the idea of making things easy ... they're not too fussed about patients waiting or how they get to see them, as long as you've got patients and we're doing the work.* (p0014-Au)

Another factor is closely associated with the conferred status and power acquired in medical school: "*especially in Brazil, the doctor often finds himself very powerful in some way, knowledgeable, infallible. This is often taught at university, so people think they know everything and often know nothing, or know less than they think they know*" (p0156-Br). The nursing profession was singled out by a Brazilian doctor as one where conflicts over roles and scope of practice are most intense:

> *I think of nursing, specifically, they suffer constant bullying from the medical institution to limit their role, so that people … pay doctors. It's very simple, for me this is very clear…. But they are so ... they are so assaulted by this medical monopoly that they do not [call a telehealth service]"* (p0155-Br)

The competence of health professionals to use information technology devices and applications was frequently cited as in need of improvement. Participants stated that there were people "*resistant to technology change still because we have still got lots of people in the workforce who are not digitally confident*" (p0088-Au, echoed by six other participants). Older professionals looked at entrants to the professions as being a "*young group of people who are able to in a fair degree understand the issues*" (p0021-Au). Of course, the implication is that eventually, as a younger generation rises through the education system and workforce, they will "*increasingly becoming accustomed to videoconferencing, web conferencing, and that young people now begin to take disciplines of telemedicine in medical courses ... (but) it is not easy to change this culture from day to night*" (p0120-Br).

Behavioural changes when new technology is adopted for personal use may not extend to professional domains. A family doctor observed that doctors used a smartphone for "*WhatsApp,* *Facebook, contacting colleagues, consulting the internet to see medicine name, everything*” but when using the employer electronic health records, “*if he does not have a [computer] terminal in the room, or if there is a fault with the systems he stops using ah, ‘this sucks, it's no good’* " (p0109-Br). One participant reported, *“I've had computers most my adult life. I've never been intimidated by technology*” (p0029-Au). Another considered that *“people are getting used to the concept of using a computer or an iPad and being more mobile, smaller sized equipment, easy access on your own computer at work, and things like that*” (p0082-Au). Overall, within the Australian and Brazilian workforces, participants felt that “*people are more resistant to technology change still because we have still got lots of people in the workforce who are not digitally confident*” (p0088-Au). Issues remained because “*some people are either technophobic or are unable to work a lot of modern technology and in this case it was getting the computer going that was the challenge*” (p0078-Au).

Nevertheless, there was widespread agreement that “*people are increasingly becoming accustomed to videoconferencing, with web conferencing, that young people now begin to take disciplines of telemedicine in medical courses ... it is not easy to change this culture from day to night*” (p0120-Br). This generational shift in skills and attitudes to information technology was seen by a number of participants as occurring rapidly:

> *The cohort of doctors certainly that I have in my hospital and the kind of doctors that are coming out now are absolutely IT enabled … so none of my doctors really had problems but we have a fairly young workforce. Our oldest practitioners are in their late 40s, the majority are in their late 30s, early 40s and then younger.* (p0100-Au)

Such changes in practice have not proved easy. In tele-rehabilitation:

> *10-15 years ago when people would have a proctor at the other end of the ... you know you have someone sitting at the other end with the patient. It will be a clinician to clinician experience it wasn't a clinician to patient experience. So they got very nervous when we were saying well there's no one at the other end, it is just the patient and you are going to be doing that.* (p0001-Au)

6.2.4 Redefining professional roles

When additional work on the part of clinicians is required by technology-based practice and threats are perceived to employment or status, conflicts can emerge between clinicians and health service managers. A consequence of the perceived additional work required when practice changes is the demand from professional organisations for financial compensation.

The AMA suggested incentive payments were necessary for telehealth consultations involving video, telephone, or email, and for associated additional administration, broadband, equipment, support, and training costs (AMA, 2011). Other Australian associations (Australian Nursing Federation, 2011; Australian Psychological Society, 2011; National Rural Health Alliance, 2011; National Stroke Foundation, 2011; Royal Australian and New Zealand College of Psychiatrists, 2011) echoed this demand, while broadly supporting telehealth with the caveat that additional funding was needed, and that telehealth should not replace face-to-face consultations, especially in regional areas where health practitioners' business could be threatened by competition from city-based services (RDAA, 2011, 2014). The Nursing Federation lobbied for MBS item payments for nurses in recognition of their particular support for patients undergoing telehealth consultations (Australian Nursing Federation, 2011). A senior management view of these demands was that "*standard power struggles that exist in every sector … our job is to say you're not going to change that overnight, with an outcome view for patients in mind and understanding that is how cultures have been built over time*" (p0073-Au).

Allocation of staff time, particularly for the administration of telehealth services, has in some cases "*been a much bigger barrier for us than actually getting the clinicians interested*" (p0032-Au). An Australian telehealth coordinator reported that a district manager "*said to me we do not have the staff to do it. I'm not going to do it, I don't have time and I don't have the staff*" (p0064-Au) and a specialist from the same area noted that "*the admin person won't do it because they report to some other person…. It's only when it goes like a directive that it's taken seriously*" (p0069-Au). Similar conflicts exist in the Brazilian system over the time needed for telehealth practice: *"there is no work incentive … to put away two hours for telehealth*" (p0109-Br). Such conflicts even extended to allocation of time for on-the-job education where management was reported to have told a participant "*we want fully qualified doctors … if a doctor takes time to study he will see fewer patients*" (p0109-Br). However, management can play a role in resolving conflict, as a senior Queensland doctor reflected, "*It couldn't have done it without their [support]…. From my perspective working in here … it has been pivotal in ensuring this works … it has to be a combined of top down and bottom up*" (p0084-Au).

Brazilian associations such as the CFM have played a powerful role in resisting telehealth practice, "*principally the CFM*" (p0145-Br), (with the exception of the Psychology Council) are *"preoccupied with protecting traditional practice … rather than considering the advent of technology and the need to be closer to people while being separated from them*" (p0154-Br). Existing CFM regulations prohibit direct consultations with patients using technology. Telehealth services have to navigate these restrictions because:

if we say teleconsultation, the CFM will close our doors tomorrow.... So when a family doctor requests an ophthalmology examination, the ophthalmologist requests a diagnostic eye test [done at a distance] which is sent as any report to the doctor. (p0151-Br)

One of the reasons why Brazilian associations protect the status quo is the existence of a large private sector, in which many health professionals own independent businesses. Consequently, there are fears that Brazilian doctors will earn less providing telemedicine service than they would in private practice (p0140-Br), according to a primary healthcare manager. This meant that "*the last item in the list is to protect the patient … and gynaecologists and paediatricians are very worried about losing employment*" (p0153-Br). Another primary care manager indicated that medical trade unions feared that "*doctors will lose their place 'you will need fewer dermatologists if this [telemedicine application] is used. We are defenders of the medical class, so we will not let this happen*'" (p0146-Br).

In Australia, similar fears were reported by a telehealth call centre manager:

the whole project was sabotaged from the start, because of potential we were a threat.… Because if we'd shown that we can replace services currently provided by the HHS, the people currently in those services … they couldn't see that we weren't trying to replace the face to face service. We were trying to augment the service. (p0105-Au)

6.2.5 Controlling technology in healthcare

At the heart of changes in professional contexts were the concerns expressed by participants about technology use in healthcare. These concerns included a fear of technology, a lack of control over technology, and the rise of health information systems as a managerial tool in healthcare to challenge the power of the medical profession.

Fear of technology was commented on by many participants (n = 44) as "*essentially a fear of the unknown. So a lot of them are fearful that they'll have to know how to use the technology*" (p0001-Au). Added to these concerns is the possibility of doctors "*looking foolish and not being able to manage the technology*" (p0082-Au). Maintaining the self-esteem of specialists was felt to be important during consultations involving distant general practitioners because "*they feel like they're being judged or assessed and some don't like being put on the spot and GPs asking questions they don't have the answer to, they feel like they're being undermined*" (p0065-Au).

Once technology was incorporated into clinical routines, initial fears and resistance tended to disappear: "*now all of them compete and see how many patients they can bring in*" (p0065-Au). When use of a new technology or technique was mandated, a specialist felt that some doctors still "*complain but they have to do it, so they learn … a neurosurgeon is never going to say I am never going to change … I am not going to take up laparoscopy …. people change all the time*" (p0069-Au).

The large investment in electronic medical records brings significant power to the information technology departments, which is exercised through control of system design. Clinicians, mainly from Australia (*n* = 29), expressed concerns about an inability to control information technology because "*there is a massive disconnect between the clinicians and the IT guys*" (p0030-Au). Clinicians felt that when they asked for help establishing telehealth services, technologists "*don't really want to know about telehealth too much. So small request like, 'Can we get wireless for the iPads?' seems to be met with, 'It's a security issue'*" (p0018-Au) or "*Doing something like this will ... will increase our risk profile*" (p0003-Au).

Control by information technology departments extends to applications which are important for telehealth services. Participants reported that "*the only problem is that it requires Google Chrome. Queensland doesn't like Chrome … but you can get through it when you've got some executive departmental support"* (p0071-Au), and a feeling that "*IT person should say yes, this is the software and this is the cable and this is how we do it. Rather than saying it can't be done or hasn't been done before"* (p0005-Au). Control of technology was often expressed through standardisation of purchasing: "*so they said why are you buying an Apple Mac mini, it's not a standard device*" (p0013-Au) and a reluctance to accommodate clinicians' requests: "w*hy are we purchasing what you're saying we will use. Why aren't we purchasing what the … clinicians want to use?*" (p0018-Au).

Such extensive control impacted relationships between clinicians and technologists to the extent that a clinician felt that "*IT systems have the feel that they constructed for the benefit of an administrator and for the bureaucracy rather than for the benefit of the patient*" (p0008-Au). Within hospital boundaries it was felt that relationships became more difficult in "*controlled spaces and I think hospitals are a very controlled space"* (p0028-Au). Control of health information systems by technologists was also frustrating for managers, as one participant reported:

> *we've been chasing some recent enhancements [to the electronic medical record] that from a tele-health perspective we would provide additional information … those that are responsible for making decisions around enhancements have identified that by doing that, that would create additional complexity within the views of various screens … and have said "we're not doing it".* (p0063-Au)

The scale of the commitment made to large electronic record systems operating in the acute sector seems to have limited resources available to support telehealth service expansion. In one

Queensland hospital a telehealth coordinator felt that the hospital "*is already digital and the rest of … goes digital over the next six months which means that trying to roll out any new telehealth is almost impossible*" (p0032). In another state, a clinician observed that when they met a senior information technology manager, "*I saw that it took up all his time … getting EPAS* (an EHR) *not working. And he was sort of very caught up with that"* (p0011-Au).

Conflicts over control of technology had, in some situations, materialised in conflict between the institutional powers of clinicians and technologists which was almost impossible to overcome: "*in some cases I've lost my job over it … trying not to be a party to either of those sitting there saying it's got to be done my way or the highway which is rarely successful for either*" (p0073-Au). In other cases, conflicts between the powers of clinicians and technologists were resolvable. According to a clinician looking for technology support for distributed telerehabilitiation teams:

> *we had to go to the wall to get a technical person at each of the three sites because … rationally would have had it all centralised.… But I said no. It all got to be down on the sites with the clinicians.* (p0011-Au)

The value of embedding integrated technical support into telerehabilitation services had been proven during an earlier pilot project for which I was a project manager (A. Taylor, Wade, et al., 2015). Inclusion of an "'at the elbow' support embedded within clinical teams" (Leverington & Bassa, 2019) proved to be a critical success factor for a state-wide implementation of the service.

6.2.6 Summary

Participants indicated that they are motivated by a desire to educate the workforce and to improve access to healthcare and the quality of patient care. However, challenges to traditional clinical practices and routines arise when healthcare activities are supported at a distance. Managers and clinicians hesitated to take on additional work and clinicians perceived threats to employment from telehealth services. Contributing to these concerns was a fear of technology and a lack of control over technology on the part of clinicians and concerns over the use of health information systems as a managerial tool in healthcare.

6.3 How Telehealth Services are Legitimised

This section explores the rules, guidelines, and other codes which legitimise the practices of telehealth services. The subsequent section examines how health professional behaviour is adapted during the development of telehealth services. A number of themes emerged as participants discussed the explicit or implicit rules and healthcare codes by which telehealth services legitimise their operations (see Appendix Q). These are the sociotechnical codes of healthcare: legislation, regulations, strategies, guidelines, processes, pathways, and referral arrangements. Healthcare codes also perform social, economic, and clinical functions. This section summarises the roles played by codes and their impact or lack of impact on clinical practice.

6.3.1 Legislation and regulations

Government legislation and regulations can limit or enable new forms of healthcare practice. Regulations can provide or deny permission to provide telehealth services and limit the scope of services through funding and reimbursement rules. The Medical Board of Australia developed guidelines for telehealth practice under the Health Practitioner Regulation National Law Act (Medical Board of Australia, 2013, 2016). In South Australia, legislation in 2009 on mental health treatment included "*inpatient treatment orders and other mental health orders, such as community treatment orders. That can be assessed via videoconferencing, this specifically the sort of wording, which was a great relief to us*" (p0026-Au). Federally funded telehealth service provision is restricted by geographically designed criteria in the MBS to regional and rural areas.

Brazilian telehealth services are highly regulated. The Brazilian CFM issues a number of regulations governing the activities of physicians, including the practice of telemedicine. Although these regulations do not technically have the force of legislation, they are interpreted as rules which must be obeyed. Interpretations of these rules varies and there have been consistent efforts to change them. In Brazil, initial reluctance on the part of the CFM to permit reporting of diagnostic imaging at a distance was overcome when telehealth services in the states of Sao Paulo and Santa Catarina lobbied for changes to regulations (p0133-Br). At present in Brazil, "*a tele-consultation directly with a doctor is not permitted*" (p0114-Br), but other forms of telehealth services, such as physician-to-physician advice, are allowed:

> *to this day we are not authorised to do teleconsultation, consultation at a distance. Some sectors are already doing it, but this is not regulated yet. What we did in the program, and we do until today, is "teleconsultoria", a second opinion for the professional.* (p0116-Br)

The CFM discussed revision of telehealth regulations in 2018. After a storm of criticism, those proposals have now been withdrawn (CFM, 2018). Two factors were behind the criticisms. Firstly, medical trade unions felt they had not been fully consulted and that continued employment of their members was threatened. One medical union stated its opposition to telemedicine because *"to defend public access to quality public health … implies conditions for the exercise of good medical practices, from the adequate remuneration of the doctor … respect for professional ethics and life. Therefore, we cannot support on-line medical consultation"* (Federação Médica Brasileira, 2019). Secondly, the timing of the proposed revisions to regulations was unfortunate because they were circulated following the national elections in late 2018. Groups operating on social media opposed to the "socialisation" of healthcare were able to link telemedicine to an opposition political figure who happened to have been a leading figure in the promotion of telehealth services under the previous government. These groups cast the CFM proposals as a coup against the status quo and went on to attack *“the wife of the* (unsuccessful ex-presidential candidate) *who was behind the telemedicine coup* ...” (Cardoso, 2019).

Despite these restrictions, in some Brazilian states the obligatory use of tele-advice services is mandated prior to referral of patients. Regulations are seen as an important strategy forcing change in existing routine practice, because "*we have to create a compulsory trigger for the use of ‘teleconsultoria’, so that it becomes a routine in the process of a doctor’s work, and that he is forced to update himself, forced to learn*” (p0143-Br).

6.3.2 Telehealth service strategies

Strategies set organisational priorities and operate within the legislative and regulatory context but can also influence regulatory change. Establishment of the Brazilian Telehealth Program was a brilliant example of a comprehensive social and political strategy which has driven change, albeit limited changes in the regulations of the CFM. The Brazilian Telehealth Program prioritised the improvement of universal healthcare, as one primary healthcare doctor explained: “*We just wanted to build what was best for the Unified Health System. This technical and therefore also moral approach enabled us to generate support and to overcome even [our own political attitudes] at that critical moment*” (p0158-Br).

This particular program and the strategies it supported have been central to the development of Brazilian telehealth services. In 2003, a progressive federal government led by President “Lula” gained power and commenced making significant investments in health and education services. These changes laid the basis for the federal telehealth program beginning in 2007 (Messina & Filho, 2013; Ministério da Saúde, 2011a; A. Silva, 2017; TelessaúdeRS, 2012). The program had several inter-related strategies:

> *We had a set of strategies for working in undergraduate courses, undergraduate courses, we had some strategies for professional education, technical vocational education, because in my department there was also the issue of professional technical education - 60% of our workforce in the Sistema Único de Saúde is of professionals of technical level, so we have to educate these professionals … we had to change undergraduate courses and have strategies to work with the professionals who were already in service…*
>
> *These policies had more or less three important parts. The first part is the concept of the health and disease process, including social determinants, so an enlarged and not*

simply a biological and pathological view of disease, as the philosophy behind all this policy.

The second part was to use health service, as the setting for the training processes, integrating education and work for both undergraduate students and in service health professionals, that is, involving the university and the health sector in developing capabilities together.

And the third part was the use of active teaching and learning methodologies for working with the students - we used Paulo Freire a lot - discussed with him, working for projects, working in groups with flatter interactions and applying information and communication technologies. It was within this vision that one of the programs that we developed was the Brazilian national telehealth program. (p0116-Br).

Growth in Brazilian telehealth services has always been strongly linked to national policy aimed at improve primary healthcare. The Brazilian primary healthcare sector is large: There are more than 45,000 primary healthcare facilities and 33,000 family health teams which require educational and professional support. Telehealth services were seen as a key delivery mechanism. One participant described this period:

In 2005, 2006, when nine universities were invited to consider how to support the Family Health Strategy the question was how to improve the referral process and avoid unnecessary referrals, by doctors connecting via the online advice platform, and then with the aid of a response deciding that the patient did not need to see a specialist, thereby reducing waiting lists is what we did in Rio Grande do Sul. So the idea was this, concentrate on primary care. Subsequent expansion would not just focus on the Family Health Strategy, but also help basic health facilities, which are slightly separate. There is also an opportunity for public telehealth to be brought to the secondary and tertiary healthcare level, principally the small hospitals and emergency facilities. (p0145-Br)

However, 12 years later, the political context of healthcare in Brazil had changed, and participants (*n* = 6) were concerned about the possible impacts of changes to the health system on telehealth services:

We have a very strong threat to the SUS. Given the size of the threat, I do not know if Telehealth is going to be a priority, you know? There is a very strong threat to dismantle SUS. We have a Federal Government now that thinks that SUS is not

> *possible to maintain and needs to be replaced with private health plans and this would dismantle the system.* (p0135-Br)

In contrast to the comprehensive approach to reform of Brazilian healthcare, the Australian focus has been on the single aim of improved access to hospital outpatient services for regional populations. While primary healthcare is an indirect beneficiary of these services, it has not been the focus for telehealth although there are signs that this is changing. One participant reflected that:

> *Let's say a primary healthcare clinic goes to a certain place for their medical support, nursing support. If it is harder than that, where do they go? … How can you support that. This is getting into the non-acute space, which we don't play in. But to me it is about how do you support the lower acuity, something doesn't need to be done right now. How can you link that with the tertiary centres, the regional centres, to allow people to stay more at home.* (p0084-Au)

Despite this singular focus, strategies have played a role in the evolution of Australian telehealth services. Participants referenced the importance of strategic change to generate support: "*in Central Queensland we have had a new CEO come in … and has really given us good direction … so everyone knows this is the direction we are going and telehealth is a very important part of it in the rural area*" (p0087-Au).

Telehealth strategies have been influential in Queensland. The Telehealth unit within Queensland Health has maintained a strategic plan since at least 2006 (Queensland Health, 2006), even though the Queensland Health eHealth strategy of 2006 was mainly concerned with the development of patient information systems (Deloitte, 2006). An extensive policy statement (Queensland Government, 2012) on rural and remote health services promoted telehealth options extensively and promised additional funding. Telehealth coordinators have been employed to support telehealth service delivery models. For instance, a Telehealth Emergency Management Support Unit was created to provide emergency management advice for rural and remote communities. The latest strategic policy has taken a long-term, 10-year view of health system directions, and aims to reduce "the need for face-to-face visits and opportunities exist to increase the scope and reach of telehealth services to include aged care and hospital in the home" by 2026 (Queensland Health, 2017, Goal 4).

Despite the existence of strategies, such as those described, a level of scepticism about their impact on healthcare was observed by participants. A Queensland clinician (p0069-Au) observed, "*the most major barrier has been there is no strategic approach to driving telehealth within clinical departments, so there may be a contract between Queensland Health and the CEOs, but I don't* *see any agenda items at operational levels about reporting on telehealth*”. A Brazilian technologist (p0128-Br) asked about the existence of ICT strategies in the state health sector replied: "*If there are clear strategies … nothing that has been published or is publicly accessible, at least* " (p0128-Br). A senior Australian manager was more damming in their criticism of strategies, noting the:

> *utter lack of investment in change or systemic change.… You have lots of politicians, lots of health service managers all saying in one form or another telehealth or hospital in my home or integrated care or patient-centred care is the way of the future and then I step back from that. And say out of a hundred billion a year to year how much have you invested systemically over a period of X years to actually look at doing this differently?* (p0073-Au)

An appeal for strategy came from a telehealth coordinator who commented, “*we have basically been asking the Department of Health for a telehealth of strategy which … I think it is needed for the next 5 years to get us to a point where it is more embedded”* (p0088), while a manager in the same state health system felt that “*there are some indications that things may move in the right direction. The … government recently released a 20-year plan for infrastructure in healthcare and it has quite a bit on telehealth*” (p0101-Au).

Participants felt that successful telehealth services required adjustments to pre-existing models of care. Consequently, there was a need to reconceptualise healthcare models so that the “*health system … would actually say, that's a really important way to do business that actually meets the consumer or the health person's needs, rather than them having to fit in with our needs. It's a really big mind shift”* (p0026-Au). Another specialist confirmed the size of this problem:

> *I don't think the attitudes change dramatically. I'll tell you why. I still don't think they understand the gravity of what can be done…. So I pushed them … saying look we can do very simple telehealth outreach…. That could save someone go on the waiting list…. Well I tried to get that started for almost eight years now. Our director … feels as though they should all come and get these 2-minute consultations.... And be put on the waiting list.* (p0097-Au)

Strategies may set organisational priorities, but changes to clinical practice require the application of guidelines to help legitimise the changes to clinical practice.

6.3.3 Guidelines for telehealth services

Participants (*n* = 32) valued guidelines for diverse reasons. A telehealth centre manager summed up the impact of guidelines:

> *Having some protocols or procedures I think are very useful to ensure appropriateness and also to streamline the process. If you're going to be triaging cases for example, having a protocol that helps you identify what type of patients and with what conditions and what requirements would help kind of make sure that you've got the most appropriate person being seen at the appropriate time.* (p0065-Au)

A specialist felt that guidelines “*show to people that is a credible group of people. So you got to do with organisations. So we did it through the Oncology Society of Australia and the College of Physicians*” (p0069-Au). An emergency services physician running a complex service generated guidelines that documented the processes to be used across multiple facilities, such as “*standard operating procedures and the algorithms … so irrespective of where, there is almost like a book on the computer*” (p0084-Au).

A telehealth coordinator relied on a guideline that mapped out “*the very beginning of a telehealth consult all the way through to the end. The requirements of the nurses and requirements of the patients. It's also included in our consent form that when patients come on to our service*” (p0060-Au). A South Australian state-wide telehealth guideline (Country Health South Australia LHN, 2017) covered many matters such as choosing when to offer telehealth versus face-to-face consultations, managing the risks in dual-care consultations, patient information about telehealth consultations, respecting patient choice, patient consent, and others. There are many forms of guidelines. Guidelines can document procedures or work instructions which support the continued operation of services: “*If I go on leave or the coordinator goes on leave and someone has to jump into our spots then those people have no idea what they're doing. So we have to do the I guess the administrative type instruction set*” (p0016-Au).

Guidelines can be quite comprehensive and have national applicability; for example, the Brazilian Telehealth Manual for Primary Care (Ministério da Saúde & Universidade Federal do Rio Grande do Sul, 2012) and the ACRRM Telehealth Guidelines (ACRRM, 2017) were relied on by several participants (*n*=3). Other organisations have created guidelines consisting of *“materials that facilitate users in the use of telehealth. For example we have video of 4 to 5 minutes, a type of tutorial*” (p0125-Br), or more detailed documentation for *“clinical protocols and also a handbook for the referral of ophthalmology cases*” (p0154-Br).

Technical guidelines which inform technology design can shape the user experience: “*we feel that we roll out videoconferencing equipment to … videoconferencing industry standards*” (p0075). Procedural guidelines documented instructions for the operation of technology: “*a 2 pager, one side is the pre-consult and the other is the technical steps in actually creating a call*” (p0037-Au).

While many guidelines have been developed in order to assist the implementation of telehealth services, not all participants agreed that the existence of guidelines was a prerequisite to successful implementation. As one doctor observed, "*I think that the background of all the documents all the policies procedures and stuff can be done but I don't think that that needs to be all organised and done before we actually provide the service*" (p0001-Au). A number of participants (*n* = 18) indicated that they made minimal or no use of any form of written guidelines. For some participants, their telehealth practice was "*based on experience, based on the fact that every consultation case is seen either by myself or by … both of us are senior consultants who have done the job for decades*" (p0038-Au), or "*because each consultant has their own. What they will or won't do in their heads*" (p0034-Au), or the guideline is "*not written down but they're internalised*" (p0014-Au).

Others felt that guidelines in "*the early stages they're fairly important but the end goal would be that it just becomes no different to - it just becomes part of practice and that you don't need them after a while"* (p0030-Au) or they were "*not necessary because* (practice) *is identical to in person, does not change because I work by talking*" (p107-Br). Clinicians expressed a need to maintain decision-making in the hands of clinicians:

> *and one of the most interesting things for me … is that there are a number of people not a huge number but a number of people have asked me for a list of things that are safe to do via telehealth and a list of things that aren't in any kind of a rule book and I just keep going back to people who say we can't do away with individual clinical reasoning in the context of the individual consumer.* (p0006-Au)

Organisational identity and healthcare professional roles shape guidelines. The "'*not invented here' phenomena occurs frequently where 'each state or centre takes the protocol and adapts it to its own reality'*" (p0117-Br).

6.3.4 Clinical and administrative processes

Within any model of care, clinical and administrative processes are key to efficient operations. The extent to which these processes were explicitly coded into guidelines varied. For instance, Australian telehealth services provide real-time video consultations. Consultations require patients at a distant end to be booked into a room and booked into a videoconferencing system at the required appointment time. A specialist indicated:

> *You know there's all this sort of extra work that needs to be done. So despite the fact that we might be there hooking in for one hour seeing four or five patients what will happen to prepare for that hour is a couple of other hours work. We also have admin*

staff here doing our other paperwork here and making sure our letters and charts and everything are okay for our end. (p0074-Au)

Six Australian participants described administrative process that were coded into documents supporting real-time telehealth services for instance, "*We just done like flow sheets and things like to send out to doctors this is what you need to do to do the referral*" (p0092-Au). In Australian telehealth services, the principal process components are the coordination of booking times across physical facilities and the collection of patient records for use during a consultation. Scheduling of appointments was a particularly difficult problem raised by Australian participants because "*liaising between our doctors the GP and the patient and getting that all lined up at a set day a set time that suits everyone is incredibly difficult*" (p0034-Au). Nurses and administrative staff continually reported "patching" existing systems that cannot facilitate cross-facility bookings or give access to shared patient records. A telehealth coordinator was hopeful that:

> *when the technology catches up again when everybody's on [an electronic medical record] in Queensland and it will be so good because not only in the electronic scheduling system we show where their appointments are, but you can actually see Cairns telehealth at eight o'clock on Friday, Royal Brisbane telehealth 8 o'clock on Friday.* (p0070-Au)

Another coordinator felt "*a single medical record would be good. I think a scheduling system that goes across multiple boundaries would be good. So primary care, secondary care, tertiary care, super specialist facilities*" (p0065-Au).

Brazilian doctors using asynchronous telehealth advice services also reported scheduling difficulties for the inclusion of telehealth services in their routine practice. During working hours, use of a computer was seen as additional work which should be done outside of working hours, for instance, "*the doctor goes home, thinking of an unresolved patient case … at 08:30 at night he accesses the platform and says: 'Look, I have a problem'. But ideally he could do this while he works*" (p0109-Br). These difficulties indicate that when telehealth service involvement is considered as additional work, it is because pathways for patient referral have not yet been mapped into existing processes.

6.3.5 Mapping pathways and referrals

Treatment and management of people within the health system requires agreement to be reached between physicians, clinical departments, hospitals, and health organisations on the processes to be used. Processes guide and refer patients through the system, from consultation to consultation and procedure to procedure. These agreements are commonly known as "models of care" or "patient pathways" and include guidelines of the types described previously: agreed processes and contractual arrangements. Pathways are a good example of healthcare codes encapsulating agreements of a social, financial, and clinical nature between actors in a health system and technical (clinical) processes to be undertaken by these actors. An Australian telehealth centre manager described how pathways could change when telehealth technologies are used:

> *redesigning models of care is important because that takes into account a whole range of things. So how are referrals made. Who ultimately has responsibility for the patient. How is information shared. How are services billed, how they're scheduled. How is information transmitted back to the primary care provider … it's taking a much wider perspective on the whole journey of care.* (p0065-Au)

Telehealth services can emerge as solutions to problematic patient care experiences during periods when the broader health system was redesigning patient pathways. In South Australia, a “Transforming Health” initiative (Government of South Australia, 2015b) had the “*premise of transforming health … there was a complete realignment of services. There was a focus on increasing ambulatory rehab and there was a real sort of redesign of a lot of the rehab services*” (p0001-Au). This provided an opportunity for powerful senior clinicians on a state-wide committee to argue, “*because the numbers you are talking about … one of the premises is treat(ment) at your home reducing travel, all that sort of thing. We can't do that unless we have telehealth*” (p0001-Au).

Patient care pathways are normally rooted in practices established within existing healthcare contexts and “*are generally based on existing relationships anyway and they - yeah, we just supplement them*” (p0090-Au). For new services where those relationships do not exist, a Queensland radiation tele-oncology service had an opportunity to design “*right from the start from the start … an advantage, nothing to change … so I wrote the model of service*” (p0035-Au). Because many pathways are based on existing relationships, as an Australian nurse observed, they may not and generally do not “*identify telehealth as an alternative … it doesn't encourage its regional specialists to provide telehealth services into the region as a way of managing outpatient strategies*” (p0103-Au). A Brazilian state health department secretary described the reliance on existing relationships as causing services which “*are fragmented within the same type of service, among types of service, levels of care, primary care, specialized care, hospital care”* (p0054-Br), and suggested that:

> *somehow information systems and Telemedicine itself could help this to be organised.... But there is … the need to contract the [health services] and this is not clear in Brazil. So it would be important for us to develop a contractual relationship with the various types of service and to require a little integration.* (p0054-Br)

As part of system reforms, Brazilian states such as Rio Grande do Sul have progressively implemented mandatory referral protocols defining the clinical criteria for referral of a patient from primary healthcare to a specialist. A state-wide review of services in Rio Grande do Sul in 2006-7:

> *evaluated the waiting lists for the specialties and … identified the most frequent reasons for referrals from the interior to Porto Alegre in each specialty. We identified that seven to eight reasons account for 80% of requests for specialised consultations. Once the most frequent reasons had been defined, our team reviewed the literature and defined, based on the evidence, the clinical situations that the specialised care will really make a difference in the care of that person.* (p0142-Br)

Subsequent service redesign, in which telehealth technology was to be applied, was based on the "*resolution of the day to day issues of primary care teams and providing evidence-based answers appropriate for primary care*" (p0158-Br). As reforms progressed there were 15 specialities covered by these protocols by 2018, which included referral protocols using telehealth services. Referral must include signs and symptoms, treatment and examinations to date, and reference to any discussion of the case with the telehealth advice line (TelessaúdeRS, 2018). Also in Brazil, the Santa Catarina tele-advice service "*implemented mandatory teleconsulting for access to specialists. So, before a referral to the orthopaedic specialty, we implemented mandatory telehealth advice. So, in this way, we generated significant improvement*" (p0136). A mandatory referral protocol for dermatology (Piccoli et al., 2015) was implemented in 2013 because "*things at least here in Brazil work if you have a clear process. So the way to force staff to make this referral through Telemedicine has been by creating this regulation*" (p0129-Br).

Where a mandatory referral to telephone advice to inform referral to specialists has been implemented in Brazil, clinical outcomes have improved and "*out of every three patients that we assessed, two we could solve in primary care*" (p0143-Br), with the benefit that:

> *There's no more extra politico horse trading going on.... Everything is monitored through the telemedicine system. Now we have the one model … where every travel is registered. Every specialised consultation that is done out of their hometown is registered and where we can prioritise things according to the needs of the patient.* (p0137-Br)

In Australian healthcare, there are few examples of tele-advice services:

> *because there's no funding model to support that. The only models, we do have a couple of services starting … instead of consultants seeing patients they meet as a*

group once a week or once a fortnight and do essentially a whole series of case conferences so they can learn from each other. (p0032-Au)

Many Australian telehealth services commented on the existing relationships which determine the implicit codes governing referral of patients to specialists. When those relationships do not exist, according to a cardiology specialist; "*patients … do a lot of travel they need not do just because there's no one there who realises that they don't need to refer them to a big centre, they can just refer to a telehealth review*" (p0086-Au), whereas in other areas, referral pathways are "*working very well. I find they're very well-established. We have a very well-established relationship, they refer cardiology issues to me … even their acute presentations, they will just give me a phone call rather than anyone else*" (p0086-Au). Development of such implicit codes for patient referral illustrates how practices can begin to change.

6.3.6 Changing practice

Participants reported changes in practice enabling adoption of telehealth services. Initial experiences of telehealth technology were often key to further adoption. A telehealth coordinator observed that:

amongst the surgeons who simply refused to do it and said there's just no way we're doing it - there were half a dozen of them - went to the stage of eventually one said that he'd give it a try and then the second person saw that person and became competitive and all of them have started doing it and now all of them compete and see how many patients they can bring in. (p0065-Au)

The coordinator continued, "*once they've got an initial appointment organised for them by our team, their whole mindset changes and then they realised it's really good. Once you get over that mindset that it is something extra that I have to do*" (p0064-Au). Participants referred to other situations where practice changes are seen as generating additional work:

I think with old school doctors you walk into clinic, see a patient face to face and that's it. Some of them see it as extra work: having to logon, dial in and see that patient in Charters Towers or wherever when patients could just come in and be part of the clinic. (p0064-Au)

Additional work arising from practice change can be viewed through two lenses. On the one hand, the patient waiting lists can be reduced by introducing new practices in primary care (p0132-Br), for instance, when a patient with high blood pressure and diabetes "*goes to a health post and says that 'the cardiologist said that I have to see an endocrinologist'. And I say 'no, I can treat diabetes. It is not necessary'. And there is conflict*" (p0156-Br). On the other hand, in a small clinic:

at three o'clock in the morning and you've got three assistant-in-nursing on with one registered nurse, the easiest thing for them to do from a resourcing perspective is to say you need to go to a hospital and you need to go. They don't want to be a videoconference with an ED [Emergency Department] physician telling them that they need to give fluids, start antibiotics, whatever the management plan may be. (p0063-Au)

Reluctance to undertake the additional work required to access telehealth advice services was described by a Brazilian technologist as being due to "*many professionals do not want to sit at a computer, they do not want to spend time, to do that*" (p0118-Br). The same participant suggested that "*by letting the professional freely decide whether or not he will do it, we will not ever achieve the usage levels that we hope would be needed, to actually avoid most referrals*" (p0118-Br). This viewpoint was echoed by a specialist using the example of the adoption of electronic medical records in Queensland: "*the* (electronic medical record) *... imagine you left it to the clinicians and we will let you decide to use it. It would never have happened*" (p0069-Au).

Application of patient-centred care concepts requiring members of multidisciplinary teams to work together to understand the diverse needs of patients has caused conflict with existing practice. A Brazilian primary health doctor discussing cardiology care felt that cardiologists should "*review all their practice, abandon everything they were used to doing … I think it is intrinsic to put the patient perspective before one's own interest … I think there is an important conflict here*" (p0155-Br); a Queensland specialist frankly stated that if his colleagues had to do patient-centred care, "*they would walk out*" (p0097-Au). Existing speciality-based clinical practice was questioned at several levels:

It's the multidisciplinary approach versus the old paternalistic people. The way that surgery is run, it's very acute, the old model is you know ... and the whole hospital ... OPD is sort of run using the acute model. It's not run using the chronic model. (p0036-Au)

It was reported that clinicians who have adapted their practices "*all sort of said they had to take a step back and sort of really think about how they speak to the patient in terms of their communication style*" (p0071-Au). Allied health professionals providing tele-rehabilitation were particularly creative and felt the new technology had improved their understanding of patient problems:

allows us so much more contextual relevance where you've got a patient who is my main problem and this is an example is my back pain and like pain really cracks on *when I have to turn the lawn mower on and I own a lawn mowing business and I can't mow lawns at the moment.* (p0071-Au)

A physician reported changes in how they felt about their practice after adopting telehealth services: "*before it was kind of like … I'd check that I had my shirt buttoned up and I'd remember everybody's name, whereas now it's just another way of human communication ... I think the big change has been myself*" (p0039-Au). Another stated, "*I saw two new patients today that I've never seen before … the technology is better … it's easier and it's more convenient ... which meant that I could just do it as a routine part of my weekly clinic*" (p0076-Au).

6.3.7 Summary

Legislation and regulations were described by participants as shaping telehealth services, especially in Brazil. Strategies also had an important role to play, although they were not always considered effective. Guidelines were valued by clinicians, but not always considered necessary. Clinical and administrative process, whether explicitly written down or implicitly internalised, were, however, key to the operation of services. Models of care or patient referral pathways which map clinical processes, guidelines, and contractual arrangements helped practitioners understand how telehealth services fitted with the system. However, enduring practice change required telehealth services to become a routine part of clinical practice.

6.4 Adaptation of Professional Behaviour

This section explores the adaptation of behaviours by health professionals as they become providers of telehealth services. The subsequent section examines the role of relationships between health professionals in building telehealth services. A number of themes (see Appendix R) emerged from participant interviews. These included the degree of acceptance of telehealth services, how risks are managed, the need to triage patients and the need to build trust in colleagues and services. Participants in this study provided rich and complex responses which illustrated several issues. Is it possible to accept a new practice or technology without first assessing the consequences of its use? When is a new practice considered trustworthy? Or does acceptance and trust only emerge over time from within new practices and processes?

6.4.1 Accepting telehealth services

The concept of acceptance of a thing or service has roots in behavioural psychology models (F. Davis, 1989) where user acceptance of a thing is seen as synonymous with actual use of a thing. While behavioural psychology models have some limitations (as discussed in Section 3.5.1), acceptance or use of a service, practice, or technical object emerged as a theme among participants. Acceptance was seen as related to the skill base or digital literacy of physicians, the training received, and the usability of the technology. Interviews with participants revealed diverse explanations for the range of acceptance and partial acceptance of telehealth services. Six participants reported variable acceptance: "*they get to pick if they want to see patients by telehealth or not. So I think so some do it more than others. Some don't do any*" (p0131-Br).

Participants who commented on acceptance (*n* = 35) focussed on the time it had taken for clinicians to start using telehealth services. In some cases, "*It took a long time and it took some harsh conversations*" (p0060-Au). Other clinical groups reported, "*It's been more a question of when can I start using it and how can I start using it, not why do I have to start using it*" (p0018-Au). It was reported that use spread as the result of professional interactions: "*where nurses have worked in a particular HHS, got to the next HHS, and … and gone why are you guys not using TEMSU more?*" (p0082-Au). An orthopaedic surgeon reported that one of his "*Principal House Officers - we had … went off and did urology, got his [fellowship] and has come back to our hospital and guess what he's doing. Telehealth in urology in the room next to me on Fridays*" (p0097-Au). In small teams, there was a snowball effect: "*all of a sudden RN Y will use it and all of a sudden it will be RN X and RN Y. So once people use it it's there and they think about it*" (p0090-Au). Use of telehealth services depended on the skills of staff, also referred to as digital literacy.

Digital literacy among physicians was seen as a requirement (six participants specifically referred to this concept) in Australia and Brazil, particularly for older physicians. "*I feel strange in front of the camera. Today the younger medical cohorts, are already there with cell phones, using Skype, already more habituated*" (p0120-Br). Training to improve the digital literacy of physicians was highlighted as a recommendation in many of the Australian telehealth guidelines reviewed in Section 2.2. Not all telehealth services had built-in training, and were rather at the stage where training was "*probably something that we should consider*" (p0035-Au). Others undertook informal training because nurses "*they're not used to that part of it. So we just got the nurses room together and a couple of them learning so that lots of people know you know how to do it*" (p0079-Au).

For services supporting emergency medicine, training was "*a very large component of what we do. I'm doing some training this afternoon with one of the rural sites.… But definitely education and training is just ongoing. We see it as bread and butter work for us*" (p0090-Au). Training could be an informal, in-service activity, "*a community of practice model … peer led conversation and learning that allows individuals to work out what their own learning goals*" (p0006-Au) in an allied health setting.

Formal training is taking place in some university medical courses: "*we actually we put it into all our exams now … everyone had to go online and do the you know the telehealth group [ACRRM] … they've got this online course for clinicians*" (p0011-Au). Brazilian telehealth services have explicitly promoted education and training as a key activity because "*to teach is to do. This is the philosophy that created telehealth*" (p0127-Br).

Participants (*n* = 17) were interested in the usability of telehealth technology for clinicians. In particular, technologists (*n* = 6) were concerned that technology was easy to use. According to one technologist, this could be achieved through co-designing activities:

> *we actually did a design team that involved two clinicians embedded and actually co-located with the development team so that there was an immediacy of feedback of does this work and getting that and 1) the actual delivery time I would say it was halved and 2) there was absolute engagement from the end users … when they hear that two clinicians had designed this.* (p0106-Au)

When technology was not easy to use, clinicians felt that "*I have to click in three places to make a transaction. Here I click a button and it works and here it doesn't. It cannot be like this, it has to be faster*" (p0121-Br). Poor technology design increases the risks to clinical practice.

6.4.2 Managing the risks of separated care

Sixty participants commented on the potential risks of using telehealth services. Many participants (*n* = 21) felt that telehealth services created no additional risks for clinicians or patients. Risks were thought to be lower for patients when travel was avoided or rural clinicians were better supported (n = 5). The different nature of risks for patients, clinicians, and health services was highlighted by some participants (five Australian participants); for instance, it was pointed out that "*I think there's huge risks for the healthcare service for not offering quality diabetic services in those areas"* (p0061-Au). Four participants acknowledged that risk was always present: "*there is a certain element of risk. I mean it is just the same as if you have a face to face and the person is sitting there saying yes I understand everything and they don't"* (p0087-Au).

Six Australian and one Brazilian participants were concerned about possible legal or ethical issues arising from the use of telehealth services. Responsibility for the patient is one such issue, because care across places introduces more than one medical professional into the care process; for instance, "*there are cases that went wrong by telehealth where there was a problem with who was really responsible*" (p0011-Au).

It could be expected, given widespread societal concerns about the privacy of information held or transmitted on electronic platforms, that this would be of concern to practitioners of telehealth services. However, not many participants (*n* = 12) commented on issues of privacy, which may indicate that it had not been a significant problem for telehealth services. Participants did express concerns about possible breaches of patient confidentiality and had either put in place processes to protect information, "*we instruct professionals to delete photos"* (p0146-Br), or relied on safeguards in the technology platform: "*you need to make sure that your videoconferencing platform is secure*" (p0001-Au).

A number of participants (*n* = 14) had put in place processes to manage risks: "*we do review of a patient with results of a scan which carries the risk of having to tell bad news over teleconference medium with only a nurse there*" (p0016-Au); one specialist reported, "*I've tried to control that by basically saying that where possible I will not see somebody where it's so urgent they had to be seen within 24 hours*" (p0039-Au). Privacy risks arising from the use of devices were seen as controllable: "*the reporting doctor for examinations can only see the examinations that he reports*" (p0129-Br).

Clinicians were able to make judgements about the possible risks of using technologies for care. According to one researcher, "*most GPs didn't, the first time they picked up a mobile phone, decide they'd take photos of all of their patient records and carry them around with them. They actually developed an ongoing sense of what's appropriate, what's not? I'm willing to talk to my patient online, I'm willing to get an email from them - those sorts of things*" (p0028-Au).

Clinicians formed their own independent judgements on the risks of using different technologies even when technologists gave advice that a particular technology (such as Skype) should not be used. *"I don't know what the rules are actually. It's not official policy but we certainly use it [Skype]"* (p0076-Au). Clinicians were also able to re-purpose older technologies which some considered had limited functionality: *"when we created telephone support, several telehealth centres ridiculed us like this, 'Ah, using the phone is not Telemedicine.' 'How are you going to discuss it over the phone?' Well, ever since they invented the phone, a doctor answers the patient on the phone!"* (p0054-Br). Clinical judgement of risk was clearly most important when deciding how, where, and when to treat patients, a process known as "triaging".

6.4.3 Triaging patients to manage risk

Triaging of patients for clinical condition and suitability for participation in telehealth services was seen as a key process to control for risk (*n* = 32). A variety of triaging methods and criteria were evident. Brazilian telehealth services use a formal process of triaging to regulate and reduce waiting lists for specialist treatment. This process deals with the risk to acute patients arising when "*there are waiting list that are not prioritised, there are acute patients waiting months for a consultation, because someone else has no urgent need*" (p0126-Br).

In Brazil, central state- or municipality-wide units examine the information provided by referring primary health doctors. On the basis of that information, patients are allocated a place in the waiting list, or the referring doctor is asked to provide further information. The decision to refer a patient always rests with the primary health doctor. Telehealth advice lines provide assistance to primary health doctors during the referral process and have been successful in reducing the waiting lists in many specialities. According to one participant in Rio Grande do Sul, the impact of triaging and telehealth services reduced the waiting list from 190,000 people in July 2014 to 97,000 people in May 2016 (personal communication, 2018):[20]

> *We have seen good results. For every three patients we triage, we are able to treat two in primary healthcare ... because when we elaborate the triaging protocol, we look at waiting lists and establish protocols that take account of 80 to 85% of problems.* (p0143-Br)

Australian telehealth services triage patients on a variety of criteria including the distance the patient has to travel, "*It is generally because they are most isolated that we choose them, because they can't get in all the time and so you offer them that solution*" (p0095-Au), or their condition: "*It's based on clinical lead in terms of the appropriate, are they appropriate for non-surgical management and they want it*" (p0071-Au). Both doctors and nurses undertake triaging: "*It is generally allocated to one or two of our clinicians, who do all the triaging for cardiology"* (p0034-Au) or "*a set of senior nurses who do a triaging sort of brief intervention whatever if they think a psychiatrist needs to come in then they organise it*" (p0008-Au). A South Australian mental health service which has developed over more than 20 years attributed its continued existence to a number of factors including co-location of teams, and use of triaging protocols (Hyde & Fielke, 2009).

Triaging in some services can give priority to high acuity patients. "*I've seen patients for the first time. I have. It's not my preferred way again because I should be able to examine the patient and I can't. So these are the emergency visits*" (p0016-Au). They also use telehealth services to provide additional support: "*For maternity in itself, we do telehealth for any high risk patients. Some of them will prefer to go down and have face to face and then there are some women who decline … and want to do telehealth*" (p0087-Au). The triaging process was used by telehealth services to decide which patients needed to be seen in-person or referred to a specialist in the acute sector. Triaging helped build confidence that patients were getting the best treatment available.

6.4.4 Building trust between health workers

Having confidence in the care provided via telehealth services was based on three components of trust identified by participants: firstly, knowing fellow professionals and thereby having confidence in their skills, specifically other clinicians (n = 9); secondly, having confidence to apply new processes and technology (n = 12); and thirdly, becoming familiar and having confidence in the functioning of technology and the systems (n = 5). A strong implicit belief in the value of a pre-

[20] Author's field notes, Rio Grande do Sul, Brazil. 2018.

existing relationship between health professionals who work together while separated by distance emerged. Namely, to know the person,

> *is also about the trust in the person at the other end. So you're asking a clinician at the other end to provide you potentially with clinical information but you don't know that person and you don't know that you can trust their clinical ability so that can often be deemed risky.* (p0032-Au)

Having physically met with a person at some time in the past was considered important to clinicians: "*you probably know that trust is a lot about how the human world works. So some of the sort of tactics I used to try and help people get trust in me is to have met me face-to-face*" (p0039). Clinicians who "*don't have relationships with referring doctors or other sites … find it very difficult to, without any rapport and knowing who they're talking to at the other end*" (p0065-Au). However, a Brazilian doctor explained that as time passes, "*people get to know the tele-consultants*" (p0145-Br). An Australian nurse indicated that trust was easy to develop with new doctors:

> *for me we just move on. Like if that geriatrician leaves, the first couple of consults that you see the next one, you see how they work and what their focus is on, and you just adjust the way you provide the information, or kind of just read what they're going to be looking for and you pre-empt it.* (p0092-Au)

Building trust is influenced by the relationships between professional roles and requires accommodations to be made by the parties involved in separated healthcare activities:

> *one of the things that can be tricky in the roles is that GPs who join into a consult with a specialist, they are actually quite intimidated and it's quite scary for them to take part in a consult with the specialist and usually they are in a position of power and superiority with their patient and suddenly they are taking a back seat and that's quite a shift.* (p0085-Au)

A Brazilian doctor described this accommodation process as being related to a degree of professional insecurity, because "*the fact that I am connected to a colleague to discuss a case, in some way shows some weakness of mine, something I don't know, some difficulty that I have*" (p0156-Br). An extreme example of insecurity reported by a Brazilian telehealth coordinator was of doctors who "*are frightened to ask questions, write, or ask clear questions*" (p0117-Br). Nurses had the same difficulties in using telehealth services, exacerbated by a feeling of professional inferiority compared with doctors because nurses "*feel a little more uncertain about using telehealth because initially it was something that doctors used*" (p0156-Br). However, an Australian specialist felt that a positive outcome of working with other doctors at a distance was that "*I would rather see a patient* *on telemedicine in the primary care clinic with their primary care … than see them by myself in my own office. I think there's no doubt I practice better*" (p0049-Au).

Participants' confidence in the technologies supporting telehealth focussed on the confidentiality of information carried by those technologies. Some participants felt that "*the truth of the matter is most people couldn't give a stuff* (about privacy)" (p0014-Au), but participants also compared the security of telehealth technologies to established technologies because "*we're still using fax machines in hospitals to transfer very significant clinical documentation. Why? Because that's what we trust and that's what the system is built around*" (p0063-Au) and "*and the irony is I guess a telephone conversation or a fax machine can be intercepted by phone more easily than video material*" (p0009-Au).

Australian participants (*n* = 23), in particular, referred to the importance of technical and administrative support staff in building trust in telehealth services:

> *You know one of our criteria one of our things was we need to have IT people in the teams embedded … we could not have worked with help desk model … you can't have a job locked and … you know if you've got a patient in front of you need someone there who can troubleshoot to deal with it because it's a clinical situation.* (p0001-Au)

Participants in established telehealth services recalled "*the IT help desk that has been supported for many years now. Where we can just pick up a phone talk to someone and within five minutes the problem is sorted. Which does not happen for other IT things*" (p0016-Au). IT was considered a key success factor "*so sometimes when the technical and clinical work together that things go well you know*" (p0002-Au). An Australian specialist commented that once the telehealth service was embedded:

> *we have from a retrieval perspective I think we have what we need in terms of a support network. I suppose it is about continuing to enable the clinicians to use technology in a way that supports practitioners and patients. We have sold the concept, it is now an accepted model of care.* (p0084-Au)

6.4.5 Summary

When health professionals become providers of telehealth services, prior attitudes, skills, ways of working, and professional relationships can change. Professional behaviours which support use of telehealth services include the ability to use or adapt the technology (the usability), acquisition of new skills (training), and adopting triaging principles to new processes. As a result, confidence and trust is built that technology, colleagues, and services will support safe, quality care.

6.5 Building Relationships to Support Telehealth Services

This section explores the building of relationships to support telehealth services. The subsequent section examines the importance of resources and funding for telehealth services. This section is not linked to a specific research question but has emerged from identification of a number of themes (see Appendix S) in participant interviews which spoke to the need to build relationships when developing telehealth services. Identified themes showed that participants valued collaboration between individuals and organisations, leadership, and development of networks. These themes were particularly important for physicians and telehealth coordinators working in states with developed telehealth services. Participants referred to leadership and the role of champions across all settings, especially by telehealth coordinators, managers, and physicians.

6.5.1 Collaboration is integral to care

In healthcare, collaboration has always been an integral part of care processes. Collaboration has been described by participants as occurring within small groups, across facilities, within states, and between government departments. For example, a Brazilian family health team comprised *"a physician, a nurse two health technicians and six community health workers. We established a WhatsApp group*" (p0109-Br). An Australian telehealth service had "*clinicians sitting in on every session … a community mental health nurse, the patient's case manager or it may be a hospital registered nurse if it's an inpatient. So we do really maintain close links with the nursing teams"* (p0026-Au). A telehealth coordinator highlighted that "*you have to have a team, that is working with you … I can't do anything by myself*" (p0133-Br).

According to a hospital-based clinician, "*collaboration works well when there are good relationships and co-operative structures between the GPs and ourselves. So you know and there's got to be willingness on both ends to work out systems that work"* (p0012-Au). When this willingness does not exist or the system context discourages collaboration, telehealth services are particularly difficult to establish. One physician noted:

> *the Department of Health has very little influence over the running of a hospital system. It's all very individual network based, so there's no driver to make it more efficient because the … districts compete with each other, compete with each other for work to whatever may be, and have no interest in cooperating because it's not what we're about.* (p0086-Au)

A consultant summarised doctors' attitudes to telehealth service provision as "*if they see their bosses embracing it and doing it of course they're not going to say no ... I don't think that they ... they don't expose themselves to any more risk by doing it*" (p0035-Au). Such formal manager and employee relationships were felt to be key enablers for cooperation in service provision (*n* = 19 participants) within organisations, together with personal relationships (*n* = 35).

Building communities of practice was observed to be another mechanism used to promote collaboration. In South Australia, a telehealth service established:

> *communities of practice within each discipline or profession. So within allied health we split them up into a speech pathologist who has their own community of practice, physio an exercise physiologist you have one, social work … and they are given an opportunity to have an open forum to trouble shoot to talk about challenges to talk about any issues and experiences that they're going through using the technology.* (p0006-Au)

In Brazil, SIGs illustrate the value of cooperation at a national scale between the education and health sectors and educational institutions:

> *Eleven years ago we did not have a body of health information technology involved in telehealth ... now we have matured. We produce knowledge, we have people involved who believe in the tools, but when we started it was a small group.* (p0116-Br)

When collaboration becomes formalised into organisational partnerships it becomes a powerful lever for systemic change. The Brazilian Telehealth Program described in Chapter 5 is a good example of collaboration at the national and state levels. In the Brazilian case, collaboration between the Ministry of Education and the Ministry of Health was key to improving the work of the family health teams where "*Brazilian telehealth on one hand the Open University of the Universal Health System [UNA-SUS] and the National Telehealth University Network [RUTE] where three joint initiatives … responded to public policy demands*" (p0116-Br).

The Australian Telehealth Pilots Program described in Section 5.7 was the product of cross-sector collaboration to support telehealth services. A report in 2010 recommended a coordinated strategy should be developed for eHealth trials across the new Australian NBN and testing of the telemedicine technologies (National ICT Australia, 2010) which led to establishment of the program. However, after the Telehealth Pilots Program was completed, national cross-sector collaboration in telehealth has appeared to stall. In Brazil, national collaboration has continued, albeit with increasing difficulties due to financial constraints. A Brazilian participant commented:

> *I think it's this partnership between the university and the state health department … let's say, it was a happy coincidence that these two ... and at the time that Telemedicine was implanted there was a superintendent here and he had a*

progressive vision, he had a vision that Telemedicine was something very good. (p0140-Br)

When national stimuli are absent, telehealth collaboration has shifted to the state level in both countries. At this level, in some states, it proved possible for leaders to build relationships between health departments and state government that have resulted in sustained commitments to telehealth.

6.5.2 Leadership develops supportive relationships

Leaders, colloquially known as “champions” of telehealth services, have a crucial role to develop relationships, as one manager indicated:

> *From my perspective working in here and me reporting to the DDG [Deputy Director General] and having a relationship with the DG [Director General] and her office has been pivotal in ensuring this works. More just being able to influence things and at the right time, chuck things in about telehealth. Telehealth has always had the support of, has always had a focus in Queensland, as you know it has the biggest, best network.* (p0084-Au)

A Brazilian telehealth leader felt that:

> *A culture and a champion are needed. There has to be someone who will promote the plan. Champions are not always in a position to coordinate. It is an internal political question. Our first 19 institutions were chosen in this way … were chosen as champion institutions. And certainly in the champion institutions there were champions.* (p0108-Br)

Australian participants (n = 36) referred to the role of champions more than did Brazilians (n = 9), (statistically significant using a two-tailed Z-test, N = 135, $p < 0.01$). For some telehealth services, the role of champions has had lasting impact:

> *[He] was driven by his enthusiasm you know and mental health was started by clinicians with enthusiasm. Now it's so embedded that the structure it's run by a person that didn't have any enthusiasm for telehealth but took it on as part of the operations of the unit you know. So that one's fully sustainable and embedded.* (p0002-Au)

Champions can have different ways of working: “*If you've got a champion who quietly goes about setting up a pilot and then gradually rolling it out, endeavouring to do it with the least moving parts. And endeavouring to do it within budget. It will work”* (p0017-Au). Having a champion does not always lead to sustainable telehealth services:

> *And then they got a new doctor in who'd come up from Melbourne and she used to do telehealth there and her first thing is why aren't we doing this. So she started and then slowly it's starting to expand.… On the other hand we had … departments [where] we've had one champion there for many years … but until recently the rest of the department have been … been completely disinterested.* (p0032-Au)

Sometimes it was necessary for a champion to stand back: "*Well I think that was actually a liability during the rollout.… It was sort of being seen as my pet project that I would roll their eyes on the implementation committee. So I kind of pulled right back*" (p0011-Au).

Champions have important roles: to bring people together, to break down obstacles, and to build bridges across organisational boundaries. A Telehealth coordinator in a Brazilian state recalled how "*I convinced the health secretary, and we convinced the governor, directly the governor and the governor gave us carte blanche as well and so a contract was made between the Health Secretary and the federal university in the state*" (p0133-Br). The result of this initial support allowed

> *open channels to all municipal governments, talk to them convince them that this was a good thing for them. It was much better than horse trading for ambulance places. And these channels never close at least not with the small cities. [We] are at liberty to call the Mayor of all these small cities and talk to them or her if necessary. The political support of the small cities is important for the State Government.* (p0137-Br)

An Australian telehealth coordinator was described as "*a bit of a bridge to … the arms of health within the SA government to … build some of these relationships ... so he is influencing the culture of the way that we use ICT in health*" (p0006-Au). Telehealth coordinators were seen as "*our bridges across those … boundaries. They're the network that are able to identify these issues*" (p0063-Au) and are able to:

> *make things happen and ... very good at knocking down barriers. And in particular in country where you know you'd have a region or a hospital or a hospital manager say oh no, I can't have my staff doing this and he would just get on the phone and make it happen.* (p0017-Au)

Participants leading the implementation of telehealth services repeatedly referred to the work required to convince people to adapt their practice: "*you have to have change champions people that are just going to doggedly pursue something that they think it's going to work and hopefully bring people along with them*" (p0001-Au). In simple terms, a trauma physician likened this process to "*the CPR of consistency, persistent, resilience*" (p0084-Au); a specialist felt that there were three ingredients to success: “*1 People, 2 Technology and 3 Perseverance”* (p0131-Br). Leaders consciously built networks of relationships.

6.5.3 Networking formalises relationships

Networks between organisations and people are a more formal expression of collaborative relationships; in this study they took various forms including committees, commissions, communities of practice, and deliberate tearoom conversations. Networks have been reported by participants as key to the operation of telehealth services. When formalised within existing governance structures, “*clinical networks actually have formed sub committees specifically around 'Okay for our specialty, let's talk all things telehealth*'” (p0075-Au). Networks still require leadership to act as bridges between different groups: “*I think one of the purposes of our telehealth support unit team is we are kind of the glue in between all of those groups like we are the conduit*” (p0075-Au). Telehealth managers are able to use networks as:

> *an enabler for me to get to clinical leaders to discuss opportunities and all and all barriers around telehealth adoption. So having a broader profile does enable me access to a very wide range of specialist providers and their steering committees and their broader networks.* (p0063-Au)

Because Brazilian health services are decentralised to the level of municipalities, they depend on formal networks to agree on joint initiatives within each state. These networks (Bilateral Management Commissions) have, in several states, agreed on the protocols for triaging patients for specialist treatment using telehealth services in order to manage waiting lists (p0126-Br).

As a counterpoint to the impact of decentralisation, various forms of collaboration across organisational boundaries have emerged, often supported by state health departments. In the state of Santa Caterina, “ *(because) there are few large municipalities that manage to resolve their own problems by themselves. The majority depend on the state to coordinate (healthcare) regionally*” (p0126-Br). Consequently, collaborative governance has evolved to coordinate care and telehealth services using bipartite management commissions between the state and municipalities. For instance, in Santa Catarina “*a meeting between state and municipal managers decided that in several specialities the referral of patients would be regulated through the (telehealth) network*” (p0126-Br).

State-wide governance mechanisms in Australia have also played an important role in supporting telehealth services within state boundaries. In South Australia, it was felt that a “*governance committee and the communities that practice … helps to influence that what can be most effectively and efficiently done state wide*” (p0006-Au). In Queensland, the state health department has been successful in keeping:

telehealth as a state-wide technology. The technology and the infrastructure, keeping that as a state-wide service and a state-wide support, bandwidth is still managed from a state-wide perspective … I think is one of the major factors that's keeping us you know with the trend of increasing telehealth. (p0075-Au)

Underpinning networks within organisations depend on professional relations and were particularly important to Brazilian participants (*n* = 21) compared with Australian participants (*n* = 2), (statistically significant using a two-tailed Z-test, *N* = 135, p < 0.01). The work of creating and maintaining relationships within an organisation is significant. One telehealth coordinator recounted how she "*had to form working relationships or reasonable relationships with all the directors.… There are probably in my work sphere about 300 or so people that require active relationship maintenance*" (p0036-Au). Some specialist telehealth services into regional Australia make a point of forming relationships with physicians in these localities:

In Roma, we flew out to meet the GPs face to face. In Mt Isa I never met them face to face ever and in Mackay I never met them face to face but definitely in the public hospital we took the trouble to fly to Roma to meet all the GP and nurses face to face before we set up the telehealth service. (p0068-Au)

Other relationships are established using less-formal methods, "*so the state-wide network's good for implementing background stuff that makes things run better, but the tea-room conversation is the best way of getting people [indecipherable] on board the process*" (p0086-Au). Established relationships are seen as particularly useful: "*my contact with the Secretary of State goes back years, so it was easy to agree common objectives and make partnerships because of that previous relationship*" (p0126-Br). Established relationships bring with them credibility:

We knew each other and there was credibility and respect that had been earned over a period of time. You can't just go in and say ... I'm really good at telehealth, this is what we are going to do. It is about having a relationship there already having worked with somebody in the trenches, spoken to them about a certain patient, they know they can rely on you. (p0084-Au)

6.5.4 An example of relationships in action

Participants described at length the role relationship building played in establishing telehealth services. This edited vignette is an account of how the central characters of Julian, George, Flores, and Christine (real names are not used) worked to establish Brazilian telehealth centres.

And the only other person who understood what we were talking about how to model this service and ... was, Christine.... And also Flores from the Ministry of Health.… But finally, *they understood a little and having understood a little, they made contact with us after the meeting, more particularly with me. They called and told me and they had realised that only Julian and I understood what the need was, and they had the resources. So they wanted us to continue participating, in a second meeting …*

I went to look for Julian because I noticed how he and I were in great agreement, and said "Julian, I got this call, I want you and me to decide together where this project will be based, so we can do everything together" … So I informed the Ministry of Health that we would accept receiving this project and we would coordinate it together ...

Between me and Julian that year, I had little more time, so I did the literature review … I read all that in English. I do not like reading English so much, but I read it all. Every week I met with Julian and said, "Look, there is nothing new" or "this week one of the articles has a very important point". I did that entire year of 2006. In that year we created the role of the tele-regulator which at that time did not exist in the literature. So the role of a family medicine tele-regulator would respond to the problems of primary care doctors and determine who can answer those questions.

Meanwhile Flores had been promoted in the hierarchy of the Ministry of Health ... she asked me to write a draft of a national regulation which all telehealth centres would adopt and she approved the regulation. (p0158-Br)

The relationship between these two doctors enabled the review of options existing at that time for telehealth services. This review led to the creation of a unique function within Brazilian telehealth services of a "tele-regulator" in family medicine who would respond to the problems of primary care doctors. Such vignettes of relationships in action are not unique; similar constructive relationships have been key to building telehealth services elsewhere in Brazil and in Australia.

6.5.5 Summary

Participants spoke of the need to build relationships when developing telehealth services. Collaboration between individuals and organisations, leadership, and development of networks were particularly important themes. The work of relationship building in the telehealth service of one Brazilian state has been illustrated, through a case study around four characters who together played pivotal roles in shaping the Brazilian telehealth program. This vignette demonstrated how close relationships between medical professionals shaped the formation of the Brazilian telehealth program. Relationships built during that formative phase, particularly with a representative of the Ministry of Health, were key to the future success of the program.

6.6 Resourcing Telehealth Services

This section explores the importance of resources and funding for telehealth services. The subsequent section examines the extent to which telehealth services have become routine, embedded, or normalised within the healthcare system. This section is not linked to a specific research question but has emerged from analysis of a number of themes (see Appendix T) in participant interviews.

6.6.1 Availability of infrastructure

Availability of infrastructure (technology and facilities), an educated workforce, and funding for telehealth services were major themes encountered in interviews. These concerns were particularly evident for telehealth coordinators, managers, and physicians in states with developed telehealth services (Queensland, Santa Catarina, and Rio Grande do Sul). Infrastructure (technology, physical facilities), human resources, and medical education form the foundation of existing health services and telehealth services. Although communications technology has changed over the past 20 years, many health professionals interviewed for my research (*n* = 46) still viewed technology infrastructure, especially communications, as a constraint to improving telehealth services.

> *I think it really though depends on a high-quality consultation/connection. Occasionally, and this is one of the reasons why I haven't been overly keen on going out to GP or patient clinics is that often the broadband connection into those places is poor and once you start dealing with a poor audio signal it really makes the consultation difficult.* (p0061-Au)

Australian participants were concerned about internet capacity. One participant felt that "*it is getting better now but occasionally it is really hard for them to see me and me to see them because the packets are not big enough, whatever you call those things*" (p0005-Au). Other participants expressed frustrations with Wi-Fi services, computers, medical records, videoconferencing applications, and mobile devices. In contrast, Brazilian telehealth services were based on asynchronous technology requiring lower connection speeds:

> *because we had that 300kbps limitation. I thought at the time this is not an efficient way of doing it because synchronous tele-consulting has the problem that…. You are taking a specialist, an expert and he's committed to you for this one hour. You were not efficiently using the expertise. So I proposed here for our telehealth people an asynchronous model.* (p0137-Br)

Communications technology is essential for telehealth services. As a Brazilian participant explained, "*now the big problem is that in the interior of Maranhão, the shortage of internet is huge*" (p0052-Br). The neglect of information technology provision within some health facilities provoked comments from Australian participants that "*Wi-Fi in every single facility would be very helpful*" (p0079) and "*in all the aged care facilities their Wi-Fi infrastructure was terrible and needed technical improvement*" (p0002-Au). Australian clinicians were concerned about "*rooms and also which room (patients are) going to go into and which room has telehealth capability and which doesn't, who's going to be there, which nurse is going to attend*" (p0077-Au).

Tensions over investment priorities for infrastructure exist. In many Brazilian states, "*the major state investment has been in physical care units…. Which was a priority*" (p0053-Br). In some states such as Santa Catarina, "*Today our infrastructure is much better. All our health posts are air-conditioned. Of 59 facilities more than 30 are totally adequate from a sanitary perspective and all have disabled access*" (p0136-Br). Given the historically low level of investment in the Brazilian public sector, the physical environments of many facilities provide poor conditions for patients. Physical infrastructure of health facilities is important, but participants also recognised the need for providing staff in these facilities with the competencies necessary to support telehealth services.

6.6.2 Providing a healthcare workforce

Uneven distribution of an educated health workforce, particularly specialists, is associated with differential access to health services and facilities for the general population. Remotely delivered services may simply change the mix of staff skills applied to care in both the peripheral and central centres. An Australian physician commented:

> *I think that the biggest impediment to the roll out is the resourcing of the peripheral centre in terms of having an administration officer and a person to sit in on the consultation to take notes. So that actually involves resources and to an extent you don't really need it. The only reason why you need an [administrator] making the appointment up there is because they're [the patient] actually physically coming into the hospital.* (p0061-Au)

Such comments (*n* = 26) arise because Australian telehealth models attempt to reduce patient travel to specialist centres by diverting patients to peripheral facilities which then provide staff to host remote consultations. The Brazilian telehealth model described in Section 5.7.2 reduces patient travel to specialist centres by retaining patients in primary health facilities and providing advice to local clinicians on how to manage conditions, thereby avoiding the need for additional administration or nursing time directly linked to a remote consultation.

In both Australia and Brazil, when staff cannot be retained in regional locations, the difficulty of managing or treating regional patients is compounded because "*you get a good relationship going with somebody … particularly remote sites, and that person then leaves because no one stays in* *remote sites terribly long … and suddenly it all falls apart with no links anymore*" (p0086-Au). Questions of isolation, professional development, personal security, and salary all play a part in high staff turnover, particularly of family doctors: "*sometimes salaries are more attractive in other municipalities. Frequently it is a question of vulnerability*" (p0124-Br).

It is difficult to avoid the conclusion that staff retention and recruitment are key to the improvement of care and access to care whether that care is provided remotely or not. Education of health professionals was seen as a means of improving staff retention. In 1995 the Australian Federal Department of Human Services and Health produced a report known as the Project for Rural Health Communications and Information Technology. The report acknowledged that "the majority of healthcare providers feel professionally isolated in their work location" (Australian Rural Health Research Institute, 1996). Twenty years later, an Australian nurse was able to comment, "*So really these young doctors have got nobody to support them. They are learning off each other but now we have got the telehealth they feel reassured*" (p0087-Au).

In Brazil, the need to develop the knowledge base of medical professionals was at the core of development of the telehealth services, and this need has been met through the creation of SIGs, hosted by the Brazilian Telemedicine Network (RUTE). Medical education was particularly important for Brazilian participants (n = 31). A coordinator of a telehealth centre outlined the educational philosophy used as being one of "*Permanent education. Our tele-education is rooted in the idea of problem solving. We have emphasised this approach and try to support workplace needs. Our educational philosophy is to identify the needs and put in place the required support*" (p0135-Br).

6.6.3 Healthcare activity funding systems

Funding for telehealth services was a prominent theme and concerned Brazilian participants (n = 52) more than Australian participants (n = 33) (statistically significant using a two-tailed Z-test, N = 135, $p < 0.01$). Because telehealth services have been developed to serve the needs of regional populations where access to acute care is geographically limited, the funding provided to primary care should be a key factor in determining the services which patients can access. Financial challenges to telehealth service provision were reported by one nurse (p0096-Au), because "*I just saw the benefit for the clients and I just ... that was fantastic. But management was looking at the bottom line. The money*".

Australian healthcare funding is generally based on activity, calculated according to the number and type of procedures or consultations provided to patients, including telehealth services. Calculations may be influenced by workforce organisations, such as the AMA. Telehealth services are often viewed as an additional workload meriting additional payments. The Australian government provided about $28 million per annum (2017-18) for telehealth specialist consultations over a limited range of specialities and procedures (DoH, 2019b). Only recently have changes been made to allow general practitioners to claim for mental health consultations (RACGP, 2018). It is worth noting that, with the exception of diagnostic services, these payments are only made for telehealth consultations which use videoconferencing. Activity payments from the Federal Government accrue to the healthcare provider or the organisation for which they work. Payments are at a higher rate than standard consultations according to rates set in the MBS.

Brazil has a table of rates for different procedures in the health system although the rates do not reflect actual costs. One manager observed, "*for ECG [electrocardiograph] exams the payment has not changed for 20 years ... For example R$5.15 [about $1.50 Australian] is the amount SUS [the Brazilian health system] pays for an electrocardiogram*" (p0127-Br). In the main, these payments have benefited telehealth services providing diagnostic services and exclude telehealth advice services which have, to date, been the dominant form of telehealth service.

6.6.4 Incentive or "fee-for-service" payments

Payment of incentives to healthcare providers to undertake work seen as additional to traditional face-to-face consultations has been a feature of healthcare funding and telehealth service funding in Australia at the federal and state levels for some time. The intention of incentive funding is to increase the availability of telehealth services by encouraging more health professionals to use telehealth services. Some state governments, such as Queensland's, provide selective incentive payments within their state health systems for telehealth activity in the belief that travel costs for patients and professionals will be contained and clinical outcomes improved if patients can be serviced closer to their place of residence (Queensland Health, 2019). Otherwise, telehealth activity attracts no additional funding which means that practitioners who see telehealth as requiring extra work are reluctant to provide telehealth services. A manager observed, "*there's only funding built into the model for outpatient not-admitted activity. We have an incentive around emergency, we have an incentive around admitted patient, an incentive around store-forward*" (p0063-Au). Clinicians often take a pragmatic view of funding. According to two participants:

> *we've got a number of hospitals who are mainly our provider sites for.... They don't see that as an issue because they'd be seeing the patients anyways, particularly patients coming from rural areas where you don't have those specialties. So whether they see them face to face or telehealth it's not going to really blow out the numbers* (p0070-Au),

and

> *people like myself have never charged Medicare fees but for tele consultation because it's difficult to do tele billing and because I've got a soft spot for the country from having*

been a flying doctor I actually just do it at the fees they offer us for Medicare … I would make more money by consulting face to face here in Adelaide than sitting in the teleconsult room. (p0007-Au)

Currently (in 2020), the fee-for-service payments of Australian healthcare are a limiting structure for telehealth services. For instance, in the new funding for patient to GP telehealth treatment, only GPs in the remotest regions (Monash level 6 and 7) will receive incentive funding from November 2019 (DoH, 2019c). This restriction is based in fears that GPs operating in metropolitan areas could undercut rural GPs if they were allowed to offer telehealth services.

6.6.5 Annual block funding of health services

As an alternative to incentive funding, annual block funding of telehealth services against performance metrics has been used to support telehealth services in both Australia and Brazil. There are many examples, but in a prominent initiative in Australia, the Telehealth Pilots Program provided $20.6 million of funding between 2013 and 2015 to nine projects across the country using broadband services to support healthcare. Queensland and South Australia have provided capital injections and support for running costs of telehealth video services. For instance, Queensland provided $30.9 million over 4 years from 2013 to 2017 (Bryett, 2015).

Telehealth centres in Australia and Brazil have benefited from state government and research funding. Researchers at the University of Queensland Centre for Online Health received about $5 million of funding from the National Health and Medical Research Council between 2013 and 2018 (National Health and Medical Research Council, 2019). Between 2007 and 2012, the Brazilian Ministry of Health funded nine universities to provide teleconsulting, telediagnosis, and second opinions. However, block funding of university-based telehealth centres led to unintended consequences when "*In 2012 we had an initiative in Brazil to open new telehealth centres, including in localities that did not want a telehealth centre, but felt obliged to participate because funding was available*" (p0151-Br). Many of the smaller Brazilian centres did not survive and "*there was the weakening of several university-based telehealth centres although some were able to grow, as in the case of Rio Grande do Sul*" (p0053-Br).

For established telehealth centres in Brazil, block federal funding has been substantial. The telehealth centre in Santa Catarina has received about 3 million Reis (about $1 million Australian dollars) annually in the period 2011 to 2017 to provide teleconsultation services (A. Silva, Carneiro, & Síndico, 2015). Rio Grande do Sul has received about 85 million Reis since 2009 for a number of project and services (R. Umpierre, personal communication, 2018).

Many Brazilian telehealth centres face cash flow problems due to delays in agreeing contracts with the Ministry of Health, or late payments of contractual instalments. During 2018 and 2019, many centres had yet to finalise agreements and have received indications that their funding will be substantially reduced. One telehealth manager complained, "*the government has cut our funding ... we will have to stop everything on the 22nd, because we have no money*" (p0117-Br). Some Brazilian states have negotiated additional once-off agreements for equipment or have entered into partnership agreements with state governments which provide in-kind support or financial contributions. For instance, "*with 1 million Reis from the state health department we established a [teleradiology] project to support 80 municipalities … the department adopted the project and commenced to fund this form of care. And until now we support 800 municipalities*" (p0113-Br). Paradoxically, although Brazilian telehealth services improve patient access to healthcare, municipal governments are not obliged to contribute to their respective telehealth centres although they benefit most from reductions in patient travel expenses. Another issue is that legislation limits the entities with which federal and state organisations can enter into contractual arrangements. A coordinator of a telehealth centre indicated, "*we have difficulties receiving money from municipalities.... The university has problems receiving resources that are not of federal origin*" (p0151-Br).

Collaboration with the private sector can bring more resources for telehealth projects or new services for patients but enable government to avoid funding of public health services. Brazilian telehealth centres collaborate with philanthropic organisations to "*find things in common, with the difficulty that objectives are different*" (p0126-Br). However, the risk of being accused of corruption has led Brazilian telehealth centres to channel such arrangements through public entities controlled by government (p0133-Br, p0144-Br, and p0151-Br).

6.6.6 Summary

Availability of infrastructure, especially communications networks, an educated workforce, and funding for telehealth services are key mechanisms affecting telehealth service development. Funding for telehealth services was shown to be of major concern. Telehealth services are constrained by the type of funding available: activity funding, incentive funding, and block funding arrangements and the rules applicable to each funding type. While telehealth services have been developed to serve the needs of regional populations where access to acute care is geographically limited, it is the level of funding provided to metropolitan centres to run public telehealth services which is the key factor in determining the accessibility of services.

6.7 Reconnected Care – Routine, Embedded, or Normalised?

This section explores assessment by participants of whether telehealth services have become part of normal healthcare. This section is not linked to a specific research question but has emerged from analysis of a number of themes (see Appendix U) arising from participant interviews. During semi-structured interviews, participants were asked for their views on whether telehealth services were considered routine care. Some participants expanded their answers to discuss the degree to which telehealth services were embedded and normalised, although these terms were not well defined. More than half of the participants (*n* = 76) were able to provide an assessment of the state of telehealth services in Australia and Brazil in 2018.

6.7.1 Are telehealth services routine or risky?

Where possible, all interview participants were asked, "Now telehealth services have been operating for some time, are they seen as routine, or still perceived as risky? Why?". Seventy-four participants responded to this question, with smaller numbers also elaborating on whether telehealth services were embedded (*n* = 45) or normalised (*n* = 31). Participants placed the following meanings on these terms:

1. Routine, where there is regular use of telehealth services within context;
2. Embedded, where processes for the use of telehealth services have been applied and the service appears to be reasonably mature; and
3. Normalised, where telehealth services are seen as ordinary care and a readily available healthcare delivery mode.

Participants, on the whole (77%, 117 out of 151 assessments),[21] felt that the majority of telehealth services were routine, embedded, or partially embedded and normalised in healthcare operations (see Table 18).Table 18.

Normalisation of Telehealth Services in Australia and Brazil

Assessments[22]	Yes – AU	Yes – BR	Partially – AU	Partially – BR	Underway – AU	Underway – BR	Not – AU	Not – BR
Routine *n* = 76	55%	64%	12%	32%	14%	0%	18%	12%
Embedded *n* = 44	41%	33%	41%	40%	0%	0%	17%	27%
Normalised *n* = 31	85%	18%	5%	45%	5%	9%	5%	27%

Australian telehealth services were rated as much more normalised than their Brazilian counterparts. Brazilian participants were at pains to emphasise "*telehealth is not a consolidated state strategy with a fixed budget. This is one of the difficulties*" (p0144-Br). Participants who had

[21] Participants were able to provide more than one assessment, e.g., rate telehealth services as both routine and embedded.
[22] Participants made assessments of whether telehealth services were routine, embedded, or normalised. More than one assessment was possible.

been involved with long-standing telehealth services tended to feel that services were routine, but there was room for improvement.

6.7.2 Are telehealth services routine?

Participants who had been involved with long-standing telehealth services tended to feel that telehealth services were routine. A South Australian psychiatrist recalled that they "*joined Country health in 2011 and that [telehealth] is actually something which works.… Yeah. It's just part of our repertoire*" (p0008-Au). A Brazilian doctor said, "*yes, now it has become a routine, there have been 13 years of operation, since 2005, there are still cities there that were in from the beginning*" (p0140-Br). Many participants felt that there was some degree of routine use of telehealth services, but there was room for improvement. Even in Queensland, which has an extensive and growing telehealth network, a hospital telehealth coordinator saw "*a future where telehealth is part of day to day practice but at the moment other than gamma knife I would say no*" (p0029-Au). A general practitioner stated that for him telehealth was routine, but "*It's not as embedded as it should be*" (p0103-Au).

In one Brazilian state, a telehealth coordinator (p0053-Br) felt that 22 municipalities could be considered routine providers of telehealth (Brazilian states usually have several hundred municipal areas). In another state with a large telehealth centre, "*20% of doctors use teleconsultoria* (telehealth advice services) *in routine care; 80% do not use it. I'm just talking about the doctors who have used the service once*" (p0143-Br). In 2012-13 the Rio Grande do Sul telehealth centre began to offer a telephone advice service that had the same aims as the computer-based service, but "*gave people the opportunity to deal with doubts quickly. It is a much more agile service which gives support when it is needed. We answer 80% of issues in the same call within 10 minute*" (p0142-Br). This telephone advice service has had greater uptake, providing national coverage because "*requesting doctors can call the service during the consultation or shortly afterwards. This gives them the flexibility to fit the support services within their own work routine*" (p0142-Br).

Participants linked assessment of telehealth services as routine to the number of patient encounters. Because telehealth services are not yet operating at a volume whereby they contribute a significant proportion of total health service interactions, a Brazilian telehealth coordinator estimated:

> *Today, Rio Grande do Sul has 10 million people living there. We have 10 million inhabitants, so we estimate that annually we're going to have something like 20 million, 25 million primary care consultations. More or less, in Brazil today, we offer 2 to 2.5 consultations per inhabitant per year. It is a very low value. In a year, for teleconsultorias, as I recall there are about 50 thousand teleconsultorias for Rio Grande do Sul ... so that's going to be 0.2% or so.* (p0143-Br)

An Australian telehealth service in Queensland, which has experienced high rates of growth, reported that in their catchment area there were "*around 800,000 outpatient consultations in a single year and we delivered just under 4,000 via telehealth. So the ratio is still very small … and out of those 800,000 many of them wouldn't ever be appropriate for telehealth*" (p0029-Br). However, individual clinical services can achieve higher utilisation rates. A radiation oncologist reported that "*referrals come in from all areas. But I think it's probably somewhere around 15 to 20%*" (p0035-Au). Ultimately, utilisation can be limited by the available funding: "*during the last 4 years we have not been able to grow because we do not have the financial support. We were growing at about 80% per year*" (p0143-Br).

6.7.3 Are telehealth services embedded?

Embedding telehealth services takes time "*to get our heads around and to understand and to know what process worked and what didn't*" (p0001-Au). A specialist took 5 years to build telehealth up "*to around about 25% of my work. So about 700 consultations review consultations 600 to 700 consultations in the last couple of years*" (p0012-Au). A cardiologist found that to schedule appointments was "*a bit tricky sometimes, we try and embed telehealth is just part of the normal process just part of the normal clinic*" (p0079-Au).

Extension of existing services can occur following the successful implementation of a service in one location. In Queensland, a dermatologist reported that a neighbouring hospital now had "*a dermatological consultant there, they also have a registrar and for various reasons we could not do kids here, so basically they are doing it now based on our sort of model*" (p0038-Au). However, simple service duplication was not always successful: "*the instruction was duplicate the Argentinian service in Brazil. But the legislation is different. I cannot just replicate what's in the other country and bring it here*" (p0123-Br). Extension of a service within national or state boundaries is sometimes more successful. The Rio Grande do Sul tele-advice service was planned to be "*offered to Porto Alegre, Belo Horizonte - in Minas Gerais - Federal District as a whole … Manaus and Maceió*" (p0142-Br) and the Santa Catarina tele-dermatology service "*will be implemented in other states*" (p0126-Br).

Among participants there was recognition of the progress made in embedding telehealth services, although telehealth coordinators were more cautious in their assessments; "*I think although we're not there yet, I think in the last 17 years we've moved away from telemedicine or telehealth being seen as something special, nice to do, quite unique*" (p0065-Au). Another said:

> *I would consider us a maturing program. I wouldn't consider us a mature program but we have managed to get telehealth embedded into a very broad range of specialties. Is it embedded. No, not yet but it's well on the way. It's embedded in many locations but it's not embedded right across the state.* (p0075-Au)

One of the main reasons expressed for caution was the instability of funding. An Australian aged care telehealth initiative ceased when the funding finished (p0106-Au). A Brazilian telehealth centre in Sao Paulo had to suspend operations while waiting for a federal government payment and the national telephone advice line operating out of the Rio Grande do Sul telehealth centre also had to reduce operations for a similar reason (p0146-Br). One of the principal reasons for this instability is that many Brazilian telehealth centres are not recognised in "*state policies … if there were state policies, no minister can remove resources, do you understand? The problem is that it is project and, being project, the minister [can say] "ah … That's expensive, I'm going to cut it*" (p0052-Br).

Participants linked the embedding of telehealth services in mainstream healthcare with the continued availability of funding predicated on reduction in costs and improvements in system efficiency. Participants who commented on the costs and benefits of telehealth services were of the view, or quoted data to show, that telehealth services were able to reduce costs and improve efficiency. In the main, participants spoke from the perspective of their own clinical contexts; for instance, telehealth *"drops the consult time from 25 minutes down to about 17 or 18 minutes. It sounds like a very small margin for us but we see about 170 patients through here a day with 14 rooms*" (p0036-Au). Managers tended to take a broader view of the available data:

> *So what we see is telehealth activity increasing 40 - 50 % annually year on year for a number of years and we continue to see that [patient travel] spend go up. So telehealth is probably in some instances meeting unmet demand and in other instances via the provision of a new telehealth service, it's identifying a broader cohort or a broader range of patients that can have some interaction via telehealth that need to travel for other parts of their care. So we're not seeing the return on investment from a financial cost saving point of view.* (p0063-Au)

Telehealth services can result in expenditure being delayed or shifted within the system and "*it looks like it saves money over a one month period. Certainly in the community. But then someone ends up might end up in hospital although that's okay because it's spending somebody else's pool of money*" (p0009-Au). In some cases, a telehealth service improves efficiency because it "*allows you to do more with the same money. So it's not necessarily saving money but it's stopping you from spending more. And you're seeing more cases and we did see that very convincingly*" (p0011-Au).

Thus, assessments of costs and benefits are influenced by the scope and context in which they are undertaken. A broad assessment of activity within the health system is important. Many of the assessments of telehealth services do not include information technology costs. Even when these costs are included it is difficult to cost use of shared infrastructure such as buildings, telephone systems, electronic health records, networks, computer rooms, administration, maintenance, and support. Telehealth service infrastructure comes at a cost:

> *We've got four techs, two customer service officers and two specialized level three techs and then myself. Cost of labour is about a million dollars. Total cost of services when you include stationary computers, the accommodation costs. That's our second biggest obviously. It's about $1.6 million [AU] a year. Then we have lifecycle management which costs me somewhere around 4 to 6 million [AU] a year which is replacing old devices.* (p0080-Au)

Ultimately, many costs are placed in the category of "overheads" which are necessary for the operation of health services but cannot be attributed to any one health service. Transport costs are one such overhead and motivated a Brazilian telehealth manager to say, "*when we started the project I wanted to show them how much money they were throwing out of the window. But that's what you call here ambulance therapy*" (p0137-Br). However, transport savings arising from a provision of telehealth service may not be large. A study of a dermatology service in Santa Catarina, Brazil found savings of between R$901,195.80 and R$410,218.35 during one year (2017) for 25,049 examinations (Von Wangenheim & Nunes, 2018, p. 61), which is about $AU6.50 per examination.

6.7.4 Are telehealth services normalised?

Three quantitative indicators are commonly applied to measurement of telehealth service normalisation: available funding, the length of time the service(s) had been operating, and the volume of patients seen using the service(s). Australian participants that felt telehealth services were part of normal practice reported that their telehealth service "*hasn't changed in the last 10 years. We still are referred by somebody else, by another specialist usually*" (p0074-Au) and "*It's just … modality now. It's nothing special … it's just our day-to-day routine.… We've got so much other ancillary equipment that can help bridge that gap with the hands on*" (p0089-Au).

A Brazilian telehealth centre which had been able to obtain long-term state funding for a large telediagnostic service recalled how their services were now taken for granted, "*once we reduced the waiting lists. And people have a hard memory and they don't remember how it was 15 years ago*" (p0137-Br). An Australian specialist recounted that:

> *I've built up a large practice in the Mildura area … and it also links it to our Endocrine training in Flinders Medical Centre here in South Australia. So we actually do eight lists in the space of 2 days. It's very high speed. We're a bit buggered.… Personally I love it. It's improved my life and I think it's improved the quality of the service delivery … I don't have a nurse or anyone in the room with me it's just as if I were doing an ordinary consultation.* (p0007-Au)

A state-wide coordinator provided a nuanced view of the extent of telehealth service normalisation:

> *The model that we, or the service that we provide or facilitate is usually fairly new to those places … so getting clinicians to embed it is probably the really difficult thing. It's very rare to find resistance in my experience. That certainly occurs. There are some people that will put up barriers … very variable I would say across the state. There's some places that have been using us for quite a while and they're really individual places ... these sort of places use us regularly, often every day or at least every couple of days, and I think it's really embedded there where it has been normalised in their processes. But that's a small minority.… I think, certainly in rural Queensland, there's a familiarity with using telehealth in an emergency through Retrieval Services, who have been doing it for 10-12 years now.* (p0090-Au)

Other participants simply stated, "*it's just ordinary care. Within the Gamma Knife we don't necessarily see it as an innovation. We just see it as part of ordinary care … that is just because it's been there from the start*" (p0035-Au).

Activity of many services is steadily increasing (see Section 5.7). Table 19 shows that telehealth services commenced as early at 1998 and are increasing at about 20% p.a. However, telehealth services are not yet operating at a volume whereby they contribute a significant proportion of health service activity. In Australia, in Queensland and South Australia, non-admitted patient events in these states was about 1.2 events per capita in 2016-17 (Australian Institute of Health and Welfare, 2018). Table 19 shows that telehealth patient events (mainly comprising non-admitted patients) in these states represented a small percentage of healthcare activities on a per capita basis.

Table 19.

Comparison of Telehealth Services by State in 2018[23]

State	Services commenced	Service modality	Telehealth events per capita	Growth rate 2015 to 2018 (%)
Queensland	1998	Video	0.028	35.0
South Australia	1998	Video	0.007	28.0
Rio Grande do Sul	2008	Advice	0.003	22.0
Rio Grande do Sul	2013	Diagnostics	0.001	21.0

[23] Author's estimates are based on unpublished documents collected during field research and published sources (including (Australian Department of Human Services, 2019; Gray, 2019; TelessaúdeRS, 2017; TelessaudeSC, 2017, 2019; Umpierre, 2019).

State	Services commenced	Service modality	Telehealth events per capita	Growth rate 2015 to 2018 (%)
Santa Catarina	2007	Advice	0.003[24]	-
Santa Catarina	2005	Diagnostics	0.131	17.0

6.7.5 Summary

Contemporary healthcare has typically been provided within specific places or facilities, so there are numerous challenges faced by organisations and healthcare professionals in extending care beyond and across those places using telehealth services. Many services report telehealth activity increasing annually year on year for a number of years although their patient volumes are small compared with place-based care. A majority of participants involved with long-standing telehealth services, particularly in Australia, felt services were routine, but opinions on the extent to which services were embedded or normalised were more cautious and it was thought that telehealth practices would take time to become fully mature.

[24] Incomplete or limited data available.

Summary of Findings: Part 2

Consistent evidence emerged from these interviews that telehealth services are influenced by the organisational and professional contexts in which they operate. When healthcare activities are supported at a distance by ICT services, then geographical, organisational, and professional service boundaries and the divide between tertiary and primary care are challenged. These boundaries proved frustrating for participants who felt that equitable access to healthcare is a deeply rooted principle of universal healthcare. In Brazil, the prime motivation for telehealth service provision has been the improvement of primary healthcare. In contrast, Australian telehealth services grew out of a desire to improve access to hospital outpatient services for regional populations.

Participants claimed that telehealth services have the potential to reach underserved populations, to use clinical time efficiently, and to facilitate improvements in the skills of isolated health providers, but participants in both countries complained that when supportive organisational direction or strategy is absent, the implementation of telehealth services becomes more difficult. Participants reported that implementation of telehealth services has not always been easy because the technologies (devices, networks, and applications) deployed by organisations to deliver telehealth services have not been designed and built for supporting healthcare activities at a distance, and have difficulties interoperating or facilitating information exchange between place-based health professionals.

Challenges to traditional conservative clinical practices and routines arise when healthcare activities are separated by distance. Contributing to these challenges was a fear of technology and a lack of control over technology on the part of clinicians and concerns over the use of health information systems as a managerial tool in healthcare. Managers and clinicians hesitated to take on additional work and clinicians perceived threats to employment from telehealth services.

Participants felt that successful telehealth services require adjustments to pre-existing models of care in order to design services to support patients' needs, termed "patient-centred care". However, the influence of inherited routines and conservative attitudes has limited the changes to medical practice required to support healthcare separated by distance. Participants identified a generational change in the ability of medical practitioners to appropriate ICT for healthcare.

Four key interactions occurring when telehealth services are used to support healthcare activities separated by distance have been identified from the themes in participant interviews. They are the need to legitimise telehealth practices, to adapt professional behaviour, to build relationships, and to resource telehealth services.

Legislation, regulations, and other codes were described by participants as shaping and legitimising telehealth services, especially in Brazil. Strategies had an important role to play, although they were not always considered effective. Guidelines were valued by clinicians, but not always considered necessary. Clinical and administrative process, whether explicitly written down or implicitly internalised, were key to the successful operation of services. Models of care or patient referral pathways which map clinical processes, guidelines, and contractual arrangements provided an understanding of how telehealth services could be delivered. Opinions differed among participants about the balance between obligatory adherence to modified guidelines which forced change (such as referral regulations in Brazil), and voluntary change of practice, clinician by clinician and service by service. Some participants felt that written healthcare codes were not a prerequisite for the implementation of telehealth services, or they may have preferred to rely on implicit codes, such as clinical reasoning. Where explicit codes existed, they were:

- valued for the credibility, authority, and protection provided against criticism or possible legal processes arising from adverse clinical events;
- used for mapping tasks and procedures in order to bridge the spaces between different medical record and appointment booking systems; or
- not fully complied with, viewed as restrictive or out of date, and circumvented.

Professional behaviour, including prior attitudes, skills, and ways of working and relationship, change when providing telehealth services. Behaviours which support use of telehealth services include the ability to use or accept the technology and acquisition of new skills. Acceptance of technologies used by telehealth services was dependant on a clinician’s digital literacy combined with the usability of technical systems and the support from technical staff. Health professionals reported that they had developed new processes to manage patients (triaging) and control telehealth services. Triaging of patients according to condition, location (distance), and urgency is universally employed by telehealth services in Australia and Brazil. Risk control measures, such as patient triaging, contributed to the building of confidence or trust in new services. Participants identified three components to trusting telehealth services to operate in an expected manner: firstly, knowing the professional colleagues involved in telehealth service; secondly, having confidence to apply new processes and technology; and thirdly, becoming familiar with technology and the systems.

Relationships which helped develop telehealth services, collaboration between individuals and organisations, leadership, and development of networks were particularly important themes in participant interviews. Collaboration between health specialities, facilities, and partnerships sustains services and enables integrated patient care across places. Communities of practice were observed to be one mechanism used to promote collaboration. Chapter 5 described how partnerships supported the early years of the Brazilian telehealth program. When partnerships and support at the national level was lacking, participants described how their focus moved to state-based partnerships. In some states, it proved possible for leaders to build relationships between health departments and state governments which have resulted in sustained operation of telehealth services. Participants felt that the leaders of telehealth services have a crucial role in bringing people together, overcoming obstacles, and building bridges across organisational boundaries in the form of social and organisational networks. Underpinning organisational networks were professional relationships. The work of creating and maintaining relationships within an organisation was reported as a significant task which depended on formal and non-formal interactions.

Resources, such as infrastructure and human resources, were seen by participants as fundamental and important factors in their ability to provide telehealth services. Availability of infrastructure, especially communications networks, an educated workforce, and funding for telehealth services, were key mechanisms influencing telehealth service development. Funding for telehealth services was of major concern: it was seen as an enabler for telehealth services, without which most services felt they could not operate. While some services were operated within existing budgets, others required incentive or transitional start-up funding because extra expense, time, or technology was needed. Participants reported many contradictions within funding systems. For instance, while telehealth services have been developed to serve the needs of regional populations where access to acute care is geographically limited, it is the level of funding provided to busy metropolitan centres to run public telehealth services which determines the services provided to regional patients.

A majority of participants involved with long-standing telehealth services, particularly in Australia, felt services were routine, but opinions on the extent to which services were embedded or normalised in mainstream healthcare were more cautious and it was thought that telehealth practices would take time to become fully mature.

The following chapter, Chapter 7, begins discussion of the themes and issues raised by participants in Chapter 6 and draws on the outline in Chapter 5 of the contexts within which telehealth services operate. Chapter 7 focuses on the influence of contexts on telehealth services.

7 DISCUSSION: THE ORGANISATIONAL AND PROFESSIONAL CONTEXTS OF TELEHEALTH SERVICES

In Chapter 1, I defined context as “the spatial and institutional locations of social structures together, crucially, with the norms, values and interrelationships found in them (i.e., the cultural structures) which condition the potential interactions between social or cultural structures and individual or collective agency” (adaptation of Pawson & Tilley, 1997, p. 216). Implicit in this definition of context is the realist proposition that social mechanisms interact within organisational and professional contexts to produce changes in contexts over time. A generalisation of this definition is that all contexts are the product of mechanisms which have operated over time on different contextual components to produce contemporary contexts. The possibility then exists that some components of context may also be viewed as contemporary mechanisms depending on their proximity in time and relevance to the phenomena under consideration. An example would be where the structure of a healthcare organisation, acting as a contextual factor, historically shapes telehealth service delivery, but when contemporary structural reforms take place, they act as a mechanism, enabling or inhibiting telehealth services. Shaw et al. (2018) make the point that “researchers must judiciously and clearly identify why certain contexts are treated as contexts, and others as mechanisms in a given analysis” (p. 11).

My discussion of the contexts and mechanisms influencing telehealth services focusses on the aggregated, enduring processes of contextual change which have been identified across several states, programs, and projects. The discussion is structured into two parts. Firstly, this chapter discusses the phenomena participants have said were influential in constructing contemporary contexts (see Sections 6.1 and 6.2). Secondly, Chapter 8 discusses the phenomena which participants felt were currently operating as mechanisms to change those contexts over time.

This chapter begins with a discussion of how the concept of context has been used in the studies of telehealth and the broader sociological literature. Discussion then turns to examining the influences of organisational contexts on telehealth services, followed by an examination of the major conflicts which are occurring in professional contexts before turning to discuss the influence of contexts on the sustainability and development of telehealth services. Figure 24 illustrates the organisation of this chapter.

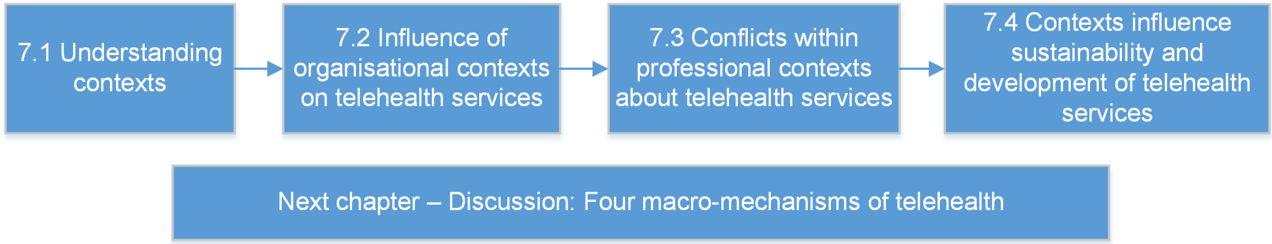


Figure 24. **Organisation of Chapter 7.**

7.1 Understanding Contexts

Contextual borders are pragmatic constructs providing conceptual, virtual, or geographical analytical limits. For instance, in the physical world, borders may be aligned along physical or virtual manifestations such as a river, which marks a frontier between states, or in the boundary between gas and liquid. In the social world, boundaries can be based on physical or virtual manifestations, such as the geographical boundaries of hospital services or the referral pathways of patients for particular specialist treatments. My analysis of the literature (Section 3.3) suggested that two types of context exist, the organisational and the professional. Organisational context concerns the collective interactions which have occurred over time to build social structures relevant to organisational activities. Professional contexts contain the interactions which occur between individuals and groups of individuals within healthcare organisations.

Participants in my research have identified events critical to telehealth service development, such as health reform, organisational decentralisation, initiation of telehealth programs, regulatory change, and economic recessions. Many of these events have been outlined in Chapter 5. Critical events indicate points at which transformations have occurred in contexts, described by Elder-Vass (2010) as a type of “macro-event” of a collective or historical nature, built on other smaller events. C. Williams and Karahanna (2013) have applied critical event analysis within an information technology governance context in order to understand the coordination of activities and projects. Another example of critical event analysis can be found in a case study of broadband technology by Dobson (2013). Dobson combined a morphogenetic approach with Pawson and Tilley’s (1997) realist evaluation methods and explanatory research methods (Danermark, 2002). The approaches used by Dobson and C. Williams and Karahanna were appropriate for organisational case studies but are difficult to apply in extensive research across many organisations. Therefore, in this discussion I seek to generalise beyond the level of specific events seen in organisational contexts to identify the broader processes or mechanisms which events represent. Exemplar processes would be health reform, commencement of a telehealth program, or changes in government priorities, in the context of health systems.

A number of researchers have studied how contexts are influential in healthcare. For instance, Allen et all. (2013) experimented in the application of critical realism and activity theory to the UK

Ambulance and Patient Transport Service. Other authors have written about individual components of context. Case studies of contextual change have looked at the political environment (Urtubey & Petrich, 2002; Whitten & Cornacchione, 2010), policy contexts (Goins, Kategile, & Dudley, 2002; Neufeld, Doarn, & Aly, 2015), economic evaluations (Abimbola et al., 2019; Snoswell, Caffery, Whitty, Soyer, & Gordon, 2018), success factors for information systems (Jen-Hwa Hu, 2003), or organisational issues (Baldwin, Mcauley, & Nostrand, 2012; Gagnon et al., 2005a) encountered in implementing telehealth services, to mention just a handful.

Other studies have focused on individual components of context which are presented to be barriers to greater use of telehealth services (Lerouge & Garfield, 2013; M. Silva, 2011), such as the readiness of organisations to use these services (Baldwin et al., 2012; Cresswell & Sheikh, 2013; Jennett, Yeo, Pauls, & Graham, 2003), or the notion that technology use diffuses through society (Darkins, 2014; Grigsby et al., 2002; J. Mitchell, 1999b). Some studies enumerate factors impacting a telehealth service deployment (Alkmim et al., 2015; S. Scott, Plotnikoff, Karunamuni, Bize, & Rodgers, 2008), or extend factorial analysis into high-level predictive system models (Diment, Yu, & Garrety, 2009; Fujimoto et al., 2000; Jean, Jankovic, Stal-le Cardinal, & Bocquet, 2015). Others have chosen to examine how technology-related practices become socially normalised (May, 2006). A handful of studies take a systems analysis approach to context, including the strategic alignment model (Boonstra et al., 2011), systems approaches (B. Russell, Smith, et al., 2015), and diffusion of innovation theory (Higa, Shin, & Au, 2006; Walker & Whetton, 2002).

The complexity of organisational and professional contexts is evident in the diversity of approaches to its analysis which have been outlined. My approach treats context holistically rather than selectively focussing on individual contextual components enumerated as barriers or factors, and begins with discussion of the influence of organisational contexts on telehealth services.

7.2 Influence of Organisational Contexts on Telehealth Services

The field research question relevant to this section was:

> How may organisational contexts influence the developmental of telehealth services? (RQ3a)

Extant studies discussed in Chapter 3 have viewed context, and components within context, as time invariant factors which simply require modification to enable telehealth service evolution. Rather than focussing on static components of context which seem influential at a given point in time, the explanatory approach (see Section 4.6) used in this discussion identifies the critical processes and events which have been most important to the evolution over time of Australian and Brazilian telehealth services. Most of these processes were readily observable (such as establishment of telehealth programs), but other collective macro-events and transformations (such as the building of broadband communications infrastructure) have occurred over extended periods which are less observable; to explain what is really happening, it is necessary to probe to a deeper level of reality within contexts.

Figures 16 and 18 in Section 5.7 illustrate some of the critical junctures and processes in the development of telehealth services in Australia and Brazil. For instance, political decisions have set healthcare priorities or led to reform of organisational structures, which in turn have provided opportunities for telehealth services or determined the available financial resources. Three processes which have historically contributed to the current organisational contexts in which telehealth services operate today emerged from my analysis of participant interviews. These processes are the shaping of services by healthcare priorities, changes in organisational structures, and the drive to automate healthcare.

7.2.1 The organisation of care and priorities for care

In Australia and Brazil, historically, political struggles have led to the creation of universal healthcare systems and influenced the social priorities of healthcare. Within these universal healthcare systems inequities in healthcare provision remain. Perkovic, Turnbull, and Wilson (2014) questioned what “universality” (of healthcare) means today, because of the inequities in access to healthcare in Australia. Operating at the nexus between universal care and inequitable care, telehealth services are able to extend healthcare to underserved populations within universal healthcare systems (Carey, Wakerman, Humphreys, Buykx, & Lindeman, 2013; Gonçalves et al., 2017; Haddad et al., 2015).

The rationale for delivering healthcare via a universal healthcare system is linked to wider cultural norms and values (Botrugno et al., 2019). Hart has argued that the UK National Health Service provides a material basis for “rehumanising society” (Tudor Hart, 2000, p. 10). In Brazil, the movement to prioritise healthcare as a democratic right was rooted in the creation of the Brazilian universal care system following the fall of the Brazilian dictatorship in 1988. Gerscham (2004), in her book *Democracy Unfinished – A Study of Brazilian Health Reform*, linked the development of democracy and health reform because:

> The potential to expand and reproduce democracy through successive approximations, with the aim of achieving democratic society and political order, helps to conceive of and implement health policies as a process of permanent transformation. (p. 262).

Other movements have influenced telehealth services. According to Almeida-Filho (2011), the desire for universal care “has provoked a strong political demand to replace the reductionist, disease-orientated, hospital centred, specialisation driven pattern of medical education by one that is more humanistic, health orientated, focused on primary healthcare, and socially committed" (p. 1899). Extending this observation, it has been argued that the healthcare landscape is "an important site of political contestation" (Jones, Fraser, & Stewart, 2019, p. 1230). Telehealth services can provide healthcare to underserved populations across geographical and organisational boundaries. Consequently, the rationale for telehealth services is inherently political and inextricably linked with the notion that healthcare should be universally available as a democratic right.

It is therefore unsurprising that many providers of telehealth services interviewed for my research were strongly motivated to improve access to healthcare and to increase the capabilities of primary health professionals. In Brazil, the socially progressive "Lula" government prioritised funding for primary healthcare and education of the medical workforce. Founding principles of the Brazilian Telehealth Program referred directly to supporting primary healthcare (Moura, 2016). Participants described how the Brazilian telehealth program now supports these priorities through extensive advice and educational services.

Governmental priorities for healthcare have influenced the available funding for healthcare and telehealth services. Government priorities can change over time. Participants have described their concerns for the long-term financing of telehealth services following the implementation of austerity measures in Brazil (Costa & Costa, 2017; Massuda et al., 2018) from 2015 onwards (see Section 6.1.1). Similarly, in Australia an initial burst of pilot telehealth service was followed by the Project for Rural Health Communications and Information Technology report which argued for greater support for regional health professionals using technology (Australian Rural Health Research Institute, 1996). However, the "honeymoon" ended with the closure of the Australia New Zealand Telehealth Committee in 2000, as priorities turned towards electronic health information systems (J. Mitchell, 1999a). It was only in 2007, when a new Labor government undertook major organisational health reforms, that priorities changed, and additional payments for telehealth consultations were provided. Nine telehealth pilot projects (see Section 5.7.1) were established focussing on aged and chronic disease care (Celler, Varnfield, & Jayasena, 2018) during this time.

7.2.2 Organisational structures circumscribe services

Even when organisational reform occurs, telehealth services remain constrained by organisational structures defined by geographical boundaries, communications infrastructure availability, devolution of responsibilities for healthcare, capacity to provide services, and design of patient care pathways. Boundaries become significant when they delineate the provision of health services. Boundaries can be described by formal or informal rules defining the location to which healthcare can be delivered, and the health conditions which define responsibilities for treating patients. Despite an ability to cross boundaries, telehealth services remain limited by organisational boundaries and agreements. Geographical boundaries influence responsibilities for care. For instance, until 2007 a number of independent hospital boards served regional South Australia. When a single organisation covering all of regional South Australia, Country Health Local Health Network, was created, it proved possible to implement the South Australian Digital Health Network to support a state-wide psychiatric service.

In 1999, Queensland Health was a state-wide unitary organisation. It was able to construct a broadband network linking health facilities within state borders between 1999 and 2001, specifically designed to support telehealth services. This network was created at a time when information technology governance was centralised into a single state-wide organisation (see Section 5.8). Although there has been a subsequent decentralisation of healthcare to regional bodies, the original structural imprint remains and telehealth services in Queensland are still supported by a statewide unit. These examples illustrate cases where greater organisational size has favoured greater coverage by telehealth service and centralisation has favoured the foundational infrastructure of telehealth services.

Decentralisation has been one of the most significant healthcare reforms in Australia and Brazil over the last 20 years. Decentralisation of healthcare took place in Australia from 2010 (Bennett, 2013) and in Brazil between 1990 and 2001 (Fleury, 2011, p. 1724) and aimed at strengthening local democratic control of health organisations, particularly in Brazil. Decentralisation of care in Brazil (Paim, Travassos, Almeida, Bahia, & Macinko, 2011; Paiva & Teixeira, 2014) appears to have had positive health outcomes (Guanais & Macinko, 2009). However, devolution of healthcare has had mixed consequences for development of telehealth services. In a discussion of radiology services in Norway, Ass (2006) concluded that there had been both advantages and disadvantages arising from decentralisation. Participants in my research have expressed the view that decentralisation complicated the tasks of maintaining state-wide infrastructure carrying telehealth services, because funding and operational agreements have to be crafted across multiple organisations. Maldonado et al. (2016) noted the unintended consequence of decentralisation of healthcare to small Brazilian municipalities leading to fragmentation of healthcare. Brazilian participants reported numerous problems in collaborating with smaller municipalities due to their lack of human and financial capacity to provide and manage the resources required for telehealth services.

The different outcomes arising from the same process of decentralisation illustrate that a single process can have different and contradictory outcomes depending on the context in which it operates. Interestingly, one outcome of decentralisation has been the emergence of new processes. In the absence of centralised healthcare structures in Brazil, substitute structures have emerged. Representative bipartite and tripartite commissions formed under the Pact for Health

(Viana, da Silva, & Yi, 2017) now coordinate healthcare pathways across each state, including telehealth services across Brazilian municipalities.

7.2.3 Contradictory consequences of healthcare automation

Ideally, healthcare pathways and telehealth services should be supported by information systems which can exchange patient information between the organisations treating a patient. According to Savage (2009), “healthcare technology serves as an untapped catalyst for higher efficiency, lower cost and broader access to care” (p. 1). Telehealth services depend on technology to exchange information between places, but healthcare organisations have been seen as lagging behind other industries in their application of information technology to the automation of healthcare processes. As in the case of decentralisation, healthcare automation has had complex and contradictory influences on telehealth services. The case for the use of information technology in healthcare is based on the proposition that automation of health records and processes, such as ordering examinations and medications, will improve the efficiency, reduce costs, and ensure safe healthcare. Whether this proposition was sufficient was questioned by Coiera (2013) who noted that:

> We are often told that national e-health projects must first lay down basic technical infrastructure and that high-value clinical systems will naturally follow, in the same way that laying railway lines is a precursor to delivering transport services. But railways can be too expensive, over-engineered, or not take us anywhere particularly useful — unless there is a destination on which we can all agree. (p. 178)

The first issue arising is that for health information systems to be useful to health professionals using telehealth services, the systems have to support exchange of information with organisations outside hospital boundaries. This level of interoperability has been difficult to achieve (McDonald, 2015b). Thatcher (2016) nominates “immature IT solutions available from vendors” (p. 240) as the second most important barrier to IT adoption. This delay in developing mature information technology can be attributed to the complexity of healthcare and, in the case of primary health, the “cottage industry” character of many providers (DoHA, 2012b; Swensen et al., 2010).

Secondly, despite the perceived advantages accruing from automation, the tensions in implementing health information systems at scale within hospitals have been significant. In principle, interoperable systems can provide access to health information, such as patient records from distant locations, and are essential for successful telehealth services. However, participants highlighted many examples where information technology had been unable to effectively support the exchange of health information between organisations (see Section 6.1.5), an issue which has also been the subject of other research (Moffatt & Eley, 2011; Nov & Schecter, 2012).

Thirdly, the cost of health information systems is large and efficiency benefits have been slow to accrue. Participants pointed out that telehealth services have had to compete for financial and human resources with health information projects. According to the Queensland Audit Office (2018), “The consistent view expressed by stakeholders is that the electronic medical record is an investment in quality and safety of patient care … it will take longer and cost far more to realise the expected benefits than the department forecast”.

In summary, healthcare automation processes have concentrated organisational information technology capacity on place-based hospital information provision, using immature systems which require significant resources. The consequences for telehealth services have been that the resources to provide information technology solutions which fully support healthcare activities at a distance have been unavailable.

7.3 Conflicts Within Professional Contexts About Telehealth Services

The field research question relevant to this section was:

> Can the development of telehealth services be understood through the analysis of conflicts which may influence the relationships between people and organisations in the course of a telehealth service? (RQ3b)

The vast majority of the participants that I interviewed had professional experience as physicians, nurses, or allied health workers. Participants’ current roles were roughly distributed equally between practising health professionals and those in management, coordination, or support roles in telehealth services. My analysis of interviews with participants identified conflicts between clinicians, managers, and technologists over medical practices, separation of care between places, and control of information technology as determining the form of telehealth services.

7.3.1 Separation of care challenges usual practice

Participants interviewed in my research were experienced, had already adopted telehealth services, and were confident users. They were primarily concerned with managing changes to practice when healthcare activities are supported at a distance, rather than focussing on differences with place-based healthcare. In contemporary medicine, the place where healthcare delivery takes place has been central to the conceptualisation and management of care. More than a century of accumulated experience of interactions between health practitioners and patients has become normalised in the form of personal face-to-face consultations in the place of care. My analysis found that splitting of the care role between two or more places, and its reconnection using technologies resulted, with a few exceptions, in changes to models of care, medical practice, and routines.

The dominant model of medical care is place based. However, use of telehealth services to better meet patient needs by avoiding unnecessary travel, providing more timely care, and connecting patients with the expertise they need was anticipated more than 20 years ago, in an introduction to the *Medical Journal of Australia*, which stated “by early in the next century, healthcare delivery will emphasise the importance of bringing care to patients rather than bringing patients to the healthcare system and tertiary hospitals, regardless of where patients live” (MacKinnon, 1997, p. 1). Subsequently, the “bringing of care to patients” as a concept has developed into “patient-centred care” where healthcare services focus on the needs of patients wherever they are located; preventative care has increased importance; and multi-morbidities can be managed by a care team (Snoeijs, Boerma, Schellevis, & Rijken, 2015).

Changes to medical practice occurred when using telehealth services because the usual methods used by practitioners to collect information and assess a patient’s condition changed. Any change in practice raises questions about the possible risks and resulting conflicts over patient management. Participants focussed on whether the information available to clinicians using a telehealth service was sufficient to enable appropriate management of patients and indicated that this judgement depended on the clinical context. For instance, participants felt that the level of useful information was higher when a video consultation replaced a telephone consultation. When a video consultation replaced an in-person consultation, clinicians changed their methods of eliciting clinical information. Some adapted their interactions with patients because of issues “around depersonalization … (and) how aspects of intangibility (such as loss of touch) are negotiated …” (Green, Hartley, & Gillespie, 2016, p. 488). Others relied on diagnostic test results.

Changes to established routines were sometimes required in order to accommodate the scheduling of a second workflow at a distant location or to include the use of a new technology (Halford et al., 2010; May, Harrison, et al., 2003). Adaptation of inherited or usual place-based clinical practice to accommodate separated healthcare activities was reported by participants but required changes in established routines. Participants felt that many of these routines were manifestations of a conservative approach to medicine which included resistance to use of new devices, such as computers or videoconferencing in medical practice.

Many participants had put in place risk-management rules (triaging) to determine which patients were safe to manage using telehealth services. Participants indicated that modification of patient triaging rules for subsequent referral, for remote management, or for immediate in-person treatment, were the most important practice changes made when telehealth services were adopted.

7.3.2 Competing sociotechnical codes influence medical practice

Interviews with clinicians revealed tensions between opposing sets of sociotechnical codes which influence practice, including professional standards, beliefs, and routines or practices relied on by medical professionals. My analysis found tensions and conflicts about the nature of best medical practice, how to respond to patient needs, the role of specialists in team care, and fears of losing professional status or employment. Participants noted that tensions over clinical practices were resolved slowly and depended on generational renewal of a conservative medical profession (Section 6.2.3).

Brazilian doctors linked a perceived conservatism to the conferred status and power acquired in medical school. Medical education provides clinicians with evidence-based knowledge and simultaneously promotes the value of “experiential, tactic and hands-on knowledge and practice” (Nettleton, Burrows, & Watt, 2008, p. 345). Tension exists between evidence-based medicine supported by contemporary medical evidence and judgement based on implicit knowledge, such as customary routine, experience, and personal knowledge (Nettleton et al., 2008). An example was the resistance to evidence-based advice provided by telehealth services in Brazil where telehealth services have made the provision of advice and education for primary healthcare physicians a centrepiece for their services. Motivations for doing so are the improvement of the quality of care for patients. As a result, the Brazilian referral systems and telehealth advice centres are increasingly implementing mandatory application of triaging protocols for referral of patients to specialists known as *regulamentos* derived from evidence-based medical knowledge.

Patient-centred care and team care were noted as emerging concepts which met resistance. Patient-centred care advocates argue for healthcare to be centred on patient needs, rather than on healthcare provider practices. Participants have indicated that some medical professionals feel that their experiences and practices are being questioned by this concept. May (2006) has described how tensions can arise between patient-centred care and evidence-based care. Team care involving multiple medical professions can meet the often-diverse needs of patients. Tensions then arise because clinicians have to work in teams which cross specialisations, facilities, and organisations (Mori, Albano, Contenti, & Mercurio, 2016; Stroetmann et al., 2010) to provide integrated care. Since patients may need access to several specialists in a timely manner, the use of telehealth services to connect healthcare providers and a patient-centred approach are mutually supportive activities.

7.3.3 Control of technology is disputed

Control of technology and the rules around technology have become a site of conflict. Expansion of electronic information systems has required additional technology design, implementation, and support roles. These roles have grown in importance within the public health systems of Australia and Brazil and have gained an ability to shape investment programs in health organisations.

Naturally, technologists are concerned to maintain control over these information systems. It was inevitable that the information technologists and medical professionals would compete for control of this technology. Many participants articulated frustrations with technologists' control over systems which could be used to support telehealth services but were limited to use within an organisation.

There were at least three key stakeholder groups competing to exercise control over telehealth services: medical professionals, especially doctors (Patel & Antonarakis, 2013; Peddle, 2007), technologists (Ruston et al., 2012), and management. Management and funders (Boonstra & Van Offenbeek, 2010; Menachemi et al., 2004) have considerable influence. Patel and Antonarakis (2013) found that the implementation of a tele-dentistry project in the UK required "strategic alignment with clinical and organisational goals, clinical engagement and strong political support" (p. 424). Thatcher (2016) found that the extent of physician resistance was the most important factor in ensuring the successful implementation of systems. Participants highlighted conflict between these groups centred on perceived risks to their respective interests during the development of telehealth services (see Section 6.2.5).

Control by medical professionals over the technology they used and their routines and practices were a key concern for participants. Studies of technology implementations show that there can be both acceptance and resistance to technology by the health profession (Hage, Roo, van Offenbeek, & Boonstra, 2013; Or, Dohan, & Tan, 2014). However, it would be wrong to place responsibility for adaptation just on health professionals. Technologists have a role in developing acceptance or creating resistance to telehealth service. For instance, a South Australia telehealth implementation model was changed to allow technologists to work closely with clinicians through a co-construction design process where they were physically co-located with clinicians. It was reported that the closeness of the ensuing "at the elbow" support from technologists embedded within clinical teams (Leverington & Bassa, 2019) was a critical implementation success factor.

7.4 Contexts Influence the Sustainability and Development of Telehealth Services

My third research question asked:

> How can the sustainability and development of telehealth services, over time and between organisational and professional contexts, be explained? (RQ3)

This question was predicated on the idea that the continued development of telehealth services, their sustainability over time, or their inclusion into "normal" care could be related to the contexts within which they operate. To date, the work of Greenhalgh et al. (2017) is the one contribution which has examined the adaptation of telehealth services over time within a whole of health system context. Greenhalgh et al. classified context into multi-layered domains comprising “the condition or illness, the technology, the value proposition, the adopter system (comprising professional staff, patient, and lay caregivers), the organization(s), the wider (institutional and societal) context, and the interaction and mutual adaptation between all these domains over time” (p. e367).

The findings from my field research presented in Chapters 5 and 6 have shown that organisational and professional influences, that is, the social and cultural structures of healthcare, have influenced both the sustainability and development of telehealth services.

7.4.1 Sustainability of telehealth services

In the literature, there are very different conceptual views of sustainability and normalisation. For instance, Bashshur et al. (2013) views a sustainable service as “a mainstream service fully integrated into the institutional portfolio of services provided by the health system” (p. 343). The concept of sustainability has been discussed by many authors (Cradduck, 2002; Gundim, 2018; Gundim & Wen, 2009; P. Taylor, 2013; Wade et al., 2010, to name just a few of the many contributions), who have suggested that many factors influence the sustainability of services. Another long-standing approach to the embedding of new technology by Rogers (1971) employs a diffusion model where the “diffusion effect is the cumulatively increasing degree of influence upon an individual to adopt or reject an innovation” (p. 161). Rogers acknowledges the relevance of social mechanisms in bringing about change; however, subsequent commentators, such as advocates of Gartner’s “Hype Cycle for Emerging Technologies” (Gartner, 2016), have neglected social mechanisms and suggested that the successful adoption of a technology is naturally a cumulative process, largely independent of contexts which, driven by the competitive advantage, a new technology may offer.

Accepting that structural change in healthcare does occur over time has implications for our understanding of sustainability and normalisation. When sustainability is viewed from the perspective of normalisation, many authors (de Brún, O’Reilly-de Brún, O’Donnell, & MacFarlane, 2016; Elwyn, Legare, Weijden, Edwards, & May, 2008; Finch, 2008; D. Morrison & Mair, 2011; Shulver, Killington, & Crotty, 2016) base their analysis on the work of May (2006) who defined normalisation as meaning:

> the embedding of a technique, technology or organizational change as a routine and taken-for-granted element of clinical practice. (May, 2006, p. 2)

May (2013a) analysed a shared clinical decision-making system using normalisation process theory and found that the ”embedding of an innovation is a state that occurs when these agentic contributions lead to appropriate normative restructuring, the reworking of relational conventions and group processes, the enacting of practices, and their projection into the future" (p. 32). The theoretical perspectives of Bashshur (2013), May (2013b), and Rogers (1971) assume that sustainability is achieved when a new service or use of a technology becomes routine, embedded, or normalised. There is a tendency in the literature to view organisational and professional contexts as a given, not as subject to change, and that therefore technology needs to adapt to a given context in order to be adopted or to diffuse successfully through social structures. This implies that a process of normalisation of telehealth practices to existing practices in mainstream care contexts is necessary. The extent to which contexts influence the development of telehealth services, or to which telehealth services change existing services, is unclear from the extant literature. If contexts were in fact dynamic, then a more reasonable proposition would be that social processes are responsible for changes to both contexts and telehealth services.

The evidence from participants in my research was that telehealth services, particularly in Australia, were becoming routine, embedded, or normalised in healthcare practices. However, even the largest telehealth services in Queensland and Rio Grande do Sul were hesitant to claim that the majority of their services were completely normalised or were operating at significant volumes. Telehealth services commenced more than 15 years ago in Brazil, 20 years ago in Queensland, and 25 years ago in South Australia, but are yet to achieve significant patient volumes compared with place-based procedures. For example, my research showed that across the Australian and Brazilian states I studied, telehealth patient events (mainly comprising non-admitted patients) still represented a small percentage of healthcare activities on a per capita basis, which implies that if sustainability of telehealth services is measured by activity, then sustainability has yet to be achieved.

The premise of this part of my research question, which sought an explanation of the sustainability of telehealth services over time and between organisational and professional contexts, was that telehealth services will develop and become a stable, normal, and sustainable feature of mainstream healthcare over time. In contrast, my research suggests that enactment of modified practices takes time -- a lot of time; that the viability of many services is uncertain; and that only a minority of services claim to be fully embedded and normalised into mainstream healthcare.

Therefore, the explanations for the sustainability or non-sustainability of telehealth services must be sought in an understanding of the interactions of telehealth services with organisational and professional contexts in Australia and Brazil.

7.4.2 Development of telehealth services

Acknowledgement of the role of context in adapting to innovations was made in a systematic review by Fleuren, Wiefferink, and Paulussen (2004) who found that the determinants of innovation were "divided into four categories: characteristics of the environment, characteristics of the organization, characteristics of the user (health professional), and characteristics of the innovation" (p. 107). A Canadian study concluded that:

> Telehealth programs are not isolated, but located within larger health organisations. Moreover, health-care organisations are also positioned in a larger geographical, economic and political environment. Therefore it is important to investigate the context in which telehealth projects are taking place … (Gagnon et al., 2005, p. 32)

My research has found that the most important contextual influences on telehealth services from an organisational perspective have been the organisation of care and its priorities, how healthcare organisations were structured and bounded, and the drive for increased use of ICT to automate healthcare processes.

In Australia and Brazil, healthcare has been organised to be delivered by universal healthcare systems, where care is (mostly) free of charge at the point of care. Nevertheless, there exist inequities and disparities in the healthcare provided by these systems, largely delineated by whether a patient lives in a metropolitan conurbation or in a regional area. Telehealth services have been seen to provide healthcare to underserved populations across geographical and organisation boundaries. Consequently, the rationale for telehealth services is inherently political and inextricably linked with the notion that healthcare should be universally available as a democratic right. The extent to which telehealth services are supported by governments reflects the prevailing priorities for care. In both Australia and Brazil, the priority given to telehealth services has waxed and waned as governments have changed.

Organisational reform is a structural process which has been occurring over time in the health sector. Reform of healthcare in universal care systems in Australia and Brazil has had a profound impact on healthcare structures and culture. Connected to structural reform or organisations are the spatial and institutional boundaries of healthcare organisations that profoundly shape the distribution of resources and relationships between healthcare providers. Geographical and political boundaries which determine where patients are treated are an obvious example. Telehealth services are constrained by these boundaries, even when technically able to operate across them. Spatial distribution of communications infrastructure and human resources has been described as a key constraint for telehealth services, while at the same time providing a rationale for their provision. Geographical decentralisation has accentuated issues of organisational capacity.

The gradual drive to automate healthcare processes using electronic information systems that has been in train during the last 20 years is a structural process which has greatly influenced the development of telehealth services. Although this was not not a focus of my interviews, participants who were directly responsible for the delivery of telehealth services felt frustrated by efforts to automate healthcare processes. Participants regarded electronic information systems as immature, in part because they have been unable to incorporate the many sociotechnical codes of healthcare practice to the satisfaction of clinicians. Participants reported that telehealth services rely on technology to deliver healthcare but are conditioned by the design of these systems to meet the needs of a single organisation in the first place, and only subsequently do they consider exchange information with other organisations. Paradoxically, telehealth services struggle to obtain even a small proportion of the funding allocated to health information systems.

A review of social practices and the uptake of technology in the healthcare sector by Shaw, Shaw, Wherton, Hughes, and Greenhalgh (2017) argued that “health and care technologies need to be embedded within sociotechnical networks and made to work through situated knowledge, personal habits, and collaborative routines”. My research has found that the most important contextual influences on telehealth services from a professional perspective have been the often-conflicting sociotechnical codes about telehealth services. These conflicts have arisen because the separation of care over distance challenges usual place-based practice, because medical practice is itself subject to competing codes, and because control of ICT used in telehealth services is disputed.

The place where healthcare delivery takes place has been central to the way health professionals manage care. Appointments, examinations, procedures, administration, and record keeping have been developed through more than a century of accumulated experience of interactions between health practitioners and patients in a place of care. My analysis found that splitting of the care role between two or more places and its reconnection using technologies resulted, with a few exceptions, in changes to these established processes, medical practice, and routines.

In professional contexts, medical practice is influenced by several sometimes conflicting and sometimes complementary norms, processes, and practices (sociotechnical codes), such as calls to base practice on evidence while simultaneously relying on accumulated experience to guide it. Conflicts arise from the argument that patient management should be patient centred instead of being determined by established practices and patient pathways; or that chronic disease care needs to be a cooperative integrated effort when in fact the medical profession is siloed according to speciality. It is therefore unsurprising that medical practices were reported by participants as being resistant to change (see Section 6.2).

Competition between information technologists, management, and clinicians, collectively and individually, for control of technology was a source of conflict. The prime concern of clinicians was to retain control over practice, including any technical elements to practice, such as information and communications systems. Managers, including managers of telehealth services, looked to technological solutions to improve system efficiency. Technologists have accumulated institutional power which was perceived to hinder clinical practice.

The development of telehealth services can be seen to be contingent on interactions with Australian and Brazilian organisational healthcare contexts and with professional healthcare contexts. The key mechanisms found in my analysis, which influence these interactions, are discussed in the next chapter.

8 DISCUSSION: FOUR MACRO-MECHANISMS OF TELEHEALTH

In this chapter, I consider the major mechanisms found from the analysis of my findings presented in Chapters 5 and 6 which have, and still are, influencing outcomes in relation to the development of telehealth services. In organisational and professional contexts, historical processes or mechanisms, have shaped, and continue to shape, contexts and the telehealth services which operate within them. This ongoing interaction between telehealth services, contexts, and mechanisms forms an interlocking set of processes. The outcome arising from these complex interactions is a new contextual state, a “new normal’, marking the beginning of a new adaptation cycle.

In this chapter, I begin by explaining how the concept of mechanisms has come to be understood within the wider sociological literature. According to Archer (1995), mechanisms cause or influence the state of a context comprised of material and cultural structures. Mechanisms arise from interactions between social actors and may not be directly observable. An example would be mechanisms which are associated with conflict, such as managerial control, which may not be openly discussed by health workers.

Based on these concepts, I show through an analysis of my findings that there are four key mechanisms of contextual change which explain the development of contemporary telehealth services. Figure 25 illustrates the organisation of this chapter.

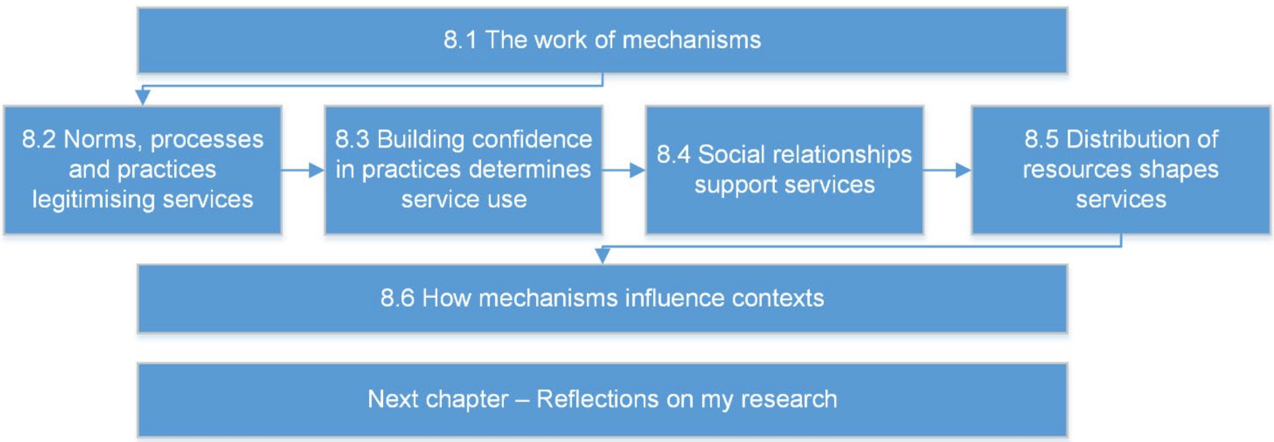


Figure 25. **Organisation of Chapter 8.**

8.1 The Work of Mechanisms

Mechanisms operating in the social world "do" work: they can be seen as being "what it is about a program which makes it work". Mechanisms have also been described as processes, theories, and explanations for particular outcomes. Westhorp (2018) has described mechanisms as processes with multiple inputs which interact with social actors to produce changes in social (and physical) contexts; that is, they have powers that produce change.

Chapter 4 has outlined how the basic concept of a mechanism fits within realist paradigms. Westhorp (2018) describe mechanisms as having inherent powers and liabilities, as being able to act as forces, as being the result of interactions, as processes, and as consisting of reasoning and resources. Westhorp argues that:

> any construct of mechanism can be right so long as it is consistent with the fundamental realist conception of mechanisms: that they are causal forces or processes which operate at a different level of the system than the outcome that they generate; that they are not observable using the same observational tools or methods that "work" at the level of the outcome they generate; and that they involve description of at least three things: the necessary components of the system, the necessary relationships between those components and the processes (or interactions) through which those components and relationships generate the outcomes that they do. (p. 53)

Implicit in these debates are assumptions about the nature of reality. Linked to the proposition that reality is stratified, is the suggestion that mechanisms are not observable "using the same observational tools or methods that 'work' at the level of the outcome they generate" (Westhorp, 2018, p. 53). The implication of this suggestion is that researchers (including me) can only understand reality, which is "hidden", by "digging" down through "hidden" levels of stratified reality extending from the empirical observational level to a deeper level of reality.

If reality is stratified into levels or compartments then it is logical to propose different categories of mechanisms and different levels of mechanism operating in different parts of reality. For example, mechanisms have been proposed to operate at the micro-social level (individuals), the meso-social level (groups), and the macro-social (societal) level (Blom & Morén, 2011). If reality is complex, then multiple mechanisms can exist, which may have different effects. Shaw et al. (2018, p. 4) point out that the diversity of understandings of mechanisms arises because "a researcher's definition of mechanism will depend on his or her underlying beliefs and interests in the analytically relevant units of analysis and components of the empirical case" (p. 4).

I have used the concept of a mechanism to causally explain "why a particular action or intervention had an observed outcome, whether that outcome be a new organizational form, a new way of approaching a problem, or any other type of structure or experience" (Shaw et al., 2018, p. 5). For my research, the outcomes of interest are explanations of the development and sustainability of telehealth services over time and between different contexts. Building on the analysis of the themes derived from interviews with participants, four macro-mechanisms for telehealth service development, each with several contributory mechanisms operating at the individual (micro-mechanism) or group level (meso-mechanisms) (Blom & Morén, 2011), are proposed to explain how:

- norms, processes and practices legitimise services;
- building confidence in practices determines service use;
- relationship building supports the development of services; and
- application of resources enables the development of services.

8.2 Norms, Processes, and Practices Legitimise Services

The field research question relevant to this section was:

> How do explicit and implicit guidelines and codes operating in the proposed research settings provide social and technical mechanisms for resolving conflict and mitigating risks that arise during telehealth service interventions? (RQ3c)

All of the codes discussed here (strategies, guidelines, work instructions, protocols, referral regulations, and clinical practice) can be seen as part of the sociotechnical codes which contribute to the cultural structures of healthcare. Sociotechnical codes were defined in Section 1.2 as representing the "norms, processes, and practices which form part of and simultaneously shape the way in which the technology is adopted". This section discusses norms in the form of organisational strategies and guidelines, processes as evidenced by regulations, and clinical practices identified in my research.

In Chapter 2, my review of telehealth guidelines concluded that "telehealth service guidelines encapsulate many of the explicit processes and practices to manage common risks". Analysis of participant interviews showed that legitimisation of practices for telehealth services requires work to actively articulate sociotechnical codes, by individuals, groups, and organisations. Organisations legitimise the practices of telehealth services by creating strategies, regulations, and guidelines.

8.2.1 Organisational strategies and guidelines shape norms

Cultural norms in the form of visions and strategies and guidelines for telehealth services were seen by participants to add credibility to, and to legitimise, telehealth services. Queensland,[25] South Australia (Government of South Australia, 2015a), Rio Grande do Sul (Governo do Estado do Rio Grande do Sul, Secretaria da Saúde, 2017), and Santa Catarina (Secretaria de Estado da Saúde de Santa Catarina, 2016) developed health service strategies which included telehealth services.These states have well-developed, relatively large-scale services (Gonçalves et al., 2017; McDonald, 2015a; Newman, Bidargaddi, & Schrader, 2016; Nobre & Von Wangenheim, 2012) (see Section 5.7). In contrast, Sao Paulo has no strategy and telehealth services are fragmented and low volume.

Some participants questioned the limitations of strategies in supporting telehealth service development (see Section 6.3.2). For instance, in Queensland, use of key performance indicators linked to strategic goals applied to executives are meant to force greater use of telehealth services, but in the opinion of some participants these have not translated into increased use of telehealth services. Research in the UK noted a “gap between the enthusiasm of policymakers and technologists for telehealth and telecare and their more limited uptake in practice” (Greenhalgh et al., 2012, p. 11). Strategies are expected to lead to changes in organisational practice, but in a systematic review of the effectiveness of strategies in healthcare, Parmelli et al. (2011) concluded, “current available evidence does not identify any effective, generalisable strategies to change organisational culture” (p. 1). In opposition, other writers have argued that strategies are key components of organisational change practices (Todnem By, 2005). Participants in my research (see Section 6.3.2) have complained that when organisational direction or strategy is absent, the implementation of telehealth services becomes more difficult (Moura, 2016; Yellowlees, 2001).

Guidelines legitimise telehealth services by prescribing their design. My review of guidelines for telehealth in Chapter 2 outlined that guidelines are written to improve quality and safety, to ensure responsibility for patients, to minimise professional liability and risk exposure, or to provide advice on patient privacy, confidentiality, and consent procedures. Guidelines were found to use medical ethical principles as a baseline norm against which medical practice could be judged. A survey by the ATA found that of the survey respondents, “the majority … are using in-house (e.g., hospital, company) developed guidelines, followed by those from professional associations/societies … and those developed by the ATA” and respondents believed that guidelines aid credibility, standardise approach to practice, reduce liability, help reimbursement, assist training, and lead to revenue-producing activities (Krupinski et al., 2013).

[25] Many of the 17 Queensland Hospital and Health Services included telehealth services in their overall strategic plans.

However, some participants (see Section 6.3.3) felt that guidelines were not necessary, or that they preferred to rely on implicit codes such as clinical reasoning. Written guidelines were not always viewed as a prerequisite to the implementation of telehealth services, but where explicit guidelines existed, they were valued for the credibility, authority, and protection provided against criticism or possible legal processes arising from adverse clinical events. However, guidelines were sometimes not fully complied with and were sometimes viewed as restrictive or out of date and circumvented.

8.2.2 Regulations define healthcare processes

Participants saw regulations as a means of forcing change in existing clinical practice using governmental or organisational authority. Australian telehealth services are regulated through advisory guidelines prepared by health organisations and professional associations. Important regulatory reform occurred in Australia when national registration of health professionals was introduced in 2010 by federal legislation (Australian Health Ministers' Advisory Council, 2018). National health practitioner regulation enables all registered health practitioners to practise across state borders. Previously, practice across borders was difficult and limited the coverage of some telehealth services. Other borders have been created by financial regulations; for instance, Australian telehealth services can only receive reimbursement for the types of specialist consultations which have been agreed within the MBS.

Regulations can support reforms which support the use of telehealth services. For instance, at the state level, the Mental Health Act in South Australia in 2010 passed reforms requiring certain patients to be diagnosed within 24 hours, and since many patients live some distance from psychiatry services, the Act specifically permitted the use of videoconferencing (Newman et al., 2016). This requirement provided a key rationale for the subsequent establishment of the Digital Telehealth Network in South Australia (see Section 5.7.1).

Regulations can limit the scope of use of telehealth services: Brazilian telehealth is regulated by the CFM (CFM, 2002) (see Section 6.3.1). Although the CFM regulates medical professionals, the regulations it defines effectively limit the practice of telehealth. The use of videoconferencing for patient consultations (CFM, 2009) is currently prohibited by CFM regulations, although they do not have the full status of government legislation (Botrugno et al., 2019).

Regulatory support for telehealth services of another type is occurring in Brazil. Regulations issued by tripartite commissions coordinate patient management across the municipal, state, and federal levels of the health system (Sousa, Macedo, Martins, & Galvão, 2019). From 2015 onwards, many states began to use these commissions to approve protocols or *regulamentos* (regulations) requiring treating doctors to follow referral protocols which require them, in some cases, to obtain advice from telehealth advice services, either online or via the telephone. These regulations have led to a large increase in the usage of telehealth services (Von Wangenheim & Nunes, 2018) and significant reduction in unnecessary referral of patients to specialists (see Section 6.3.5).

8.2.3 Social interactions influence practice

While guidelines may appear to influence clinical practice directly, it is actually the interactions between individuals and groups of individuals adopting the practices which act as a causal mechanism. Without social interactions, guidelines have little effect. According to Bosse et al. (2006), "systematic reviews of strategies for changing professional behaviour show that passive interventional methods of disseminating and implementing guidelines, such as their publication in professional journals, rarely lead to changes in professional behaviour" (p. 392).

Social interactions which influence telehealth services are discussed further in Section 8.4. For the moment, it is sufficient to indicate that participants reported that development of guidelines takes place within organisational units, teams, associations, and organisations. Within such social groups, it was in the interests of members to mitigate the risks of telehealth services by the creation of guidelines which codified practice. Participants confirmed that it is during the early implementation stages of a telehealth service that explicit and, especially, implicit assumptions, existing clinical practices, standards, guidelines, and frameworks become important (Krupinski et al., 2011; Sabesan et al., 2014).

Agreement on the models of care, or "patient pathways" (Coughlan, Eatock, & Eldabi, 2006), involves multiple stakeholders during the implementation of telehealth services. Models of care were felt by participants to be an important framework for telehealth services (see Section 6.3.5). Models of care encapsulate agreements of a social, financial, technical, and clinical nature between actors in a health system and define the clinical processes to be undertaken by these actors (Bradford, Caffery, & Smith, 2016). New telehealth models of care tend to be built on known, existing relationships, processes, and technology, but their implementation can be difficult when contradictory practices exist, such as unregulated patient entry points, siloed medical records, or disincentives to collaborate with fellow practitioners. Participants reported that tensions over the practice changes required to support healthcare activity at a distance (see Section 6.3.6) were evident between:

- enforcement of new practices and voluntary acceptance of practice change (encouraged by education and training);
- use of explicit guidelines or reliance on implicit clinical experience, knowledge, and routines;
- continuing to use existing information systems or undertaking additional administrative work to provide additional functionality; and

- delivery of telehealth services within existing patterns of care or within modified healthcare models.

An exemplar of the importance of practice change comes from a study by Shulver (2016) of clinicians in South Australia delivering tele-rehabilitation. Shulver found that the clinicians most willing to practise in telehealth services “were focussed on the potential for telehealth to achieve better outcomes for patients, and were willing to re-think and adjust their practice to provide distance healthcare” (p. 10).

8.2.4 Summary

My analysis shows a number of contributory mechanisms support the norms, processes, and practices which legitimise telehealth services. Legitimisation occurs when a norm is backed by and agreed to by social groups. Organisational strategies and guidelines shape norms. Strategies were developed by organisations to adapt to and exploit the potential of telehealth services to improve access to healthcare. Development of strategies and guidelines was a social process which took place within organisations and stakeholder groups. Regulations define healthcare processes; codes in the form of guidelines, ethical principles, work instructions, protocols, and referral regulations were used to manage risks in the design or operation of telehealth services and to define practices.

Norms, processes, and practices form the sociotechnical codes for telehealth services which simultaneously shape the way in which the technology supporting healthcare activities at a distance is adopted. Sociotechnical codes influence practice as the result of social interactions. Processes in the form of regulations are agreed at a political, governmental, or organisational level and require the involvement of stakeholder groups. Clinical practices and processes have to take account of norms, processes, and the preferences of individual clinicians or teams to develop models of care for telehealth services. Sociotechnical codes were primarily used to mitigate the risks of telehealth services, but also had to manage a number of conflicts around changes to practice, clinical experience, clinical routines, information system functionality, and existing models of care while at the same time building confidence in modified clinical practices.

8.3 Building Confidence in Practices Determines Service Use

The research question relevant to this section was:

> Do the mechanisms of risk acceptance and trust in the proposed research settings play a role in resolving conflicts over implicit or explicit organisational and professional codes? (RQ3d)

Analysis of the themes in participant interviews relating to the behaviour and culture of health professionals found that building the confidence of health professionals to practise using telehealth services was predicated on a willingness to include technologies in their practice, to manage the risks, to develop trust in telehealth services, and to resolve conflicts over the limitations of telehealth services.

8.3.1 Accepting technology in practice

Acceptance has been defined as ‘‘an individual’s psychological state with regard to his or her voluntary or intended use of a particular technology’’ (Gattiker, 1984, as cited in Chau & Hu, 2002, p. 298). Use and acceptance of telehealth services by health professionals and patients has been studied from perspectives of the technology acceptance model (TAM) and the theory of planned behaviour (TPB) derived from psychometric research into the use of information systems outlined in Section 3.5.

Many of these studies (Gagnon et al., 2012; Huang & Lin, 2014; Hwang et al., 2014; Orruño et al., 2011; Rho, Choi, et al., 2014; Su et al., 2013; Yam, 2012) employ a mathematical analysis of responses to surveys in order to establish relationships (both correlative and predictive) between acceptance or intent to accept a technology and perceived ease of use. These techniques can inform the study of technology acceptance by providing evidence of correlations between variables but, according to Porpora (2015), they “even in the rigorous form of a regression equation cannot serve as an explanation” (p. 62). These studies often either neglect to describe the context of the survey or assume that context is invariant in time.

Participants in my research felt that acceptance of technology was linked to three contributory mechanisms that evolved over time (see Section 6.4.1). Acceptance was linked to the digital literacy of users; it varied according to education and in part was determined by generationally acquired skills. Digital literacy, in particular among physicians, was seen as important by interview participants in Australia and Brazil, particularly for older physicians.

Participants argued that the acceptability of telehealth systems could be improved by employing “digital” consumer devices with which people were already familiar. The rationale for this argument was that consumer devices, such as a mobile phone, were easier to use. This finding can be related to the concept of sociotechnical codes if we remember that users of consumer devices have learnt the sociotechnical codes for the use of these devices outside of their professional lives. The design of consumer devices when used for healthcare activities therefore matches existing mental models. The sociotechnical code comprising the literacy of device use and the design of the device then contains no contradictory elements. Development of digital literacy provides health professionals with the sociotechnical codes needed to operate digital technologies confidently.

8.3.2 Managing risks of practice

Developing confidence in the technology was the first step in building confidence in telehealth services. Two additional measures mentioned by participants were building confidence in telehealth services through “knowing” the people, both patients and fellow professionals, and through managing risks by limiting the scope of service (triaging). Clinical or technical practices were then developed which reflected the capabilities of health professionals and the scope of service to be provided.

Estimation of risk is well established in industry, for example, for quantitative measurement of component failure rates, or for qualitative assignment of numerical levels to indicate the degree of risk which may be incurred by organisations before and after the application of mitigation measures to reduce selected risks (ISO, 2018). Risk assessment in healthcare is also well developed, especially in acute and trauma care (Cameron, Gabbe, Smith, & Mitra, 2014). Triaging in telehealth services at the acute level is an important component of telehealth services in Australia (Kyle et al., 2012) and was frequently referred to by participants. In Brazil, where telehealth services focus on primary healthcare, triaging plays an important role in managing patient referral to specialists (Pfeil, 2018).

Participants described triaging of patients for a clinical condition, or suitability for participation in telehealth services, as the principal process employed to manage the inherent risks or limitations of telehealth services (see Section 3.5). Triaging of patients for telehealth services extended existing triage practices (both implicit and explicit) with the addition of criteria for urgency and the distance (and hence travel time) involved for the patient or clinician for a physical appointment. Clinicians triaging patients often compared prior practice (face-to-face appointments) with appointments via telehealth services and looked for equivalent levels of risk. Risk-management rules are discipline specific and context dependent: Tele-mental safety plans have been described by Luxton (2010); tele-cardiology risk factor management in South Australia has been discussed by Wade and Stocks (2017). Analysis of a South Australian tele-rehabilitation service found that the different clinical groups involved in patient care (urban clinicians, rural allied health clinicians, novice urban clinicians, telehealth clinicians, and residential aged care staff) had varying views about the workability of telehealth services. More experienced clinicians and rural or aged care staff displayed more confidence in telehealth services (Shulver et al., 2016).

Adaptation of the current state (in this case, face-to-face consultations which may be perceived as having low or known risks) to a new state (where care is delivered at a distance) brings tensions over potential new risks. Organisational and professional risk-control processes in the form of triaging procedures contributed to the building of confidence or trust in new services and constrained health professionals to behave in an expected fashion. Managers, clinicians, and technologists running telehealth services were concerned to follow established legal and regulatory frameworks which provided some protection against unforeseen events. Confidence building in fellow health professionals was based in the perceived need to maintain established methods of practice when using the new technologies to deliver care at a distance. By choosing (triaging) patients who could be easily managed at a distance, health professionals were able to build confidence in modified practices.

8.3.3 Creating trust in practice

Trust is posited as decisions based on inductive inferences which are believed in some way to be reliably based on previous experiences. Hence, trust is linked to acquired confidence in a future outcome based on experiences. Green (2016) recommended that confidence in new practices can be acquired through “training and self-education to understand the modifications to clinical practice of healthcare across different medical specialties as a result of service separation” (p. 183). Trust in the health service context has most often been studied in the context of the clinician-to-patient relationship (P. Ward, Attwell, Meyer, Rokkas, & Leask, 2017a, 2017b; P. Ward, Rokkas, et al., 2017) but less so with respect to interprofessional collaboration (Poole et al., 2004).

Trust is a multi-faceted concept. Ozawa and Sripad (2013) identified trust in systems and confidentiality as key components of trust in health service provision. Trust in institutions has been described as the “mutually interacting relationships between individuals and social systems” (Meyer, Ward, Coveney, & Rogers, 2008, p. 177) where the risk in “trusting” the institution is that the organisation or individual will (or will not) behave as expected. An extension of institutional trust is trust in a practice or process to perform as expected. This type of “practice trust” and the risk(s) associated with a service was the most pertinent form of trust for telehealth services from the perspective of managers, technologists, and clinicians.

Trust between clinicians practising through technology has been proposed as a factor in technology use (see Sections 2.2.4 and 3.5) and was confirmed as important by participants (see Section 6.4.4). Initially, many health professionals are concerned about total dependence on a technology, in case it fails (Mair et al., 2007). To mitigate these concerns, many telehealth services, especially in Australia, have built support processes relying on technical and administrative staff which ensure process continuity (see Section 6.3.4). Participants in my research felt they were able to bridge physical distances through relying on trustful, confidence-building relationships with colleagues, technologists, or patients (see Section 6.4.4).

8.3.4 Summary

Management of the risks and the development of trust combine to reduce conflicts over the limitations of telehealth services. Risk management and trust support the building of confidence in the ongoing use of telehealth by health professionals. Confidence in technology increased when sociotechnical codes (codes held as practices, habits, routines, and cognitive patterns in human brains) and knowledge -- or digital literacy -- were relevant to the proposed technical procedures. Building of confidence in telehealth services was founded in established relationships between health professionals who agreed on the use of triaging processes to control possible risks to patients.

Three contributory mechanisms to building confidence in practice have been located through my analysis: acceptance, risk management, and trust building work to change behaviour at the individual level (clinicians) and group level (organisations), assisted by the individual and group formulation (interactions) of implicit (mental) codes and explicit (written) codes, which together form the sociotechnical codes of telehealth services. The following section explores the interactions which build the relationships needed to operate telehealth services.

8.4 Social Relationships Support Services

Social relationships are the fabric of cultural structures. The building of social relationships was not specifically linked to one of my field research questions but emerged as a clear theme (see Section 6.5) that influenced the adaptation of organisations, structures, and clinical practices to telehealth services. There were three major contributory mechanisms to relationship building in support of telehealth services: collaboration, leadership, and network building. To these components, the theme of conflict can be added (see Sections 6.2.3 and 6.3.6). Relationship building underpinned the operation of norms, processes, and practices which formed the sociotechnical codes of telehealth services discussed in Section 8.2.

Elder-Vass (2010) ascribes relationships within interest groups, communities of collaboration, and networks with the casual power which has “the tendency to increase conformity of its members to the norm” (p. 124); that is, to affect the behaviour of individuals. Elder-Vass suggests that these groups function as “norm circles”:

> a norm circle is the group of people who are committed to endorsing and enforcing a particular norm. Such groups are social entities with people as their parts, and because of the ways in which the members of such groups interact (a mechanism) they have the causal power to produce a tendency in individuals to follow standardised practices. (p. 22)

According to Sunyoung Cho et al. (2009), during an intervention “telehealth collaboration and networking among organizations emerge through dynamic interactions between diverse external forces and internal interests and motives" (Cho et al., 2009, p. 354). This section explores the extent to which relationships between health specialities, management, technologists, and support staff sustain telehealth services.

8.4.1 Collaboration establishes relationships

Collaboration and teamwork have always been important in healthcare (Singh, Mathiassen, Stachura, & Astapova, 2010). Collaboration across the clinical and technical domains in operation and design of technology (Cardno, 2000; Petersen, Bertelsen, & Bjørnes, 2013) has been a particular catalyst in telehealth services because "effective collaboration between clinical and technical stakeholders and further workforce education in telehealth can be key enablers for the transition of face-to-face care to a telehealth mode of delivery" (A. Taylor, et al., 2015, p. 1).

Collaboration was based on understandings, alliances, agreements, and contracts between health professionals, organisations, and loose associations based on common interests. Communities of practice were observed to promote collaboration across organisational and geographic boundaries (see Section 6.5.1). Participants in my field research corroborated the finding by de Lima Verde Brito et al. (2015) that in Brazil, "The RUTE network and its SIGs provide an example of innovation in scientific collaboration, which enabled the development of collaborative health groups in university hospitals, with the involvement of researchers from all regions of the country and abroad" (p. 1). Collaboration, when formalised, results in partnerships between organisations, as is the case with Brazilian SIGs, or in early international partnerships (Chan, 2007; Robinson, Savage, & Campbell, 2003), and becomes a powerful lever for systemic change. As a result, in some Brazilian states, relationships have been built between health departments and state government which support sustained commitments to telehealth services.

Collaboration in the form of partnerships underpinned the early years of the Brazilian telehealth program. From 2011 onwards, a tripartite commission comprising representatives from federal government, the states, and municipal governments was established to manage the National Telehealth Program (Ministério da Saúde, 2011). In Australia, a partnership between the Australian Australian Government Departments of Health and Communications established the Telehealth Pilots Program between 2013 and 2015 (A. Taylor et al., 2015).

Collaborative networks form the basis for establishing relationships within organisations but the work of creating and maintaining these networks is a significant task. The value of established relationships is the credibility they bring to telehealth initiatives. Underpinning collaboration within organisational networks are personal relations: Participants who were specialists delivering telehealth services into regional Australia reported that they made a point of forming personal relationships with physicians in these localities (see Section 6.5.1).

Participants emphasised that collaboration between health professionals is an integral part of the culture of healthcare which is underpinned by personal relationships and collaborations that take time and human agency to build (see Section 6.5.1). These relationships and norms sustain the operation of telehealth services and enable clinicians to resolve conflicts and extend their existing practice to caring at a distance.

8.4.2 Relationships provide a means of resolving conflicts

Use of telehealth services does not come about as an inevitable consequence of technology availability or organisational reform. Resistance to reform and technology-based interventions may be as important as acceptance (van Offenbeek et al., 2013) and may be based in different group interests. Orlikowski and Gash (1994) suggest that "where the technological frames of key groups in organizations—such as managers, technologists, and users—are significantly different, difficulties and conflict around the development, use, and change of technology may result" (p. 174). A key proposition in this work is that:

> Managers, system, developers, and users, at a minimum, will be key actors, and by dint of their membership in particular social groups and the different roles and relationships they have with technology, will tend to share their group's technological frame. (p. 179)

Analysis of interviews showed that clinicians, managers, and technologists all tried to exercise power and thereby control existing clinical practices, resources, and information technology. When their interests did not coincide, conflict became visible, especially in regard to information technology, clinical practice, and workloads. The role of technologists in controlling information technology has been discussed in Section 7.3.3. Conflict over technology occurs when practices, devices, networks, and applications have not been designed and built for delivering healthcare across boundaries, or when there are difficulties in interoperating and facilitating the sharing of information between health professionals across boundaries. Questions of technology design and interoperability were of greater concern in Australia than in Brazil (see Section 6.1.5), but the reasons for this difference are unclear.

Conflict over sectional interests based on professional boundaries can rise to the surface when changed practices require additional work or are perceived to threaten existing employment. The AMA suggested incentive payments were necessary for telehealth consultations involving video, telephone, or email consultations and the associated additional administration, broadband, equipment, support, and training costs (AMA, 2011). Professional status and employment prospects are sometimes perceived as being threatened by telehealth services: Medical associations in Brazil have used their assumed position of medical authority to limit changes in established medical practice (Associação Brasileira de Telemedicina e Telessaúde, 2019; Melo, 2019) due to fears that telehealth services will threaten the viability of their businesses. Recent reform proposals in 2018 from the CFM for more extensive liberalisation of the use of communications technologies in patient care have proved controversial (CFM, 2018). In part, the existence of these restrictions has limited telehealth services in Brazil to providing second opinions from a doctor or specialist to the treating doctor.

In the Australian context, medical associations have been more willing to support telehealth services as long as their members' business model is not threatened. The Rural Doctors Association stated, "the use of telehealth in primary care should only be viewed as an adjunct to rural general practice and not as an alternative to face-to-face consultations" (RDAA, 2014, p. 2). The concern was that rural doctors could be undercut by metropolitan-based telehealth services. This remains a key concern of the federal government's policymaking for telehealth services (personal communication, 2019)[26] and demonstrates that "organised medicine remains politically skilful in steering and modifying government policies" (Willis, 2006, p. 428).

Managers struggle to manage conflicts over the organisation of resources, particularly resources, funding, and workloads across telehealth service boundaries. A common managerial reaction to the task of embedding an innovation such as telehealth was to complain of a lack of time and staff (see Section 6.3.6). Those involved in telehealth services then look for support from elsewhere in the organisation to overcome this type of resistance.

My analysis established that the individuals performing the roles of technologists, clinicians, and managers (including coordinators of telehealth services) have different, but overlapping interests (norms), and each group exercises some degree of power and control in each of their structural and cultural realms. Applying Elder-Vass's (2012) concept of norm circles, it can be seen that each group belongs to a different circle, with different norms, which sometimes coincide because they are all members of an organisational norm circle. When the norms held by each group are different, then conflicts over overlapping interests, such as telehealth services, occur. Resolution of such conflicts occurs when norm circles succeed in "normalising the use of technology in clinical practice, through convincing a wider professional audience of the value of the technology" (T. Williams et al., 2003, p. 52).

8.4.3 Leadership develops relationships across boundaries

Participants in my research felt that telehealth services spanning geographical, organisational, and professional boundaries must develop relationships across wide audiences in order to become effective service providers. Boundaries can take diverse forms. Geographic, organisational, professional, and technological borders which impact telehealth services – and healthcare more broadly – need to be seen as boundaries not only to the edge of a region. Boundaries can also be

[26] Private conversation.

conceptualised as “political, geographical, technological, cultural, and economic borders” (Whitten & Cornacchione, 2010, p. 215). Organisational borders are a case in point. The scope of telehealth services delivery has always been constrained by the boundaries of the organisational structures within which participants find themselves (see Section 6.1.3). Boundaries between acute- and primary-care organisations continue to impede integrated care for patients. Geographical boundaries have in the past controlled the accreditation of physicians (as discussed by Siwicki, 1999) and still directly influence where and by whom patients are cared for. There is a need to make boundaries disappear when patient-centred care is provided.

Participants often referred to the contributions that leaders have made to enabling telehealth services to operate across boundaries (see Section 6.5.2). Australian participants particularly valued the role of leaders in “championing” telehealth service causes. Participants described important characteristics of successful leadership as being able to bring people together, to break down obstacles, and to build bridges across organisational boundaries. In doing so, these leaders often become known as telehealth champions (Al-Qirim, 2007; DuBose-Morris, 2014; Ellis, 2005; Wade & Eliott, 2012), especially in Australia (see Section 6.5.2). The obvious question which then arises is this: Is “the existence of effective champions for telehealth a result of personal characteristics, organisational policies or are they just people in the right place at the right time?” (DuBose-Morris, 2014, p. 126). Evidence from my research points in both directions, but crucially, shows that champions need supportive management and organisational networks to be effective.

Participant accounts demonstrated that the support of organisational networks and relationships between health professionals across boundaries is key to creating collaboration between health professionals. Collaboration creates political support and mobilises resources for telehealth services. Individuals who are able to develop these relationships have been described as “boundary spanners” (P. Williams, 2002). Telehealth implementers, when acting as boundary spanners, have learnt how to navigate the boundaries of different groups exercising power and control over information technology, existing clinical practices, employment, and resources in order to normalise telehealth services within healthcare. Navigation of these interests required conscious agential work. Participants leading the implementation of telehealth services repeatedly referred to the work required to convince people to adapt their practice (see Sections 6.5.2 and 6.5.3).

8.4.4 Summary

Collaboration establishes relationships. Building of support for telehealth services, clinical networks, and communities of practice among clinical, managerial, and technology groups requires these groups to reach agreement and to collaborate on the aims and practices to pursue. Relationships provide a means of resolving conflicts. Once such groups or “norm circles” have established relationships they act as mechanisms which have causal power to advocate for and enforce sociotechnical codes. Leadership develops relationships across boundaries. The value and power of boundary spanners who have acted as leaders stems from their interactions within various norm circles, within and external to organisations, which could build relationships and gain adoption of sociotechnical codes favourable to telehealth service development.

8.5 Distribution of Resources Shapes Services

While not specifically linked to a research question, but emerging as a clear theme in my findings, the distribution of resources to telehealth services was a concern expressed by participants (see Section 6.6). Participants made it clear that resources -- human, technological, and financial -- are clearly visible mechanisms which can support or inhibit outcomes favourable to telehealth services. Dalkin et al. (2015) have proposed that when resources are introduced into a context, for instance, as funds for a project or as enabling technology, then there is a "change in reasoning … (which) alters the behaviour of participants, which leads to outcomes" (p. 4). Elaborating on this proposition, it is logical to infer that the withdrawal of resources can also lead to outcomes. The very rationale for telehealth services, the improvement of access to healthcare, is a consequence of the lack of healthcare resources within sections of universal healthcare systems.

At one level of social analysis, the availability of resources to telehealth services is just a very obvious empirical observation. However, underlying the uneven availability of healthcare resources at a deeper level of reality are political, governmental, and economic priorities. In turn, at a deeper level of reality are other influences, such as the place-based structure of healthcare, the accounting problems posed by payments for separated care, conflicts between groups for control of resources, and organisational strategies and relationships between decision-makers who decide the allocation of resources.

Dalkin et al. (2015) posited a mechanism whereby the availability of resources led to a change of reasoning by actors. The contrary process, whereby a change in reasoning can lead to the allocation of resources, is also a possible mechanism. Two simple examples demonstrate the outcomes of this type of reverse mechanism. Firstly, in Brazil, the creation of telehealth services as a means of extending universal healthcare has been extensively documented in my research. Secondly, in Queensland, Australia, the funding for telehealth services was politically important due to the relatively large numbers of people who live outside metropolitan areas. Participants in my research indicated a third resource-related mechanism: In regional and remote areas, the limited availability of infrastructural and human resources was described as limiting the development of organisational structures supporting telehealth services.

8.5.1 Availability of infrastructure and staff

My findings, presented in Chapters 5 and 6, show that the resources available for health services – physical, human, and financial – are unevenly distributed in Australia and Brazil despite the improvements made in healthcare over the last 20 years (see Chapter 5). There are clear disparities of resources, particularly physical infrastructure and human resources, between, on the one hand, a private hospital in Sao Paulo which runs a valet parking services for its clients and an elite telehealth service for private health insurance customers and, on the other hand, a small community health clinic in an outlying suburb which has only a handful of old computers used for patient registration.

Participants commented that the physical infrastructure of health facilities determines their ability to participate in telehealth services (see Section 6.6.1) and may even compete for resources with information technology. For instance, the historically low level of investment in the Brazilian public sector means that the physical environments of many facilities provide poor conditions for patients. Capital investment by municipalities is prioritised for building and environmental upgrades rather than for communications and information technology which could facilitate telehealth services. Australian clinicians were also concerned about the availability of physical facilities and technology for telehealth consultations. Although the Australian Government funded a Broadband for Health program until 2009 to improve the information technology availability (Communio, 2009), Australian health professionals interviewed for my research still felt technology was a constraint to improving telehealth services. Many participants expressed frustration with Wi-Fi services, computers, medical records, videoconferencing applications, mobile devices, and Internet capacity (see Section 6.6.1).

Australian participants were particularly concerned about Internet capacity, because connection speeds in Australia do not meet the needs of the applications used for telehealth (which primarily uses synchronous video technology). In contrast, Brazilian telehealth services were consciously designed to operate over asynchronous technology using historically lower connection speeds, and communications coverage remains uneven outside metropolitan areas. A Brazilian survey of the use of information technology in health illustrated large variations in the availability of computing and communications infrastructure between urban and rural, public and private, and richer and poorer regions (Martinhão, 2017), which limits the availability of telehealth services.

One of the difficulties that telehealth services face when considering service development is that healthcare organisations may not be funded to provide infrastructure. Responsibility for building construction or communications links can reside across organisational boundaries with other departments and organisations. As a result, many of the assessments of telehealth services have not included information technology costs (Caffery, Hobbs, Hale-Robertson, & Smith, 2017). Even when these costs are included, it is difficult to cost use of shared infrastructure, such as buildings, telephone systems, electronic health records, networks, computer rooms, administration, maintenance, and support.

Uneven distribution of the health workforce, particularly specialists, is associated with differential access to health services and facilities for the general population in Australia (National Rural Health Alliance, 2013) and in Brazil (Scheffer, 2018) (see Section 6.1.4). There are contradictory implications for telehealth services. On one hand, telehealth services can extend healthcare to areas which lack certain specialities; on the other hand, even remotely delivered care requires staff in peripheral centres to administer and supervise patients, and additional staff in central locations to provide care (see Section 6.6.2). Remotely delivered services may simply change the mix of staff skills applied for care provision in both the peripheral and central centres. In both Australia and Brazil, the difficulty of managing or treating regional patients is compounded by the difficulties of retaining staff. Questions of isolation, professional development, personal security, and salary all play a part in high staff turnover, particularly of family doctors.

8.5.2 Availability of funding

Funding was seen as an enabler for telehealth services, without which most services felt they could not operate. Funding issues which were touched on by participants related to the amount, stability, and methods of funding. Public health managers by virtue of their role are reluctant to talk directly about political issues, but my research has found that an awareness of the political issues which determine the economic resources they seek is never far from managers' minds (see Section 6.1.1). In the early years of telehealth, between 1995 and 2005, funding for pilot telehealth projects was derived from multiple sources including international, federal, and state organisations, and health, education, and research bodies (see Section 5.5). Subsequently, some state health organisations took over funding responsibility or contributed towards development of telehealth services. This occurred in states which now have the most developed telehealth service: Queensland (2001), South Australian (2010), Santa Catarina (2005), and Rio Grande do Sul (2004). In comparison, state funding in Sao Paulo (Brazil) did not occur until much later and telehealth services have yet to achieve widespread service coverage there.

Stability of funding represents a major problem for telehealth services, especially in Brazil (see Section 6.6.5). In both countries, telehealth services have to work within existing funding arrangements (see Sections 6.6.3, 6.6.4, and 6.6.5). Budgets that are determined on an annual basis, tied to specific projects, and subject to continuous renegotiation, do not provide the financial stability for long-term planning. When federal government funding has been unavailable, some states have stepped in and implemented telehealth services to improve access to healthcare for regional communities. Participants have spoken of the importance of state support in maintaining and expanding telehealth services in Queensland, Santa Catarina, and Rio Grande do Sul (see Section 6.7). The largest services in terms of number of patient episodes are Queensland in Australia, and Santa Catarina and Rio Grande do Sul in Brazil, where state governments have historically invested in telehealth.

Funding of Brazilian telehealth centres was reported as unreliable. Initially, federally funded universities were chosen to host telehealth centres because they had the required levels of expertise and, importantly, federal funds could be channelled, monitored, and audited. However, dependence on one source of funding, subject to national political and economic considerations, has created cash flow problems for most telehealth centres (see Section 6.6.5). Additionally, federal funds could only be used for the specified purposes, constraining federal universities' partnership options with the private sector.

In contrast, Australian telehealth services have mainly been funded from within the budgets of state health services, receiving block grants annually. State funding consists of combinations of block funding grants for projects or telehealth centres, incentive funding linked to the number of telehealth episodes, and activity funding arising from unitised payments for health episodes. All these arrangements present problems for new services. Block grants are normally time limited; incentive payments generate expectations that the incentive will be maintained indefinitely; and activity funding is based on unitised payments which do not always represent true costs (see Section 6.6.3).

At the federal Australian government level, some specialist consultation fees began to be subsidised through Medicare from 2011 (see Sections 5.7 and 6.1.2) but have yet to be expanded to cover a broader range of clinical activity due to budgetary concerns. In Brazil, federal funding for the Brazilian Telehealth Program and telehealth centres and the University Telemedicine network began in 2007, expanded in 2012, and has continued, albeit with some interruptions (2017-18), to the present day (see Section 5.7.2), although the current funding situation remains uncertain.

Adequate funding of telehealth services was seen by participants as a key to the continued operation of telehealth services. Australian participants also agreed that existing funding arrangements for telehealth services are not working. In Australia, subsidies of medical professional consultation fees do little to improve the affordability of healthcare and have limited value in encouraging specialists to offer telehealth services. Within the Australian public acute health sectors, incentive payments to services offered from hospitals have encouraged a greater range of telehealth services, but these incentive payments are only temporary arrangements. While some telehealth services have been able to secure funding on a more or less permanent basis, a number depend on block funding through contracts and grants, which require constant renegotiation.

8.5.3 Summary

Availability of resources is a key explanatory mechanism for the current limited scale of some telehealth services. Resource availability was clearly identified as a mechanism influencing the building of organisational structures supporting telehealth services. Resources are built from three contributory mechanisms: infrastructure provision, staff allocation and training, and financial provision. Telehealth services may enable highly paid specialists working in urban centres to provide remote advice and consultations to patients in regional health facilities; however, staff are still needed to assist patients. Buildings, rooms, electric power, and communications infrastructure are still required. Financial provision for telehealth services reflects the funding arrangements within the broader health sector. The scale and dependability of resources and funding for telehealth services is not yet comparable with that available to major centres of care, such as hospitals: Telehealth services remain the poor cousin of place-based health services. Uneven distribution of resources in Australia and Brazil is reflected in disparate telehealth services, healthcare, employment, income, physical infrastructure, and education, and in the availability (or otherwise) of a skilled health workforce.

8.6 How Mechanisms Influence Contexts

Pawson and Tilley (1997) referred to the role of contexts in conditioning “the potential interactions between social or cultural structures and individual or collective agency” (p. 216). The corollary processes, where individual or collective agency expressed through social interactions influence contexts, are the mechanisms which influence social and cultural structures. These social interactions, described in this chapter, form the major underlying mechanisms operating in professional and organisational contexts. Danermark et al. (2019) have described this duality between structure and agency as “a dynamic in which social structures and agency form and reform each other over time” (p. 93). Clearly, the relationships between mechanisms and contexts are complex and it is sometimes difficult to identify which explanations relate to contexts and which relate to mechanisms. Shaw et al. (2018), in a comparative cross-organisational study, discussed the interrelationship of mechanisms and context at the policy, organisational, and healthcare provider level, concluding that “mechanisms may also act as contexts in any individual intervention” (p. 11). The relationships between organisational contexts, professional contexts, and four macro-mechanisms which operate to influence contexts and thereby enable telehealth services are illustrated in my meta-theoretical model of telehealth service development in Figure 26.

This meta-theoretical model suggests that the processes shaping the development of telehealth services are not those of innovation, normalisation, or the attainment of sustainability. Instead, processes of adaptation and conflict resolution operate within contexts influenced by mechanisms.

The model has two major components: organisational contexts (discussed in Section 7.2) and professional contexts (discussed in Section 7.3). In each of these contexts, historical and current component processes have shaped, and continue to shape, contexts. I have chosen not to describe these component processes, although important, as mechanisms, because my analysis showed that they were historically connected to contexts. For instance, how care is organised, structured, and automated is historically part of the social structures of organisational contexts. Similarly, conflicts in professional contexts over separation of care, medical practice, and control of technology are historically linked to the cultural structures of professional contexts.

This chapter has identified that processes of mutual adaptation between organisational and professional contexts to telehealth services occur, influenced by macro-mechanisms operating at the group or societal level. This ongoing interaction between telehealth services, contexts, and mechanisms can be represented as an interlocking set of processes. The outcome arising from these complex interactions is not normalisation or sustainability, but a new contextual state, a “new normal’, marking the beginning of a new adaptation cycle. Figure 26 provides a graphical representation of these interactions.

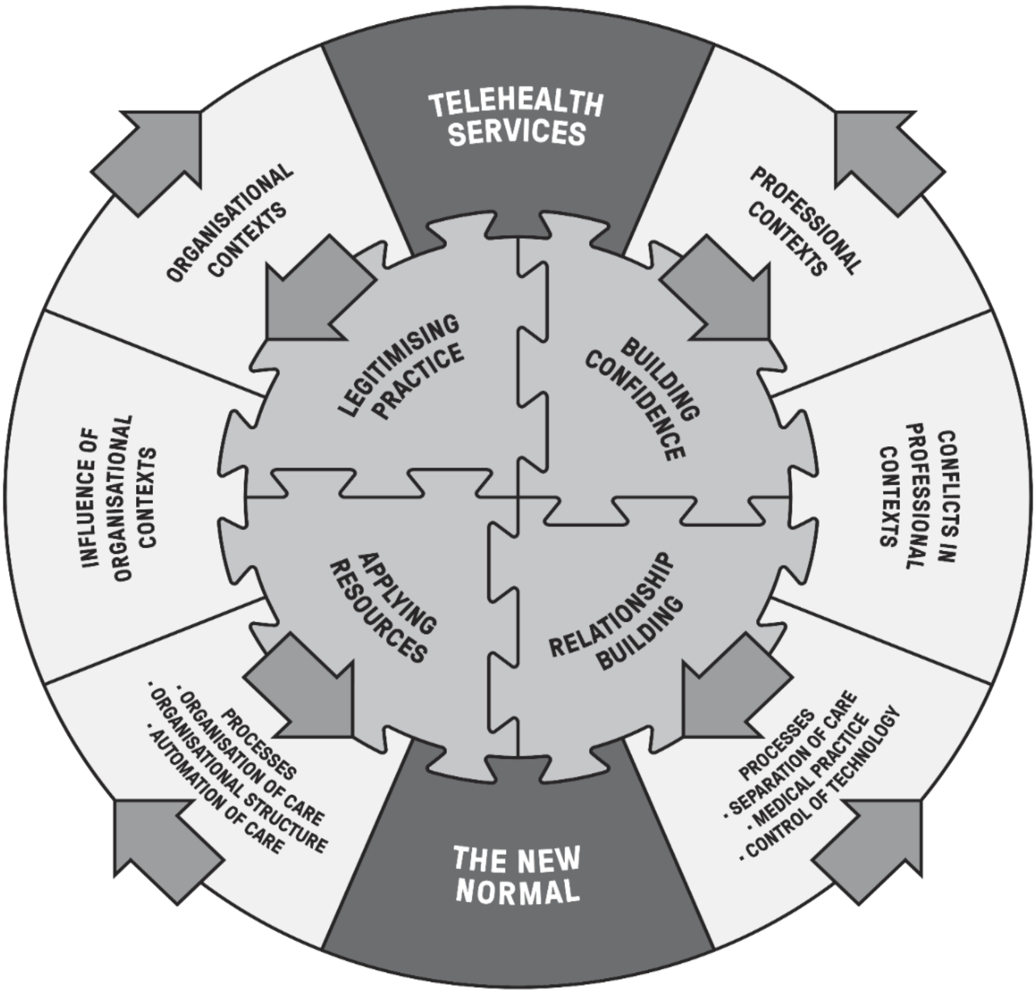


Figure 26. **How contexts and mechanisms influence telehealth services.**

According to this meta-model, contextual change is driven not by technology or organisations or individuals, but by component processes and mechanisms given causal power through interactions within the underlying relationships between actors, especially health professionals, managers, and technologists working in healthcare organisations within their professional contexts. Table 20 outlines how social and cultural component processes have influenced the structures within which telehealth services operate.

Table 20.

Social and Cultural Processes Influencing Telehealth Services

Structures	Component processes
Social structures: Determine the influence of organisational contexts on telehealth services	• Organisation of care and priorities for care shape telehealth services • Organisational structures circumscribe telehealth services • The drive for healthcare automation has had contradictory consequences for telehealth services
Cultural structures: Are influenced by conflicting sociotechnical codes about telehealth services	• Separation of care challenges usual practice • Medical practice is influenced by competing codes • Control of technology is disputed

Organisational contexts represent the social structures of healthcare. Three component processes in organisational contexts have been found to influence telehealth services: firstly, how care is organised and prioritised to shape telehealth services; secondly; how organisations are structured to shape telehealth services; and thirdly, the drive to automate healthcare, which has had positive benefits for telehealth services but has also diverted resources from telehealth services.

Professional contexts comprise the cultural structure of healthcare. Professional contexts have been the site of conflict over the adaption of professional cultures which contain conflicting sociotechnical codes relevant to telehealth service operation. Firstly, when healthcare activities are supported at a distance, customary place-based care practices require modification. Secondly, medical practice has over time been subject to competing codes (patient-centred care, evidence-based care, integrated care, automated care) and tele-healthcare that seek to modify customary place-based practices. Thirdly, there is ongoing conflict for control of technologies used in care which is clearly evident in telehealth services. Social interactions over norms, processes, and practices mediate these conflicts, legitimise telehealth service provision, and build confidence in modified professional practices which support healthcare activities at a distance.

Interacting with the organisational and professional structures of telehealth services, four macro-mechanisms have been identified in my research that explain how:

- norms, processes, and practices legitimise services;
- building confidence in practices determines service use;
- relationship-building supports the development of services; and
- application of resources enables the development of services.

The role of sociotechnical codes is prominent throughout my analysis of the four macro-mechanisms. Within professional contexts, practices (Section 7.3), particularly medical practices, manifest the sociotechnical codes which are central sites of contest in the development of norms, processes, and practices which legitimise services (Section 8.2). Sociotechnical codes are reconfigured in the building of confidence in services (Section 8.3), and through the social relationships which support services (Section 8.4) sociotechnical codes are provided with causal power. Associated with these macro-mechanisms, a number of contributory mechanisms have been found. Table 21 lists these mechanisms.

Table 21.

Macro and Contributory Mechanisms Operating on Social and Cultural Structures

Four macro-mechanisms operating on social and cultural structures	Contributing mechanisms
Norms, processes, and practices legitimise modified professional practices	• Organisational strategies and guidelines shape norms • Regulations define healthcare processes • Social interactions influence practice
Building confidence in practices cements professional practices	• Accepting technology in practice • Managing risks of practice • Creating trust in practice

Four macro-mechanisms operating on social and cultural structures	Contributing mechanisms
Social relationships mediate conflicts over professional practices	• Collaboration establishes relationships • Relationships provide a means of resolving conflicts • Leadership develops relationships across boundaries
Distribution of resources supports the social structures needed by telehealth services	• Availability of infrastructure • Availability of staff • Availability of funding

Summarising Table 21, four mechanisms have been found to operate across the contexts of Australian and Brazilian telehealth services. Each macro-mechanism consists of several contributory mechanisms. Firstly, norms, processes, and practices legitimised telehealth services in Australia and Brazil. For instance, my findings show that organisational strategies and guidelines shape organisational and professional norms. Regulations play a strong role in defining healthcare processes (that is, what can and should be done in practice), and social interactions, particularly between healthcare professionals, influence practice.

Secondly, building confidence in practices came though the acceptance of new techniques and technologies supporting healthcare activities at a distance in both Australia and Brazil. Confidence in new or modified practices was built by conscious management of perceived clinical and technological risks by health professionals. Trust was thereby created in practices which employ new techniques and technologies.

Thirdly, participants in my research emphasised that social relationships, often supported by leadership from “boundary spanning” roles, support the development of services through the establishment of collaborations, that relationships provide a means of resolving conflicts over technology use, and that changes to practice enable trust in practice to be created by health professionals. In both Australia and Brazil, social relationships were considered important. However, Brazilians valued collaboration more than Australians did, and Australians looked to the role of champions to support telehealth services more than Brazilians did.

Finally, but no less importantly, all telehealth services in Australia and Brazil reported that the distribution of resources to their organisations or services profoundly influenced the scope and scale of services they could provide. In Brazil, the allocation of financial resources for telehealth services by government was a significant concern whereas in Australia, participants were more concerned about the availability of ICT.

The following chapter reflects on my research experiences, including the design of the investigation, the analytical methods used, the validity of my findings, and the limitations which circumscribed my investigation, analysis, and conclusions.

9 REFLECTIONS ON MY RESEARCH

9.1 Research Design

There have been several studies of telehealth services at a national level including Australia (Wootton, Blignault, & Cignoli, 2003), Argentina (Urtubey & Petrich, 2002), Brazil (Campos, Haddad, Wen, & Alkmim, 2009; Gundim & Wen, 2011), Cabo Verde (Lecaj et al., 2014), India (Bhatia & Singh, 2014), Mexico (Coutiño, Vivian, Hernandez, & Gonzalez, 1999), Russia (Khasanshina & Stachura, 2006), South Africa (Strachan, 2001; van Dyk, Groenewald, & Abrahams, 2010), Tunisia (Trichili, Dhibi, & Solaiman, 2008), and the USA (Lerouge & Garfield, 2013). However, to my knowledge my research is the first contemporary, extensive, cross-national study of telehealth services. My research developed a conceptual model of enquiry based on a review of the extant theoretically orientated literature on telehealth and applied it to the analysis of interviews with health professionals in Australia and Brazil.

My research was innovative in that I set out to understand the underlying forces which had shaped the evolution of telehealth services in Australia and Brazil. Official reports, empiricist surveys, randomised control trials, and systematic reviews of the literature seemed to me to lack explanatory power. To support a deeper analysis, I adopted a critical realist ontology of the world. Within a realist perspective, it should be noted that realist research does not require adherence to a particular methodology or technique (Bergene, 2007; Porpora, 2015; Zachariadis et al., 2013). Therefore, my investigative techniques included analysis of the literature, collection of documentary evidence from the field, and semi-structured interviews which together permitted a deep enquiry into the personal experiences of participants in developing telehealth services.

My initial intention was to research telehealth services in two Australian states. When the opportunity arose to extend the research settings to include three states in Brazil, it became possible to envisage a transnational comparison of telehealth services across two different national cultures. Given the scale of this challenge, it became clear to me that the research design would be extensive, rather than intensive (see Edwards et al., 2014, p. 27) and would require a constant comparative case analysis, contrasting telehealth services across state and national boundaries.

Key to enhancing the explicative power of my research was a review of peer-reviewed literature on telehealth which enabled a theoretically informed, conceptual model of enquiry to be built (see Chapter 3). Based on this model, interview themes and questions were developed. In total, 135 health professionals, including clinicians, nurses, managers, coordinators, and technologists, were interviewed. All interviews were transcribed into English or Portuguese. Quotations from participants interviewed in Portuguese and subsequently referred to in this thesis were translated by the author. For each setting (a state) in which interviews took place, an analysis of the context for telehealth services, and their history, development, and status, was developed. Over time, further documentary evidence was collected from telehealth services which supported a comparative analysis (in Chapter 5) of the ways in which the contexts for telehealth services in Australia and Brazil have influenced the mechanisms associated with their development.

The advantage of my research design was that it was able to take a wide-ranging sample of participants across many jurisdictions and combine the evidence from participant interviews with documentary data, both published and unpublished. While lacking the specificity of an intensive case study, this design enabled themes to be aggregated and compared across several contexts to identify the processes and the high-level mechanisms which can be observed to act in all contexts. The power of my design compared to a single case study was that it could more confidently generalise across diverse contexts.

9.2 Research Analysis

My analysis was based on realist methods outlined in Section 4.5. Detailed analysis was based on an explanatory research model which employed a six-stage process moving from concrete to abstract and back to concrete conceptions, employing comparison, retroduction, abduction, and resolution to identify mechanisms (see Section 4.6). Initial management of the data (interviews and documents) followed a process of open and axial coding and recoding similar to that used by Fletcher (2017) where data were coded against the initial conceptual enquiry model (see Section 4.1). Themes and sub-themes were generated based on the observed patterns. During this iterative, abductive process, information was disassembled, coded, rearranged, and recoded in an attempt to see where data fitted or did not fit within the initial conceptual model. Over a total of five iterations, modifications were made to themes and to the model itself, to generate a revised set of themes and a new meta-theoretical model of how contexts and mechanisms influence telehealth services.

Reflection on different iterations of my model was supported by a wide range of theoretical literature, including contributions from fields outside of telehealth. This process of retroduction enabled a coherent set of high-level (macro) mechanisms and lower level (micro or meso) contributory mechanisms to be postulated, grounded in a thematic data structure but related to prior published research. Implicit in the meta-theoretical model is the proposition that reciprocal adjustment occurs between interventions and the contexts within which they are located. The continuous nature of these adjustments supports the existence of phased or cyclic changes in contexts. The concept of phased social change is not new; for instance, Rogers (1971) has described innovation as “the process by which alteration occurs in the structure and function of a social system” (p. 38).

Markers for contextual changes were identified through rapid realist analyses of telehealth services in the five Australian and Brazilian states. For instance, political events leading to changes in health and education policies were identified, which provided a favourable or less favourable context for telehealth services. In order to understand how telehealth services in Australia and Brazil had evolved over time, a number of clearly observable critical historical events were identified (see Section 5.7) which marked key underlying processes, such as changes in government priorities or construction of communications infrastructure.

Hitherto, analysis of phased change within contexts has been limited to time-bound case studies where detailed information was obtained on the interactions taking place within organisations. For example, Cresswell and Sheikh (2013), Herepath (2014), (2009), Hu, Chau, and Sheng (2002), and Volkoff et al. (2007) all report on this type of context. Studies at a national level are less common (Hartvigsen & Pedersen, 2015). Extant examples are intensive case studies, such as that contained in a study of phased changes in enterprise governance found in the work of C. Williams and Karahanna (2013), which appeared difficult to replicate in my extensive, comparative research. However, towards the end of my analysis, a paper by Shaw et al. (2018) was published, which contained an extensive (250 interviews) and a comparative study across three organisations using realist methodologies in the context of an integrated care project. The results of Shaw et al.'s study echoes some of the findings of my research described in this chapter, which identified legitimisation and relationship building as important mechanisms.

Although my research is based on critical realist ontology, I did not intentionally set out to operationalise Archer's (1995) morphogenetic, cyclic frameworks of social change (see Section 4.5) because there were few examples in the literature applying her framework. Archer examined phased change from a realist perspective. She conceived three phases of social change, which operate continuously. During the first phase, material and cultural structures set the conditions for the second phase. Subsequently, interactions occur at the agential level. In the third phase, a rebuilding or reinforcement of material and cultural structures may occur which then leads to another morphogenetic cycle. However, my analysis supports Archer's conceptualisation of social change by demonstrating that pre-existing social and cultural contexts have circumscribed the development of telehealth services. Interactions between professional groups and individuals have been found that seek to change organisational and professional contexts, leading to contextual changes in which the use of telehealth services is increasingly considered a "normal" practice in the contexts studied.

The value of my research is that it is possibly the first study of telehealth services which brings the lens of realist methods to a critical, extensive, comparative study from which I was able to derive a meta-theory of cyclic change (see Section 8.6). My meta-theoretical model of how telehealth services are influenced by contexts and mechanisms is a prototype for a mid-range theory of how technology-supported health services develop. My model treats social (organisational) and cultural (professional) contexts as fundamental units of description and analysis. Within the structural and cultural boundaries of organisational and professional contexts, agential interactions take place on a continuing basis. I was able to identify four macro-mechanisms: legitimisation, confidence building, relationship building, and resource distribution, which have shaped and are shaping the contexts for telehealth service operations. These mechanisms over time have generated new contexts, within which telehealth services are part of the "new normal".

9.3 Research Validation

One of the most difficult issues in qualitative research is how to validate, confirm, or verify results, understandings, mechanisms, and theories. One approach is to report on a set of research design criteria which could assist other researchers in duplicating the results of the research, such as the criteria for reporting qualitative research (COREQ) checklist (Tong, Sainsbury, & Craig, 2007). Appendix V contains a modified checklist of my research design and methods based on these criteria.

My approach to confirming the validity and verification of my research design focuses on the interpretive validity of my research. From within a realist paradigm, a framework for thinking about validity and verification of realist research has been proposed by Maxwell (2012) which highlights the requirement for descriptive validity, interpretive validity, theoretical validity, and generalisability. Although Maxell warns researchers that this framework should not be used "mechanically to eliminate threats to their accounts" (p. 145), it is useful for summary purposes to group an outline of measures taken in my research under the categories he proposed.

Descriptive validity refers to an assessment of the accuracy of accounts of reality by the researcher, such as interviews or texts, and whether these accounts accurately summarise the data or omit certain data. Descriptive validity considers the extent to which the representation of the collected data, including inferences from those data, are independent of the researcher's frame and any theoretical frame (Maxwell, 2012). It would be incorrect to claim that my research was independent of my own interests. For instance, my purposeful sampling strategy sought out key actors in telehealth services who were very committed to their roles. Nevertheless, as described in Section 4.7, participant accounts were tested for completeness by:

- testing of the semi-structured interview guide across multiple contexts;
- interviewing additional participants until "saturation" of themes was clearly reached; and
- searching for additional participants which could offer alternative perspectives.

Interpretive validity is the extent to which the researcher's representation of the meaning of data, for instance, whether participants' statements in an interview are aligned with the meanings that the participants attach to those statements. These meanings are usually not explicitly stated but are inferred by the researcher based on both the interview data and the participant's social position, beliefs, and values, insofar as these are known. Processes I used for analysing and comparing the data are described in Section 4.9.

Theoretical validity is connected with both descriptive and interpretive validity and concerns the next steps in the research process, the use of categories and any inferred relationships between them. The issue is "the legitimacy of the application of any given concept or theory to established facts, or indeed whether any agreement can be reached about what the 'facts' are" (Maxwell, 2012, p. 141). My claim for the theoretical validity of my findings is based on the processes I employed during the analysis and comparison stages, which included:

- Triangulation using multiple and different methods, including abduction, retroduction, and comparison to corroborate inferences and some limited quantitative pattern analysis. This included informal discussions while I was co-located with telehealth services to confirm understandings and investigate discrepancies in information.
- Triangulation of collected data from semi-structured interviews of health service professionals across multiple jurisdictions, supplemented by collection of documentary material such as articles, publications, reports, websites, and reports.
- A continuous process of confirmation and reflection leading to redescriptions of findings (abduction) and connection of contributory mechanisms and higher order macro-mechanisms (retroduction). For example, I sought to understand the context of healthcare in each setting before commencing interviews, especially in Brazil, which is significantly different in many respects from the Australian context.
- Extensive numerical cross comparisons of the level of interest expressed by participants in each theme, which found similar levels of interest in most themes across professional roles, states, and countries. Qualitative coding analysis and comparison comprised successive dis-assembly and reassembling of the information provided by participants within an evolving analytical structure. Assembly and reassembly of this information continued throughout the analysis stage of my research.
- Identifying possible explanatory mechanisms for change using information derived from multiple settings and telehealth services and triangulation of conclusions against multiple and different sources including peer-reviewed literature and other publications such as reports, interview transcripts, and quantitative data.

- Purposefully looking for conflicting interests, exceptions to the case, and contrary mechanisms during the enquiry and analysis stages, sometimes relating to the influence of the differing Australian and Brazilian contexts.

Generalisability of my research findings within other Australian and Brazilian contexts is considered possible because a high degree of “saturation” of the information from interviews was achieved during the enquiry stage. During this stage, similar themes (demi-regularities) rapidly became evident during interviews across different states and countries. Given the contextual similarity of other Australian and Brazilian states to the ones within which I undertook my research, it would be reasonable to expect similar findings in these additional contexts. It is likely that in other countries with universal healthcare systems, many of the same mechanisms which have been identified in my research would be found.

One of the strengths of my research is that it rests on a review of internationally published literature on telehealth (Chapter 3). Many of the findings contained in this literature review informed my research design so it could be expected that a proportion of my findings could also be replicated in a range of national contexts. For instance, one recent study by Shaw (2018) has found mechanisms operating in an integrated care project which echoed some of the mechanisms I have identified in my research. These mechanisms included those at the organisational level to establish interpersonal relationships between healthcare providers, at the policy level to justify inter-organisational collaboration, and a mechanism at the professional level which focuses on patient-centred care supported by committed leadership.

When undertaking this type of extensive research using realist methods in other settings, researchers should be aware of its advantages and disadvantages. Collection of a large amount of data potentially increases the validity of findings, but it is difficult for one researcher to process. A team of researchers working interchangeably across all settings would be better equipped to process large data sets. Dealing with large data sets in extensive research, however, can fail to capture lower level detail from within a particular research case. A detailed case study combined with extensive comparative research would be an ideal research approach if resources permit.

In common with other researchers, I struggled to differentiate processes existing in contexts and mechanisms interacting with telehealth service interventions until it became clear that some explanations refer to the same processes which act or have acted in different contexts or at different contextual levels. For instance, a mechanism such as relationship building can act as a contemporary mechanism and has also acted in the past to shape prior contexts. In part, I have relied on the accounts of participants to determine which processes were situated in contemporary contexts and which mechanisms are now interacting with telehealth services to adapt contexts.

This problem illustrates the complexity, difficulties, and resulting richness that a realist approach can bring to research.

9.4 Research Limitations

My study was designed to investigate telehealth services largely within dominant state public health services across multiple contexts. As such, the study was not designed to understand in detail the development of single telehealth services in the public or private health sectors. Given the extensive nature of this enquiry, my findings and analysis provide only a snapshot, albeit an extended view, of telehealth services in Australia and Brazil. I was unable to study specific services longitudinally from the position of an insider. Instead, I had to search for clues in articles, documents, guidelines, and participant interviews to understand what had happened in the contextual past and which contemporary mechanisms were operating to determine the evolution of telehealth services.

In this study, I interviewed health professionals (clinicians, managers, and technologists) who were or had been closely involved with, and often strongly supportive of, telehealth services. By interrogating the experiences of participants through semi-structured, conversational interviews, I was able to understand some of the lived professional experiences of participants. There existed some inherent biases in participant responses; for instance, no participant opposed telehealth services. Another source of potential bias has been my own involvement in telehealth services. This experience has driven my search for answers to long-standing questions I developed during my professional career. While this motivation was certainly a positive one and enhanced the research effort, there were occasions when prior tentative assumptions, views, or conclusions may have influenced my line of investigation. The only protection against this bias was the range, number, and diversity of the participants I interviewed, which ensured that my own assumptions were challenged when necessary by participants.

Other limitations of this study included logistical difficulties and scheduling clashes, which led to some possible participant interviews being cancelled. Some logistical difficulties in arranging interviews were overcome by using videoconferencing or telephone interviews for remote participants in Australia and Brazil. Scheduling of data collection was dependent on obtaining timely ethical and governance approvals. The major limitation encountered was delays in governance approval required from many health service organisations in Queensland. This meant that it was not possible to arrange interviews with employees of some regional Queensland health services. While delays in obtaining approvals were frustrating, the intervening time between application and approval was used to undertake transcription and preliminary analysis of data. An associated limitation by design of my research is that participants from a number of Australian and Brazilian states which run telehealth services could not be obtained due to the logistical difficulties of extending my research scope. For instance, the Northern Territory, Western Australia, and Minas Gerais in Brazil have extensive telehealth services which have not been included in my research.

Another limitation of my research is the possibility that the instruments, methods, and processes used in my research are insufficient. In other words, the wrong questions may have been posed, participants may not have been probed on issues which should have been elaborated on, and insufficient data may have been collected. Documentation and data on health services were difficult to access. Sometimes they did not exist, or existed in multiple forms in different repositories, in formats or classifications which were difficult to compare. This limitation was most evident when collecting data in Brazil for the purposes of comparing telehealth services between states, but it was also evident in Australia, where a national data set on telehealth activity does not exist and state-based collections have limited insight into actual activity. Data collection in Brazil was facilitated by the availability of large national databases but hindered by language barriers and advice from local researchers that many data sets were unreliable. In the last analysis, the data which have been collected represent a best effort to obtain representative samples that can contribute to finding answers to the specific research questions that have been posed.

It was an undeclared intention of my research to attempt to test the comparative utility of some mid-range theories (for instance, the theory of planned behaviour, diffusion of innovations, or activity theories) using the data collected in my research. However, because the research methodology was extensive rather than intensive, the contextual ground was large. No single organisation or service provided the level of detail in documents or participant interviews which would have enabled a sufficiently bounded case study for testing of mid-range theory with any level of confidence. For the same reasons, detailed investigation of micro-level mechanisms, and even lower level mechanisms, was not possible.

A final limitation emerged during the enquiry and analysis stages, which was the difficulty of processing the large amount of rich data collected from a large number of participants. Despite multiple stages of enquiry and analysis, a large amount of material was passed over as repetitive because "saturation" had been reached, or as being of minor importance because the evidence base was small. It is therefore possible that many more "nuggets" of information remain to be analysed. The following chapter revisits my original research questions, discusses the implications of my investigation for practitioners and theory, and summarises my major findings.

10 CONCLUSION

10.1 Revisiting the Research Questions

My *first research question* was “What are the processes or practices which form part of and simultaneously shape the way in which the technology is used within telehealth services which are advocated by organisations and professional groups?” My research into this question was based on an analysis of the codes of telehealth (guidelines, regulations, etc.) because these codes represent the views of many healthcare organisations about the processes and practices that should be used by telehealth services. Key conclusions from this analysis (see Section 2.4) were that:

- Telehealth codes support, legitimise, and standardise the ways in which telehealth services are delivered.
- Codes are seen as playing an important role in seeding the deployment of telehealth services and managing risks.
- Codes are almost as diverse as the telehealth services themselves, covering clinical, operational, and technical matters in legislation, standards, guidelines, position statements, policies, and frameworks.

My *second research question* was designed to look outside of organisational boundaries and asked, “What are the influences on the development of telehealth services as represented in theories addressing this process?” In answering this research question (Section 3.8), I examined the perspectives contained in the existing theoretical literature and concluded that from a societal perspective the visons for telehealth services and technology in healthcare advocate for increased access to healthcare, better health outcomes, and improved system efficiency. When healthcare activities are supported at a distance, changes in health professional practices and relationships occur, and conflicts emerge between the different interest groups over roles and practices. Health professional practices determine the way in which technologies can be used in telehealth services.

My *third research question* was “How can the development and sustainability of telehealth services over time and between different contexts be explained?” To answer this question, four theory-driven field research questions to guide my fieldwork were developed. These questions were based on specific issues exposed when answering the first and second research questions.

The *first field research question* asked, “How may organisational contexts influence the development of telehealth services?” My research found that despite the differing organisational structures in Australian and Brazilian healthcare, the organisation and priorities of care shape telehealth services, organisational structures circumscribe telehealth services, and the drive for healthcare automation has had contradictory consequences for telehealth services.

The *second field research question* asked, “Can the development of telehealth services be understood through the analysis of conflicts which may influence the relationships between people and organisations in the course of a telehealth service?” My analysis identified that separation of care challenges usual practice, medical practice is influenced by competing sociotechnical codes, and control of technology is disputed.

The *third field research question* was “How do explicit and implicit guidelines and codes operating in the proposed research settings provide social and technical mechanisms for resolving conflict and mitigating risks which arise during telehealth service interventions?” My research showed that norms, processes, and practices legitimise the sociotechnical codes of telehealth services only when these codes are backed by and agreed to by social groups. Collaboration within social groups establishes relationships, which provide a means of resolving conflicts and creating trust in practice.

The *fourth field research question* asked, “Do the mechanisms of risk acceptance and trust in the proposed research settings play a role in resolving conflicts over implicit or explicit organisational and professional codes?” My research found that technology was accepted into practice when risks had been managed and trust created in new or modified practices.

In Section 7.4.1 I discussed the proposition that telehealth services will develop and become more of a stable, normal, and sustainable feature of mainstream healthcare over time. I concluded instead that stability, routinisation, embeddedness, or normalisation do not have an end point, but are continuous over time, contingent on multiple mechanisms and embedded within social and cultural structures. In other words, the development of telehealth services can be seen to be contingent on four key mechanisms which have interacted with Australian and Brazilian organisational healthcare contexts and professional healthcare contexts outlined in Chapter 8.

10.2 Implications for Practice

My research is important for evaluators of technology-supported programs who are seeking to determine outcomes arising from a service intervention, such as telehealth services. My research shows that single-method evaluations of outcomes, whether they be evidence-based trials or qualitative research, including simple realist evaluation schemas, provide limited understandings of complex systems. Evaluation of telehealth services needs to be theoretically informed and to employ multiple methods in order to explain the impact of telehealth services in health service contexts.

My research draws the clear, but obvious conclusion that telehealth services are a viable means of extending care to underserved populations. The fresh insight my research brings is that telehealth services will continue to evolve and adapt to changing health contexts and technology capabilities. That some services may expand, whereas others may not, should not imply failure or lack of “sustainability” of telehealth services. Importantly, my research concluded that the sustainability of telehealth services is never guaranteed but is contingent on and sustained by multiple mechanisms embedded within social and cultural structures.

Practitioners participating in this study identified that the work of modifying practices for service delivery at a distance should be underpinned by the building of relationships between all of the stakeholders in healthcare. These relationships provide the confidence to adopt norms, processes, and practices which legitimise modified practices. A consistent level of infrastructure, human resources, and funding is also required to build the organisational structures which support telehealth services.

From the policy perspective, my research shows that providing access to universal care has underpinned telehealth services and that policymakers should not lose sight of the need to make universal healthcare a reality for everyone. From the perspective of evaluators of telehealth services, my research demonstrates the value of a realist approach to critical evaluation

My research demonstrates that multiple mechanisms influence the implantation of new services. All of us, healthcare clients, patients, healthcare professionals, managers, and technologists have the power to influence mechanisms which will support access to universal healthcare using telehealth services.

10.3 Implications for Theory

Based on a cross-national study using realist methods, my research has been able to provide a significant addition to theoretical knowledge in the form of a meta-theoretical model of how contexts and mechanisms influence telehealth service development (Section 8.6). While acknowledging that the demarcation of mechanisms and context is not always clear, my model provides an important insight: that contextual change is not driven by technology or organisations or individuals. Instead, it is the underlying mechanisms which gain causal power from interactions within the underlying relationships between actors, especially health professional, managers, and technologists, which influence changes in contexts. Organisational and professional contexts which contain these interactions are themselves not stable but evolve over time under the influence of mechanisms to form new states.

My application of the concept of sociotechnical codes enables the practices and behaviour of health professionals to be holistically viewed as "norms, processes, and practices which form part of and simultaneously shape the way in which the technology is adopted”. Sociotechnical codes are more than just guidelines or routines: My research shows that it is the relationships between health professionals which provide the sociotechnical codes with causal power. It is within these relationships between health professionals that negotiations occur to change place-based sociotechnical codes to support healthcare activities at a distance.

My research has demonstrated that contextual change occurs over time and within social and cultural structures, represented by organisational and professional contexts respectively. Consequently, as contexts change under the influence of mechanisms, new contextual states are created, which in turn evolve under the influence of the same continuing, modified, or new mechanisms. In other words, a “new normal” contextual state becomes a fresh context.

My meta-theoretical model of how contexts and mechanisms influence telehealth services allows for the deployment of many mid-range theories for more detailed explanation of lower level (micro or meso) mechanisms. For instance, the legitimisation of telehealth services can be understood through normalisation process theory constructs, or the building of confidence in the practices of telehealth services can be the subject of diffusion of innovations theory or technology acceptance modelling. Due to the extensive scale of my research, I was unable to apply any of the current mid-range theories to the investigation of subsidiary mechanisms; for example, the acceptance of technology in medical practice, such as TAM, TPB, UTAUT, or the health belief model, which may have some explicatory powers. However, application of diverse methods and theoretical approaches has greater explanatory power when rooted in an understanding of contexts. Researchers should ensure that, for example:

- Trials, surveys, and assessments seek to understand and describe the contexts within which the research takes place.
- Studies of organisational or behavioural change seek to understand and describe the contexts within which the changes occur.
- Technology-orientated research considers the needs of practice and the (design) changes required to make technology useful in any given context.

My research provides an important addition to knowledge by identifying that four macro-level mechanisms (and multiple subsidiary mechanisms) explain how legitimisation, confidence building, social relationships, and distribution of resources are the key drivers of telehealth service development.

10.4 Future Research Directions

An overarching direction for research on technology-linked interventions could focus on the extent to which the adaptation of contexts is key to the appropriation of technologies. Research based on this approach could modify, validate, or extend the meta-model proposed. It would be particularly valuable to study sectors other than healthcare to identify different mechanisms other than the ones found in my research. This study was based on an extensive study across multiple contexts; a case-specific study which was able to track the adaptation of contexts and active mechanisms within the environment of a single service, would be particularly useful.

Research into private sector telehealth services would be useful because this study was unable to investigate this healthcare setting, largely because these services at present play a minor role in delivering healthcare in Australia and Brazil. While my research has been able to compare telehealth services across two countries, future research, for instance, in a European context, could consider a broader cross-national study of telehealth service evolution.

10.5 Major Findings

My study is the first to undertake a cross-national study using realist methods across two federated, continental-scale countries with universal care systems. Resulting analysis shows that organisational and professional contexts influence the development of telehealth services. Key to the development of new services was the work of resolving conflicts over modified care practices and revision of existing place-based healthcare practices. Resolution of conflicts was enabled by the development of relationships between all stakeholders in the health system.

Telehealth services in both Australia and Brazil face similar challenges in adapting to care across places, changing medical culture and adapting practices to work across places when supported by technology. In both countries, reforms at a political, organisational, economic, or regulatory level significantly influence the contexts for telehealth services. Given the important differences in the structural organisation of health services between Australia and Brazil, and the different modalities of telehealth services in the two countries, it was surprising to discover that the underlying mechanisms influencing telehealth services and their contexts were similar.

The contribution to knowledge that my research brings is the finding that, across both Australia and Brazil, the adaptation of organisational and professional contexts was not driven by technologies, organisations, or individuals, but by interaction of telehealth services with contexts through four macro-mechanisms for:

- legitimising practice based on explicit and implicit sociotechnical codes including strategies, guidelines, and clinical routines;

- building confidence in practices through accepting technology into practice, management of the risks of practice, and creation of trust in practice;
- building relationships between actors (health professional, managers, technologists); and
- acquiring resources including ICT, human resources, and funding.

In both countries, changes to clinical behaviour and practices supported the adoption of telehealth services. Australian clinicians accepted telehealth services when they fitted within their own risk envelope and when they felt supported by their organisation and professional associations. In contrast, Brazilian clinicians were less concerned about the risks of telehealth services, perhaps because telehealth services were tightly controlled by the regulations of their CFM. However, sections of the Brazilian workforce feared that telemedicine would influence face-to-face relationships with patients and, indirectly, their employment options.

The contribution to knowledge which my research brings is the finding that when implementing telehealth services, organisations and professionals were found to interact through and within social groups or “norm circles” to encode new practices into explicit and implicit strategies, guidelines, and regulations, which I have described as sociotechnical codes. Not all of these interactions were concerned with creating specific telehealth guidelines. Clinicians, especially in Australia, often extended their own established practices, for instance, triaging criteria, into telehealth practice without creating new written guidelines. Other telehealth services spent considerable time designing new guidelines before commencing service. Sociotechnical codes uncovered in my research acted as a locus for the resolution of conflicts which occurred during the adaptation process from place-based to separated care supported by telehealth services.

Of particular importance was my finding that the underpinning relationships between health professionals were crucial to the development of telehealth services. Collaboration of professionals across geographic, organisational, disciplinary, and political boundaries was noted as a key mechanism by many participants. Certain roles developed relationships across organisations and disciplines. Individuals working in these roles became boundary spanners and developed strong communities of practice or “norm circles”. Although this mechanism was important in both countries, Brazilian professionals relied more on collaborative networks than did their Australian participants.

Availability of resources for telehealth services, particularly infrastructure and funding, appeared more limited in Brazil than in Australia. The key contextual difference between Australia and Brazil is that Brazilian health professionals felt that the whole Brazilian universal care system is under threat due to national austerity measures which have been in place since 2016, and that this threat reflected on the stability of telehealth services.

Contrary to my own expectations, participants felt that the majority of telehealth services were routine, embedded, or partially embedded and normalised in healthcare operations. However, my research concluded that continued operation, development, or sustainability of telehealth services is never guaranteed, but is contingent on and sustained by the four key mechanisms embedded within contexts which have been outlined.

My research enhances understanding of the:

- importance of organisational and professional contexts;
- key mechanisms operating in Australian and Brazilian organisational and professional contexts;
- competing sociotechnical codes within professional contexts; and
- how evolution of telehealth services over time is contingent on the interactions between these contexts and mechanisms.

My research has wider applicability for the study of health technology. Telehealth services utilise a subset of the many technologies used in healthcare. A critical and holistic realist approach to the understanding of health technologies should be encouraged.

Last, but not least, at the beginning of my thesis, I posed the question of whether the technology used in telehealth services shape our healthcare, or if we, collectively, change and shape the technology and services used in healthcare. Once technology is understood as the assembly of decontextualised technical elements combined in unique configurations for specific social purposes, in this case, telehealth services, my findings show that technology is shaped by social mechanisms. These mechanisms have causal power derived from interactions within the underlying relationships among actors in organisational and professional contexts. These interactions occur over which norms, processes, and practices, the sociotechnical codes of telehealth services, should form part of and simultaneously shape the way in which the technologies are adopted.

Therefore, any expectation that the application of technology will be successful in alleviating deficiencies in healthcare is misplaced. As Zuboff (2019) concludes, the “image of technology as an autonomous force with unavoidable actions and consequences has been employed across the centuries to erase the fingerprints of power and absolve it of responsibility” (Zuboff, 2019, p. 225). It should now be clear, at least in the context of my research on telehealth services, that the answer to the question of whether technology or Victor Frankenstein is responsible for determining how technology is used in healthcare is, simply, “We are, we did it, not the monster!”.

REFERENCES

Aanestad, M. (2003). The camera as an actor: Design-in-use of telemedicine infrastructure in surgery. *Computer Supported Cooperative Work, Computer Supported Cooperative Work: CSCW: An International Journal*, *12*(1), 1–20. https://doi.org/10.1023/A:1022492210898

Aas, I. H. M. (2006). Organizational decentralization in radiology. *Journal of Telemedicine and Telecare*, *12*(suppl 1), 1–3. https://doi.org/10.1258/135763306777978524

Abimbola, S., Keelan, S., Everett, M., Casburn, K., Mitchell, M., Burchfield, K., & Martiniuk, A. (2019). The medium, the message and the measure: A theory-driven review on the value of telehealth as a patient-facing digital health innovation. *Health Economics Review*, *9*(1), 21. https://doi.org/10.1186/s13561-019-0239-5

Access Economics. (2003). *The economic impact of an accelerated rollout of broadband in hospitals*. Retrieved from http://ict-industry-reports.com.au/wp-content/uploads/sites/4/2013/10/2003-Broadband-in-Hospitals-Economic-Impact-Access-Economics-DCITA.pdf

Accreditation Canada. (2003). *National initiative for telehealth framework of guidelines*. Retrieved from https://www.isfteh.org/files/work_groups/FrameworkofGuidelines2003eng.pdf

Agency for Clinical Innovation. (2019). *Telehealth in practice*. Retrieved from https://www.aci.health.nsw.gov.au/__data/assets/pdf_file/0008/509480/ACI_0261_Telehealth_guidelines.pdf

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, N.J. USA: Prentice-Hall.

Alkmim, M. B. M., Marcolino, M. S., Figueira, R. M., Sousa, L., Nunes, M. S., Cardoso, C. S., & Ribeiro, A. L. (2015). Factors associated with the use of a teleconsultation system in Brazilian primary care. *Telemedicine and E-Health*, *21*(6), 473–483. https://doi.org/10.1089/tmj.2014.0112

Allen, D. K., Brown, A., Karanasios, S., & Norman, A. (2013). How should technology-mediated organizational change be explained? A comparison of the contributions of critical realism and activity theory. *MIS Quarterly*, *37*(3), 835.

Almeida-Filho, N. (2011). Higher education and health care in Brazil. *The Lancet*, *377*(9781), 1898–1900. https://doi.org/10.1016/S0140-6736(11)60326-7

Alonso, N., Massenburg, B. B., Galli, R., Sobrado, L., Birolini, D., Alonso, N., … Birolini, D. (2017). Surgery in Brazilian health care: Funding and physician distribution. *Revista Do Colégio Brasileiro de Cirurgiões*, *44*(2), 202–207. https://doi.org/10.1590/0100-69912017002016

Al Quran, H. A., Khader, Y. S., Ellauzi, Z. M., & Shdaifat, A. (2015). Effect of real-time teledermatology on diagnosis, treatment and clinical improvement. *Journal of Telemedicine and Telecare*, *21*(2), 93–99. https://doi.org/10.1177/1357633X14566572

Al-Qirim, N. A. Y. (2003). Teledermatology: The case of adoption and diffusion of telemedicine health Waikato in New Zealand. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *9*(2), 167–177. https://doi.org/10.1089/153056203766437507

Al-Qirim, N. (2007). Championing telemedicine adoption and utilization in healthcare organizations in New Zealand. *International Journal of Medical Informatics*, *76*(1), 42–54. https://doi.org/10.1016/j.ijmedinf.2006.02.001

Alverson, D. C. (2014). When does telemedicine become a standard of care? *The SciTech Lawyer*, *10*(3), 22.

American Telemedicine Association. (2007). *Practice guidelines for teledermatology*. Retrieved from http://www.americantelemed.org/resources/telemedicine-practice-guidelines/telemedicine-practice-guidelines/practice-guidelines-for-teledermatology#.VuFGL_I97IU

American Telemedicine Association. (2010). *A Blueprint for Telerehabilitation Guidelines*. Retrieved from https://www.americantelemed.org/resource_categories/practice-guidelines/

American Telemedicine Association. (2013). *Practice guidelines for video-based online mental health services*. Retrieved from http://www.americantelemed.org/resources/telemedicine-practice-guidelines/telemedicine-practice-guidelines/practice-guidelines-for-video-based-online-mental-health-services#.VuFCmPl97IU

American Telemedicine Association. (2014a). *Core Operational Guidelines for Telehealth Services Involving Provider-Patient Interactions*. Retrieved from https://www.americantelemed.org/resource_categories/practice-guidelines/

American Telemedicine Association. (2014b). *Guidelines for TeleICU Operations*. Retrieved from http://www.americantelemed.org/docs/default-source/standards/guidelines-for-teleicu-operations.pdf?sfvrsn=2

American Telemedicine Association. (2014c). *Practice guidelines for live, on demand primary and urgent care*. Retrieved from http://www.americantelemed.org/docs/default-source/standards/primary-urgent-care-guidelines.pdf?sfvrsn=4

Andersen, S. T., & Jansen, A. (2012). Installed base as a facilitator for user-driven innovation: How can user innovation challenge existing institutional barriers? *International Journal of Telemedicine and Applications*, *2012*, 673731. https://doi.org/10.1155/2012/673731

Andersen, T., Bjørn, P., Kensing, F., & Moll, J. (2011). Designing for collaborative interpretation in telemonitoring: Re-introducing patients as diagnostic agents. *International Journal of Medical Informatics*, *80*(8), e112–e126.

Andreassen, H. K., Kjekshus, L. E., & Tjora, A. (2015). Survival of the project: A case study of ICT innovation in health care. *Social Science & Medicine*, *132*, 62–69. https://doi.org/10.1016/j.socscimed.2015.03.016

Archer, M. (1995). *Realist social theory: The morphogenetic approach*. Cambrige, UK: Cambridge University Press.

Aronson, S. H. (1977). The Lancet on the telephone 1876-1975. *Medical History*, *21*(1), 69–87.

Associação Brasileira de Telemedicina e Telessaúde. (2019). Conselheiros do CFM revogam a Resolução nº 2.227/2018, que trata da Telemedicina [Delegates of the Federal Medical Council withdraw Resolution 2.227/2018 about Telemedicine]. Retrieved March 21, 2019, from http://www.abtms.org.br/?p=2366&lang=pt

Astbury, B. (2013). Some reflections on Pawson's science of evaluation: A realist manifesto. *Evaluation*, *19*(4), 383–401. https://doi.org/10.1177/1356389013505039

Audiology Australia. (2013). *Professional practice standards—Part B clinical standards—Chapter 6*. Retrieved from https://audiology.asn.au/Tenant/C0000013/Position%20Papers/Member%20Resources/Clinical%20Standards%20partb%20-%20whole%20document%20July13%201.pdf

Australian Bureau of Statistics. (2014). *Australian population grid, 2011*. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.0072011?OpenDocument

Australian College of Rural and Remote Medicine. (2012). *Australia, Specialists (ACRRM)—Telehealth Advisory Committee standards framework*. Retrieved from http://www.ehealth.acrrm.org.au/telehealth-standards

Australian College of Rural and Remote Medicine. (2017). *Handbook for the TeleHealth online education module*. Retrieved from http://www.acrrm.org.au/docs/default-source/documents/rural-and-remote-medicine-resources/handbook-for-telehealth-online-education-module-final.pdf?sfvrsn=0

Australian Digital Health Agency. (2018). *Australia's national digital health strategy*. Retrieved from https://conversation.digitalhealth.gov.au/australias-national-digital-health-strategy

Australian Government Department of Health. (2017). *MBS video consultation items*. Retrieved July 10, 2017, from http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/connectinghealthservices-itemlist

Australian Government Department of Health. (2018). *General practice statistics*. Retrieved August 19, 2018, from http://www.health.gov.au/internet/main/publishing.nsf/content/general+practice+statistics-1

Australian Government Department of Health. (2019a). *Medicare Benefits Schedule (MBS) Review Taskforce reports*. Retrieved April 9, 2019, from http://www.health.gov.au/internet/main/publishing.nsf/Content/MBSR-open-consult

Australian Government Department of Health. (2019b). *Telehealth quarterly statisitics update*. Retrieved from http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/connectinghealthservices-factsheet-stats

Australian Government Department of Health. (2019c). *Telehealth services provided by GPs and non-specialist medical practitioners to patients in rural and remote areas*. Retrieved from http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/Factsheet-GPTeleHealth

Australian Government Department of Health and Ageing. (2009). *A Healthier Future for all Australians Final Report*. Retrieved from http://www.cotasa.org.au/cms_resources/documents/news/nhhrc_report.pdf

Australian Government Department of Health and Ageing. (2012a). *NBN enabled Telehealth Pilots Program*. Retrieved from http://www.health.gov.au/internet/main/publishing.nsf/content/ehealth-nbntelehealth-pilots/$File/Fact%20Sheet.pdf

Australian Government Department of Health and Ageing. (2012b). *State of corporatisation*. Retrieved from https://www.health.gov.au/internet/main/publishing.nsf/Content/foi-disc-log-2012-13/$File/222-1213%20Doc%206%20State%20of%20Corporatisation%20Report%20-%20February%202012.pdf

Australian Government Department of Health; Health Workforce Division. (2019). *National registration and accreditation scheme (NRAS)*. Retrieved from https://www1.health.gov.au/internet/main/publishing.nsf/Content/work-nras

Australian Government Department of Human Services. (2019). Telehealth data.

Australian Health Ministers' Advisory Council. (2018). *Regulation of Australia's health professions: Keeping the national law up to date and fit for purpose*. Retrieved from https://www.coaghealthcouncil.gov.au/Portals/0/Regulation%20of%20Australias%20health%20professions_Keeping%20the%20National%20Law%20up%20to%20date%20and%20fit%20for%20purpose%20FINAL.pdf

Australian Institute of Health and Welfare. (2016). *Primary health care in Australia*. Retrieved August 22, 2018, from Australian Institute of Health and Welfare website: https://www.aihw.gov.au/reports/primary-health-care/primary-health-care-in-australia/contents/about-primary-health-care

Australian Institute of Health and Welfare. (2017a). *Health expenditure Australia 2015-16.* Retrieved from https://www.aihw.gov.au/reports/health-welfare-expenditure/health-expenditure-australia-2015-16/contents/dynamic-data

Australian Institute of Health and Welfare. (2017b). *Hospital resources 2015-16*. Retrieved from https://www.aihw.gov.au/getmedia/d37a56cb-dc6b-4b28-a52f-8e00f606ce67/21035.pdf.aspx?inline=true

Australian Institute of Health and Welfare. (2018). *Non-admitted patient care 2016–17*. Retrieved from https://www.aihw.gov.au/getmedia/a6c9c592-4e8b-4b53-b7f6-3a01d91ed801/aihw-hse-206.pdf

Australian Medical Association. (2011). *AMA submission on Connecting Health Services with the Future: Modernising Medicare by Providing Rebates for Online Consultations*. Retrieved from https://ama.com.au/submission/submission-connecting-health-services-future-modernising-medicare-providing-rebates

Australian Medical Association. (2018). *AMA private health insurance report card 2018*. Retrieved from https://ama.com.au/sites/default/files/documents/AMA%20Private%20Health%20Insurance%20Report%20Card%202018_3.pdf

Australian National Telehealth Committee. (2002). *National telehealth plan for Australia and New Zealand*. Canberra: Commonwealth Dept. of Health and Ageing.

Australian Nursing and Midwifery Federation. (2013a). *Guidelines for telehealth online video consultation funded through Medicare*. Retrieved from http://anmf.org.au/documents/reports/Telehealth_Guidelines.pdf

Australian Nursing and Midwifery Federation. (2013b). *Telehealth standards: Registered midwives*. Retrieved from http://anf.org.au/documents/reports/Telehealth_Standards_Registered_Midwives.pdf

Australian Nursing Federation. (2011). *Comments to the Australian Government in response to the Discussion Paper on Connecting Health Services with the Future: Modernising Medicare by providing Rebates for Online Consultations*. Retrieved from http://anf.org.au/documents/submissions/ANF_Submission_Medicare_Rebates_for_Online_Consultations.pdf

Australian Nursing Federation. (2013). *Guidelines for telehealth on-line video consultation funded through Medicare*. Retrieved from http://anmf.org.au/documents/reports/Telehealth_Guidelines.pdf

Australian Psychological Society. (2011). *Modernising Medicare by providing rebates for online consultations*. Retrieved from http://www.inpsychology.com.au/Article.pdf

Australian Rural Health Research Institute. (1996). *Telehealth in rural and remote Australia: Report of the project for rural health communications and information technologies*. Retrieved from http://www.healthinfonet.ecu.edu.au/key-resources/bibliography/?lid=8480

Bailey, Q., Bryant, J., Hayes, L., Jensen, M., & Whiting, R. (1998). ICU telemedicine – where we are today. *Australian Critical Care*, *11*(2), 60. https://doi.org/10.1016/S1036-7314(98)70461-8

Baldwin, P. K., Mcauley, W. J., & Nostrand, J. V. (2012). Organizational factors associated with the use of telehospice. *Journal of Telemedicine and Telecare*, *18*(2), 90–93.

Banbury, A., Parkinson, L., Nancarrow, S., Dart, J., Gray, L., & Buckley, J. (2014). Multi-site videoconferencing for home-based education of older people with chronic conditions: The Telehealth Literacy Project. *Journal of Telemedicine and Telecare*, *20*(7), 353–359. https://doi.org/10.1177/1357633X14552369

Bardram, J., Bossen, C., & Thomsen, A. (2005). *Designing for transformations in collaboration: A study of the deployment of homecare technology*. Presented at the Proceedings of the 2005 international ACM SIGGROUP conference on Supporting group work.

Barlow, J., Bayer, S., & Curry, R. (2003). The design of pilot telecare projects and their integration into mainstream service delivery. *Journal of Telemedicine and Telecare*, *9 Suppl 1*, S1-3. https://doi.org/10.1258/135763303322196132

Barlow, J., Bayer, S., & Curry, R. (2006). Implementing complex innovations in fluid multi-stakeholder environments: Experiences of "telecare". *Technovation*, *26*(3), 396–406. https://doi.org/10.1016/j.technovation.2005.06.010

Barnes, J. K. (2006). Telemedicine: A conflict of laws problem waiting to happen - how will interstate and international claims be decided? *Houston Journal of International Law*, *28*(2), 491.

Bashshur, R. L., Shannon, G., Krupinski, E. A., & Grigsby, J. (2013). Sustaining and realizing the promise of telemedicine. *Telemedicine and E-Health*, *19*(5), 339.

Bateman, C. (2011). Cutting-edge telemedicine venture freezes as official bodies frown. *South African Medical Journal*, *101*(6), 368.

Beauchamp, T. L., & Childress, J. F. (2001). *Principles of biomedical ethics* (5th ed). United Kingdom: Oxford University Press.

Bee, P., Lovell, K., Airnes, Z., & Pruszynska, A. (2016). Embedding telephone therapy in statutory mental health services: A qualitative, theory-driven analysis. *BMC Psychiatry*, *16*. https://doi.org/10.1186/s12888-016-0761-5

Bennett, C. C. (2013). Are we there yet? A journey of health reform in Australia. *The Medical Journal of Australia*, *199*(4), 251–255. https://doi.org/10.5694/mja13.10839

Bergene, A. (2007). Towards a critical realist comparative methodology. *Journal of Critical Realism*, *6*(1), 5–27. https://doi.org/10.1558/jocr.v6i1.5

Bhaskar, R. (1997). *A realist theory of science*. London and New York: Verso Books.

Bhatia, J. S., & Singh, C. (2014). Adoption of telemedicine in India – An exploratory study. *International Journal of Emerging Technology and Advanced Engineering*, *4*(10), 473–483.

Bhatta, R. (2013). *Evaluation of the Rural-Telemedicine program in Nepal: Study from the selected districts*. Tromsø, Norway: University of Tromsø.

Bielefeld University Library. (2019). BASE - Bielefeld academic search engine | What is BASE? Retrieved October 26, 2019, from https://www.base-search.net/about/en/

Bijker, W. E. (2009). Social construction of technology. In J. K. B. Olsen, S. A. Pedersen, & V. F. Hendricks (Eds.), *A companion to the philosophy of technology* (pp. 88–94). Retrieved from http://onlinelibrary.wiley.com.ezproxy.flinders.edu.au/doi/10.1002/9781444310795.ch15/summary

Bijker, W. E., Hughes, T. P., & Pinch, T. J. (1987). *The social construction of technological systems: New directions in the sociology and history of technology*. Cambridge, Mass: MIT Press.

Blackwell, N. A. M., Kelly, G. J., & Lenton, L. M. (1997). Telemedicine ophthalmology consultation in remote Queensland. *The Medical Journal of Australia*, *167*(11 12), 583.

Blom, B., & Morén, S. (2011). Analysis of generative mechanisms. *Journal of Critical Realism*, *10*(1), 60–79. https://doi.org/10.1558/jcr.v10i1.60

Bonder, S., & Zajtchuk, R. (1997). Changing the paradigm for telemedicine development and evaluation: A prospective model-based approach. *Socio-Economic Planning Sciences*, *31*(4), 257–280. https://doi.org/10.1016/S0038-0121(97)00018-9

Boonstra, A., Broekhuis, M., van Offenbeek, M., & Wortmann, H. (2011). Strategic alternatives in telecare design: Developing a value-configuration-based alignment framework. *Journal of Strategic Information Systems*, *20*(2), 198–214. https://doi.org/10.1016/j.jsis.2010.12.001

Boonstra, A., & Van Offenbeek, M. (2010). Towards consistent modes of e-health implementation: Structurational analysis of a telecare programme’s limited success. *Information Systems Journal*, *20*(6), 537.

Bosse, G., Breuer, J., & Spies, C. (2006). The resistance to changing guidelines—What are the challenges and how to meet them. *Bailliere’s Best Practice in Clinical Anesthesiology*, *20*(3), 379.

Boston Consulting Group. (2004). *National health information management information & communications technology strategy*. Retrieved from https://ozhealthithistory.wikispaces.com/file/view/Boston+Con+Gp+2004+Main+Report.pdf

Botrugno, C., Goldim, J. R., & Fernandes, M. S. (2019). O telessaúde Brasil redes: Um sistema tecnologico “socialmente engajado” [The Brazilian Telehealth Network: A socially engaged technology]. *Latin American Journal of Telehealth*. Retrieved from http://cetes.medicina.ufmg.br/revista/index.php/rlat/article/view/271

Bouamrane, M., Osbourne, J., & Mair, F. S. (2011). Understanding the implementation integration of remote tele-health services … an overview of Normalization Process Theory. In *5th International Conference on Pervasive Computing Technologies for Healthcare (PervasiveHealth) and Workshops* (pp. 300–307).

Bousquat, A., Giovanella, L., Fausto, M. C. R., Fusaro, E. R., Mendonça, M. H. M. de, Gagno, J., & Viana, A. L. d’Ávila. (2017). Tipologia da estrutura das unidades básicas de saúde brasileiras: Os 5 R [The structure and type of Brazilian basic health units]. *Cadernos de Saúde Pública*, *33*(8). https://doi.org/10.1590/0102-311x00037316

Bradford, N., Caffery, L., & Smith, A. (2016). Telehealth services in rural and remote Australia: A systematic review of models of care and factors influencing success and sustainability. *Rural and Remote Health*, *16*(4), 4268.

Bradford, N. K., Young, J., Armfield, N. R., Herbert, A., & Smith, A. C. (2014). Home telehealth and paediatric palliative care: Clinician perceptions of what is stopping us? *BMC Palliative Care*, *13*, 29.

Brazilian Institute of Geography and Statistics. (2010). *Densidade demográfica 2010* [Demographic density]. Retrieved from https://mapas.ibge.gov.br/tematicos/demografia

Brazilian Institute of Geography and Statistics. (2016). *Arranjos Populacionais e Concentrações Urbanas do Brasil* (2nd ed.) [Urban population locations and distribribution in Brazil]. Retrieved from ftp://geoftp.ibge.gov.br/organizacao_do_territorio/divisao_regional/arranjos_populacionais/arranjos_populacionais.pdf

Briggs, A. (2017). *Private health insurance: A quick guide*. Retrieved from https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1718/Quick_Guides/PrivateHealthInsurance

Brooks, E., & Manson, S. M. (2012). The diffusion of telehealth in rural American Indian communities: A retrospective survey of key stakeholders. *Telemedicine Journal and E-Health*, *18*(1), 60–66.

Brown, A. (2007). Reorienting critical realism: A system-wide perspective on the capitalist economy. *Journal of Economic Methodology*, *14*(4), 499–519. https://doi.org/10.1080/13501780701718789

Brusamento, S., Legido-Quigley, H., Panteli, D., Turk, E., Knai, C., Saliba, V., … Busse, R. (2012). Assessing the effectiveness of strategies to implement clinical guidelines for the management of chronic diseases at primary care level in EU Member States: A systematic review. *Health Policy*, *107*(2–3), 168–183. https://doi.org/10.1016/j.healthpol.2012.08.005

Bryett, A. (2015). *Telehealth in Queensland*. Paper presented at the Success and Failures in Telehealth, Brisbane, Australia.

Bryman, A., & Burgess, R. (Eds.). (1994). *Analyzing qualitative data*. Retrieved from https://doi.org/10.4324/9780203413081

Bulletpoint. (2013). *NBN enabled Telehealth Pilots Program*. Retrieved July 11, 2017, from Bulletpoint website: http://www.bulletpoint.com.au/nbn-enabled-telehealth-pilots-program/

Caffery, L., Hobbs, A., Hale-Robertson, K., & Smith, A. (2017). *Telehealth substitution of rural outreach services: An economic analysis.* Paper presented at the 14th National Rural Health Conference, Cairns, Australia. Retrieved from http://www.ruralhealth.org.au/14nrhc/content/caffery

Cameron, P. A., Gabbe, B. J., Smith, K., & Mitra, B. (2014). Triaging the right patient to the right place in the shortest time. *BJA: British Journal of Anaesthesia*, *113*(2), 226–233. https://doi.org/10.1093/bja/aeu231

Campos, F. E., Haddad, A. E., Wen, C. L., & Alkmim, M. B. M. (2009). The National Telehealth Program in Brazil: An instrument of support for primary health care. Latin American Journal of Telehealth, 1(1), 39–66.

Canadian Society for Telehealth. (2009). *Canada, National Telehealth Regulation/ Position Statement and Recommendations*. Retrieved from http://telehealth.org/wp-content/uploads/2013/11/Position_Statement_and_Recommendations.pdf

Canadian Stroke Network. (2013). *Telestroke implementation toolkit*. Retrieved from https://support.otn.ca/en/members/telestroke-private/toolkit

Cardno, E. J. (2000). Managing the “fit” of information and communication technology in community health: A framework for decision making. *Journal of Telemedicine and Telecare*, *6*(suppl 2), 6–8. https://doi.org/10.1258/1357633001935644

Cardoso, F. (2019). Caneta Desesquerdizadora da Saúde—Posts. Retrieved March 21, 2019, from https://www.facebook.com/pg/CanetaDesesquerdizadoradaSaude/posts/

Carey, T. A., Wakerman, J., Humphreys, J. S., Buykx, P., & Lindeman, M. (2013). What primary health care services should residents of rural and remote Australia be able to access? A systematic review of “core” primary health care services. *BMC Health Services Research*, *13*, 178. https://doi.org/10.1186/1472-6963-13-178

Carroll, P., Anderson, D., Oliver, T., & Sim, L. (2011). *Teleradiology in Queensland Health: Establishing teleradiology services to support rural and remote services in Queensland*. Paper presented at the Successes and Failures in Telehealth, Brisbane, Australia.

Celler, B. (2015). *Design of a multi-site multi-state clinical trial of home monitoring of chronic disease in the community*. NSW, Australia: Commonwealth Scientific and Industrial Research Organisation.

Celler, B. (2018). *The definitive summation of the results of the NBN CSIRO telehealth trial and their policy implications*. Retrieved from https://event.icebergevents.com.au/uploads/contentFiles/files/2018-SFT/Branko-Celler-SFT2018.pdf

Celler, B., Varnfield, M., & Jayasena, R. (2018). What have we learned from the CSIRO national NBN telehealth trial? *Studies in Health Technology and Informatics*, *246*(Telehealth for our Ageing Society). https://doi.org/10.3233/978-1-61499-845-7-1

Chan, F. Y. (2007). Fetal tele-ultrasound and tele-therapy. *Journal of Telemedicine and Telecare*, *13*(4), 167–171. https://doi.org/10.1258/135763307780908030

Chan, F. Y., Soong, B., Watson, D., & Whitehall, J. (2001). Realtime fetal ultrasound by telemedicine in Queensland. A successful venture? *Journal of Telemedicine and Telecare*, *7*(suppl 2), 7–11. https://doi.org/10.1258/1357633011937290

Chan, F. Y., Taylor, A., Soong, B., Martin, B., Clark, J., Timothy, P., … Wootton, R. (2002). Randomized comparison of the quality of realtime fetal ultrasound images transmitted by ISDN and by IP videoconferencing. *Journal of Telemedicine and Telecare*, *8*(2), 91–96.

Chan, F. Y., Whitehall, J., Hayes, L., Taylor, A., Soong, B., Lessing, K., … Whiting, R. (1999). Minimum requirements for remote realtime fetal tele-ultrasound consultation. *Journal of Telemedicine and Telecare*, *5*(3), 171–176.

Chandra, A., Pettry, C., & Paul, D. (2005). Telemedicine from a macromarketing viewpoint: A critical evaluation with proposed licensing strategies. *Journal of Nonprofit & Public Sector Marketing*, *13*(1–2), 111–135. https://doi.org/10.1300/J054v13n01_07

Chau, P. Y. K., & Hu, P. (2001). Information technology acceptance by individual professionals: A model comparison approach. *Decision Sciences*, *32*(4), 699–718.

Chau, P. Y. K., & Hu, P. J.-H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information & Management*, *39*(4), 297–311. https://doi.org/10.1016/S0378-7206(01)00098-2

Chipps, J., & Mars, M. (2012). Readiness of health-care institutions in KwaZulu-Natal to implement telepsychiatry. *Journal of Telemedicine and Telecare*, *18*(3), 133–137. https://doi.org/10.1258/jtt.2012.SFT103

Cho, S., Mathiassen, L., & Gallivan, M. (2008). From adoption to diffusion of a telehealth innovation. In *Proceedings of the 41st Hawaii International Conference on System Sciences* (pp. 245–245). https://doi.org/10.1109/HICSS.2008.177

Cho, S., Mathiassen, L., & Gallivan, M. (2009). Crossing the diffusion chasm: From invention to penetration of a telehealth innovation. *Information Technology & People*, *22*(4), 351–366. https://doi.org/10.1108/09593840911002450

Cho, S., Mathiassen, L., & Robey, D. (2006). The dialectics of resilience: A multilevel analysis of a telehealth innovation. *IFIP International Federation for Information Processing*, *206*, 339–357. https://doi.org/10.1007/0-387-34410-1_22

Clark, A. M. (2013). What are the components of complex interventions in healthcare? Theorizing approaches to parts, powers and the whole intervention. *Social Science & Medicine, 93*(Supplement C), 185–193. https://doi.org/10.1016/j.socscimed.2012.03.035

Cilliers, L. (2014). Using the cloud to provide telemedicine services in a developing country. *South African Journal of Information Management*, *16*(1).

Cockcroft, S. (2015). Exploring the impact of IS theory on health informatics. In *48th Hawaii International Conference on System Sciences* (pp. 4938–4947). https://doi.org/10.1109/HICSS.2015.585

Coiera, E. (2013). Why e-health is so hard. *The Medical Journal of Australia*, *198*(4), 178–179. https://doi.org/10.5694/mja13.10101

Coleman, A., & Coleman, M. (2013). Activity theory framework: A basis for e-health readiness assessment in health institutions. *Journal of Communication*, *4*(2). Retrieved from http://www.krepublishers.com/02-Journals/JC/JC-04-0-000-13-Web/JC-04-2-000-13-Abst-PDF/JC-04-2-095-13-081-Coleman-A/JC-04-2-095-13-081-Coleman-A-Tt.pdf

Collier, A., Morgan, D. D., Swetenham, K., To, T. H., Currow, D. C., & Tieman, J. J. (2016). Implementation of a pilot telehealth programme in community palliative care: A qualitative study of clinicians' perspectives. *Palliative Medicine*, *30*(4), 409–417. https://doi.org/10.1177/0269216315600113

Communio. (2009). *Broadband for health*. Retrieved from https://www1.health.gov.au/internet/main/publishing.nsf/Content/A3E1F0F02186B88FCA257BF0001A4D9F/$File/BFHP.pdf

Country Health South Australia LHN. (2017). *Guidelines for clinical services offering digital telehealth network consultations* (unpublished internal report). South Australian Government.

Cornford, T., & Klecun-Dabrowska, E. (2001). Ethical perspectives in evaluation of telehealth. *Cambridge Quarterly of Healthcare Ethics*, *10*(2), 161–169.

Correa, G., & Domènech, M. (2013). Care networking: A study of technical mediations in a home telecare service. *International Journal of Environmental Research and Public Health*, *10*(7), 3072–3088. https://doi.org/10.3390/ijerph10073072

Costa, N. do R. (2017). Brazilian healthcare in the context of austerity: Private sector dominant, government sector failing. *Ciência & Saúde Coletiva*, *22*(4), 1065–1074. https://doi.org/10.1590/1413-81232017224.28192016

Coughlan, J., Eatock, J., & Eldabi, T. (2006). Evaluating telemedicine: A focus on patient pathways. *International Journal of Technology Assessment in Health Care*, *22*(1), 136–142.

Coutiño, J. C., Vivian, M. G., Hernandez, L. A., & Gonzalez, A. O. G. (1999). Preliminary results from the Mexican national telemedicine network. *Journal of Telemedicine and Telecare*, *5*(2), 131–133.

Cradduck, T. (2002). Sustainability—The Holy Grail of telehealth? *Journal of Telemedicine and Telecare*, *8*, 7–8.

Cresswell, K., & Sheikh, A. (2013). Organizational issues in the implementation and adoption of health information technology innovations: An interpretative review. *International Journal of Medical Informatics*, *82*(5), e73–e86. https://doi.org/10.1016/j.ijmedinf.2012.10.007

Creswell, J. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Croll, J., Norton, C. J., Gray, L. C., Bryett, A., & Smith, A. C. (2012). Telehealth opportunities in regional Queensland: A scoping study. *Journal of Telemedicine and Telecare*, *18*(8), 451–454. https://doi.org/10.1258/jtt.2012.GTH106

Crotty, M., Killington, M., Van Den Berg, M., Morris, C., Taylor, A., & Carati, C. (2014). Telerehabilitation for older people using off-the-shelf applications: Acceptability and feasibility. *Journal of Telemedicine and Telecare*, *20*(7), 370–376. https://doi.org/10.1177/1357633X14552382

Crowe, B., & McDonald, I. (1997). Telemedicine in Australia: Recent developments. *Journal of Telemedicine and Telecare*, *3*(1).

Dalkin, S., Greenhalgh, J., Jones, D., Cunningham, B., & Lhussier, M. (2015). *What's in a mechanism? Development of a key concept in realist evaluation*. Retrieved from http://eprints.whiterose.ac.uk/85522/3/What%27s%20in%20a%20mechanism%3F%20Development%20of%20a%20key%20concept%20in%20realist%20evaluation..pdf

Danermark, B. (2002). *Explaining society: Critical realism in the social sciences* (1st ed.). London: Routledge.

Danermark, B., Ekstrom, M., & Karlsson, J. C. (2019). *Explaining society: Critical realism in the social sciences* (2nd ed.). London: Routledge.

Daniel, H., & Sulmasy, L. (2015). Policy recommendations to guide the use of telemedicine in primary care settings: An American College of Physicians position paper. *Annals of Internal Medicine*, *163*(10), 787–+. https://doi.org/10.7326/M15-0498

Dardelet, B. (2001). In the kingdom of expertness, the profane is king. Carriers of medical innovations. In *Proceedings of the 34th Annual Hawaii International Conference on System Sciences* (8 pp). https://doi.org/10.1109/HICSS.2001.926566

Darkins, A. (2014). The growth of telehealth services in the veterans health administration between 1994 and 2014: A study in the diffusion of innovation. *Telemedicine and E-Health*, *20*(9), 761–768. https://doi.org/10.1089/tmj.2014.0143

Dattakumar, A. (2013). *A unified approach for the evaluation of telehealth implementations in Australia*. Retrieved from http://apo.org.au/research/unified-approach-evaluation-telehealth-implementations-australia

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance. *MIS Quarterly*, *13*(3), 319.

Davis, T. M. (2013). *Integrating telemedicine for disaster response: Testing the Emergency Telemedicine Technology Acceptance model* (George Mason University). Retrieved from http://hdl.handle.net/1920/8353 de Brún, T., O'Reilly-de Brún, M., O'Donnell, C. A., & MacFarlane, A. (2016). Learning from doing: The case for combining normalisation process theory and participatory learning and action research methodology for primary healthcare implementation research. *BMC Health Services Research*, *16*(1), 346. https://doi.org/10.1186/s12913-016-1587-z

de Lima Verde Brito, T. D., Baptista, R. S., de Lima Lopes, P. R., Haddad, A. E., Messina, L. A., & Torres Pisa, I. (2015). The collaborative coordination of special interest groups on the telemedicine university network (RUTE) in Brazil. *Studies in Health Technology and Informatics*, *216*, 1010.

Deloitte. (2006). *Queensland Health eHealth Strategy* (unpublished Internal report).

Dickens, B. M., & Cook, R. J. (2006). Legal and ethical issues in telemedicine and robotics. *International Journal of Gynecology and Obstetrics*, *94*(1), 73–78. https://doi.org/10.1016/j.ijgo.2006.04.023

Diment, K., Yu, P., & Garrety, K. (2009). Complex Adaptive Systems as a Model for Evaluating Organisational Change Caused by the Introduction of Health Information Systems. Proceedings; Frontiers of Health Informatics - Redefining Healthcare, 165–169. Canberra, Australia: Health Informatics Society of Australia HISA.

Dobson, P. J., Jackson, P., & Gengatharen, D. (2013). Explaining broadband adoption in rural Australia: Modes of reflexivity and the morphogenetic approach. *MISQ Archivist*. Retrieved from https://pdfs.semanticscholar.org/305c/27ddf864b851d975ef31185221b49d0845a5.pdf?_ga=1.191743082.1748518395.1482243206

D'Souza, R., Hustig, H., & Montgomery, W. (2001). Telehealth in rural and remote mental health: A review of the use of telepsychiatry in education, training, treatment, discharge planning and a health economic evaluation of the telemedicine service. *Australian and New Zealand Journal of Psychiatry*, *35*(4), A7–A7.

DuBose-Morris, R. (2014). *An interpretative phenomenological analysis of telehealth champions* (Doctoral dissertation). Nova Southeastern University, Florida. Retrieved from CEC Theses and Dissertations. http://nsuworks.nova.edu/gscis_etd/140

Duckett, S. (2015). Medicare at middle age: Adapting a fundamentally good system. *Australian Economic Review*, *48*(3), 290–297. https://doi.org/10.1111/1467-8462.12120

Duckett, S. (2018). Australia's health system is enviable, but there's room for improvement. Retrieved July 6, 2018, from *The Conversation* website: http://theconversation.com/australias-health-system-is-enviable-but-theres-room-for-improvement-81332

Dyb, K., & Halford, S. (2009). Placing globalizing technologies: Telemedicine and the making of difference. *Sociology*, *43*(2), 232–249. https://doi.org/10.1177/0038038508101163

Edwards, P. K., O'Mahoney, J., & Vincent, S. (Eds.). (2014). *Studying organizations using critical realism: A practical guide*. Oxford, New York: Oxford University Press.

Ekeland, A. G., Bowes, A., Flottorp, S., & Flottorp, S. (2010). Effectiveness of telemedicine: A systematic review of reviews. *International Journal of Medical Informatics*, *79*(11), 736–771. https://doi.org/10.1016/j.ijmedinf.2010.08.006

Elbanna, A., & Linderoth, H. (2015). The formation of technology mental models: The case of voluntary use of technology in organizational setting. *Information Systems Frontiers*, *17*(1), 95–108. https://doi.org/10.1007/s10796-014-9513-6

Elcock, M. (2008). Evaluation of QEMS Trauma strategies (unpublished internal report). Queensland Health.

Elder-Vass, D. (2008). Searching for realism, structure and agency in Actor Network Theory. *The British Journal of Sociology*, *59*(3), 455–473. https://doi.org/10.1111/j.1468-4446.2008.00203.x

Elder-Vass, D. (2010). *The causal power of social structures*. Retrieved from https://www-cambridge-org.ezproxy.flinders.edu.au/core/books/causal-power-of-social-structures/DC90FA9DAB2FDCFFF9E3D8E98A7D9585

Elder-Vass, D. (2012). *The reality of social construction*. Retrieved from https://www.academia.edu/2366759/The_reality_of_social_construction

Elder-Vass, D. (2017). Material parts in social structures. *Journal of Social Ontology; Vienna*, *3*(1), 89–105. http://dx.doi.org.ezproxy.flinders.edu.au/10.1515/jso-2015-0058

Ellis, I. (2005). The clinical champion role in the development of a successful telehealth wound care project for remote Australia. *Journal of Telemedicine and Telecare*, *11*, 26–28.

Elwyn, G., Legare, F., Weijden, T. V. D., Edwards, A., & May, C. (2008). Arduous implementation: Does the Normalisation Process Model explain why it's so difficult to embed decision support technologies for patients in routine clinical practice. *Implementation Science*, *3*(57), 57.

Emmel, N., Greenhalgh, J., Manzano, A., Monaghn, M., & Dalkin, S. (Eds.). (2018). *Doing realist research*. London: SAGE Publications.

Essén, A. (2009). The emergence of technology-based service systems; A case study of a telehealth project in Sweden. *Journal of Service Management*, *20*(1), 98–121. https://doi.org/10.1108/09564230910936878

Esser, P. E., & Goossens, R. H. M. (2009). A framework for the design of user-centred teleconsulting systems. *Journal of Telemedicine and Telecare*, *15*(1), 32–39. https://doi.org/10.1258/jtt.2008.080601

Esterle, L., & Mathieu-Fritz, A. (2013). Teleconsultation in geriatrics: Impact on professional practice. *International Journal of Medical Informatics*, *82*(8), 684–695. https://doi.org/10.1016/j.ijmedinf.2013.04.006

European Commission. (2015). *Protection of personal data*. Retrieved April 27, 2016, from http://ec.europa.eu/justice/data-protection/

Faogoli, J., Coles, W., Price, L., & Siebert, D. (2001). *Pathology grand rounds by videoconferencing* (A. C. Smith, Ed.). Brisbane, Australia.

Federação Médica Brasileira. (2019). Sindicato dos Médicos publica carta contra telemedicina [Publication of a letter from the Doctor's Union opposing telemedicine]. Retrieved March 21, 2019, from Federação Médica Brasileira website: http://portalfmb.org.br/2019/02/06/al-sindicato-dos-medicos-publica-carta-contra-telemedicina/

Federal Medical Council. (2002). *Resolução CFM nº 1.643/2002*. [Federal Medical Council Resolution 1.643/2002]. Retrieved from http://www.portalmedico.org.br/resolucoes/cfm/2002/1643_2002.htm

Federal Medical Council. (2009). *Aprova o Código de Ética Médica* [Approval of the Medical Ethics Codes]. Retrieved from http://www.portalmedico.org.br/resolucoes/cfm/2009/1931_2009.htm

Federal Medical Council. (2018). *Resolucao N° 2.227, de 13 de dezembro de 2018*. [Federal Medical Council Resolution 2.227, 13th December, 2018]. Retrieved February 28, 2019, from Imprensa Nacional website: http://imprensanacional.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/62181135/do1-2019-02-06-resolucao-n-2-227-de-13-de-dezembro-de-2018-62180763

Federal University of Santa Catarina. (2019). Equipe – Telemedicina – Santa Catarina. [The Santa Catarina Telemedicine Team]. Retrieved March 20, 2019, from http://site.telemedicina.ufsc.br/equipe/

Federation of State Medical Boards. (2014). *Model policy for the appropriate use of telemedicine technologies in the practice of medicine*. Retrieved from https://www.fsmb.org/Media/Default/PDF/FSMB/Advocacy/FSMB_Telemedicine_Policy.pdf

Feenberg, A. (1995). *Alternative modernity: The technical turn in philosophy and social theory*. Berkeley, USA: University of California Press.

Feenberg, A. (2002). *Transforming technology: A critical theory revisited* (2nd ed.). Oxford, USA: Oxford University Press.

Ferreira, A. C., O'Mahony, E., Oliani, A. H., Araujo Júnior, E., & da Silva Costa, F. (2015). *Teleultrasound: Historical perspective and clinical application*. https://doi.org/10.1155/2015/306259

Finch, T. (2008). Teledermatology for chronic disease management: Coherence and normalization. *Chronic Illness*, *4*(2), 127–134. https://doi.org/10.1177/1742395308092483

Finch, T. L., Mair, F. S., & May, C. R. (2007). Teledermatology in the UK: Lessons in service innovation. *The British Journal of Dermatology*, *156*(3), 521–527.

Fiocruz. (2010). *Saúde Amanhã* [Interactive]. Retrieved from http://mapas.saudeamanha.icict.fiocruz.br/flx10sal.htm

Fishbein, M. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, Mass, USA: Addison-Wesley.

Fitch, C. J., Briggs, J. S., & Beresford, R. A. (2001). System issues for telemedicine systems. *Health Informatics Journal*, *7*(3–4), 222–230. https://doi.org/10.1177/146045820100700318

Fitzgerald, R. (2008). Medical regulation in the telemedicine era. *The Lancet*, *372*(9652), 1795–1796. https://doi.org/10.1016/S0140-6736(08)61743-2

Fleetwood, S. (2014). Critical realism and systematic dialectics: A reply to Andrew Brown. *Work, Employment & Society*, *28*(1), 124–138. https://doi.org/10.1177/0950017013501955

Fletcher, A. J. (2017). Applying critical realism in qualitative research: Methodology meets method. *International Journal of Social Research Methodology*, *20*(2), 181–194. https://doi.org/10.1080/13645579.2016.1144401

Fleuren, M., Wiefferink, K., & Paulussen, T. (2004). Determinants of innovation within health care organizations—Literature review and Delphi study. *International Journal for Quality in Health Care*, *16*(2), 107–123. https://doi.org/10.1093/intqhc/mzh030

Fleury, S. (2011). Brazil's health-care reform: Social movements and civil society. *The Lancet*, *377*(9779), 1724–1725. https://doi.org/10.1016/S0140-6736(11)60318-8

Fleury, S. (2014). Democracia e Inovação na Gestão Local da Saúde [Democracy and Innovation in the Local Management of Health]. In *Fiocruz*. Retrieved from https://portal.fiocruz.br/livro/democracia-e-inovacao-na-gestao-local-da-saude

Flichy, P. (2007). *Understanding technological innovation: A socio-technical approach*. Cheltenham, UK: Edward Elgar Publishing.

Flinders University. (2019). FindIt@Flinders. Retrieved August 25, 2019, from https://flinders-primo.hosted.exlibrisgroup.com/primo-explore/search?vid=FUL&lang=en_US&fromRedirectFilter=true

French, B., Day, E., Watkins, C., Mcloughlin, A., Fitzgerald, J., Leathley, M., … Lightbody, C. (2013). The challenges of implementing a telestroke network: A systematic review and case study. *BMC Medical Informatics and Decision Making*, *13*, 125.

Fujimoto, M., Miyazaki, K., & Von Tunzelmann, N. (2000). Complex systems in technology and policy: Telemedicine and telecare in Japan. *Journal of Telemedicine and Telecare*, *6*(4), 187–192.

Gagnon, M. P., Godin, G., Gagne, C., Fortin, J., Lamothe, L., Reinharz, D., & Cloutier, A. (2003). An adaptation of the theory of interpersonal behaviour to the study of telemedicine adoption by physicians. *International Journal of Medical Informatics*, *71*(2–3), 103–115. https://doi.org/10.1016/S1386-5056(03)00094-7

Gagnon, M. P., Lamothe, L., Fortin, J., Cloutier, A., Godin, G., Gagne, C., & Reinharz, D. (2005a). The impact of organisational characteristics on telehealth adoption by hospitals. *Journal of Health Organization and Management*, *19*, 32–56.

Gagnon, M.-P., Lamothe, L., Fortin, J., Cloutier, A., Godin, G., Gagné, C., & Reinharz, D. (2005b). Telehealth adoption in hospitals: An organisational perspective. *Journal of Health Organization and Management*, *19*(1), 32–56.

Gagnon, M. P., Orruño, E., Asua, J., Abdeljelil, A. B., & Emparanza, J. (2012). Using a modified technology acceptance model to evaluate healthcare professionals' adoption of a new telemonitoring system. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *18*(1), 54–59.

Gammon, D. (2008). An overview and analysis of theories employed in telemedicine studies. *Methods of Information in Medicine*, *3*.

Garcia, L. R., Silva, E., & Terra, J. C. C. (2015). A comparison of telehealth programs between the USA and Brazil: A legal perspective. *Smart Homecare Technology and TeleHealth*, *3*, 139–145.

Garg, V., & Brewer, J. (2011). Telemedicine security: A systematic review. *Journal of Diabetes Science and Technology*, *5*(3), 768–777.

Gartner. (2016). *Gartner's 2016 hype cycle for emerging technologies*. Retrieved January 10, 2017, from http://www.gartner.com/newsroom/id/3412017

Gattas, M. R., Macmillan, J. C., Meinecke, I., Loane, M., & Wootton, R. (2001). Telemedicine and clinical genetics: Establishing a successful service. *Journal of Telemedicine and Telecare*, *7*(2_suppl), 68–70. https://doi.org/10.1258/1357633011937191

Gerschman, S. (2004). *Democracia Inconclusa: Um estudo da reforma sanitária brasileira* [An Incomplete Democracy: A study of health reform in Brazil]. Retrieved from https://portal.fiocruz.br/livro/democracia-inconclusa-um-estudo-da-reforma-sanitaria-brasileira

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Cambridge: Polity Press.

Giuliano, I. C. B., Barcellos, C. L., Von Wangenheim, A., & Sergio, M. (2012). Issuing electrocardiographic reports remotely: Experience of the telemedicine network of Santa Catarina. *Archive of Brazilian Cardiologists*, *99*(5).

Goins, R. T., Kategile, U., & Dudley, K. (2002). Telemedicine, rural elderly, and policy issues. *Journal of Aging & Social Policy*, *13*(4), 53–71. https://doi.org/10.1300/J031v13n04_04

Gonçalves, M. R., Umpierre, R. N., D'Avila, O. P., Katz, N., Mengue, S. S., Siqueira, A. C. S., … Harzheim, E. (2017). Expanding primary care access: A telehealth success story. *Annals of Family Medicine*, *15*(4), 383. https://doi.org/10.1370/afm.2086

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly*, *19*(2), 213.

Government of South Australia. (2010). *Mount Gambier 10 year local health service plan 2010 – 2019*. Retrieved from http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+reform/strategy+for+country+health/priority+areas+of+the+country+health+strategy/10+year+local+health+service+plans

Government of South Australia. (2011a). *Port Augusta and Roxby Downs 10 year local health service plan 2011 – 2020*. Retrieved from http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+

reform/strategy+for+country+health/priority+areas+of+the+country+health+strategy/10+year+local+health+service+plans

Government of South Australia. (2011b). *Waikerie and Districts 10 year local health service plan 2011 – 2020*. Retrieved from http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+reform/strategy+for+country+health/priority+areas+of+the+country+health+strategy/10+year+local+health+service+plans

Government of South Australia. (2015a). *Country Health SA local health network strategic plan 2015-2020*. Retrieved from https://www.sahealth.sa.gov.au/wps/wcm/connect/bce5060049abf7459368df9b6ca12d15/14049.3+CHSALN+Strategic+Plan+2014-ONLINE.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-bce5060049abf7459368df9b6ca12d15-mMANvkd

Government of South Australia. (2015b). *Transforming health: Delivering transforming health – Our next steps*. Retrieved from http://transforminghealth.sa.gov.au/resources/useful-documents/

Governo do Estado do Rio Grande do Sul, Secretaria da Saúde. (2017). *Plan Estadual de Saude 2016-2019* [State Health Plan]. Retrieved from https://saude.rs.gov.br/upload/arquivos/201701/05153251-pes-2016-2019-sesrs.pdf

Gragnolati, M., Lindelow, M., & Couttolenc, B. (2013). *Twenty years of health system reform in Brazil: An assessment of the sistema unico de saude* (No. 78682; pp. 1–131). Retrieved from http://documents.worldbank.org/curated/pt/909701468020377135/Twenty-years-of-health-system-reform-in-Brazil-an-assessment-of-the-sistema-unico-de-saude

Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Gray, L. (2019). *The state of telehealth in Australia: Is there a need for policy change?* Paper presented at the Successes and Failures in Telehealth 2019, Gold Coast, Australia.

Retrieved from https://event.icebergevents.com.au/uploads/contentFiles/files/2019-SFT/Len%20Gray.pdf

Green, T. (2016). *Trust me, I'm a doctor: Understanding clinician's experiences of service separation and trust formation in telehealth* (Doctoral dissertation). University of Queensland, Brisbane, Australia.

Green, T., Hartley, N., & Gillespie, N. (2016). Service provider's experiences of service separation. *Journal of Service Research*, *19*(4), 477–494. https://doi.org/10.1177/1094670516666674

Greenhalgh, T., Humphrey, C., Hughes, J., Macfarlane, F., Butler, C., & Pawson, R. (2009). How do you modernize a health service? A realist evaluation of whole-scale transformation in London. *The Milbank Quarterly*, *87*(2), 391–416. https://doi.org/10.1111/j.1468-0009.2009.00562.x

Greenhalgh, T., Procter, R., Wherton, J., Sugarhood, P., Hinder, S., & Rouncefield, M. (2015). What is quality in assisted living technology? The ARCHIE framework for effective telehealth and telecare services. *BMC Medicine*, *13*. https://doi.org/10.1186/s12916-015-0279-6

Greenhalgh, T., Procter, R., Wherton, J., Sugarhood, P., & Shaw, S. (2012). The organising vision for telehealth and telecare: Discourse analysis. *BMJ Open*, *2*(4), e001574. https://doi.org/10.1136/bmjopen-2012-001574

Greenhalgh, T., Robert, G., Bate, P., Kyriakidou, O., Macfarlane, F., & Peacock, R. (2004). *How to spread good ideas: A systematic review of the literature on diffusion, dissemination and sustainability of innovations in health service delivery and organisation*. Retrieved from http://www.netscc.ac.uk/netscc/hsdr/files/project/SDO_FR_08-1201-038_V01.pdf

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *Milbank Quarterly*, *82*(4), 581–629. https://doi.org/10.1111/j.0887-378X.2004.00325.x

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Hughes, G., A'Court, C., … Shaw, S. (2017). Beyond adoption: A new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. *Journal of Medical Internet Research*, *19*(11), e367. https://doi.org/10.2196/jmir.8775

Greenhalgh, T., Wherton, J., Sugarhood, P., Hinder, S., Procter, R., & Stones, R. (2013). What matters to older people with assisted living needs? A phenomenological analysis of the use and non-use of telehealth and telecare. *Social Science & Medicine*, *93*, 86–94. https://doi.org/10.1016/j.socscimed.2013.05.036

Grigsby, J., Rigby, M., Hiemstra, A., House, M., Olsson, S., & Whitten, P. (2002). The diffusion of telemedicine. *Telemedicine Journal and E-Health*, *8*(1), 79–94. https://doi.org/10.1089/15305620252933428

Guanais, F. C., & Macinko, J. (2009). The health effects of decentralizing primary care in Brazil. *Health Affairs*, *28*(4), 1127–1135. https://doi.org/10.1377/hlthaff.28.4.1127

Guise, V., Anderson, J., & Wiig, S. (2014). Patient safety risks associated with telecare: A systematic review and narrative synthesis of the literature. *BMC Health Services Research*, *14*, 588. https://doi.org/10.1186/s12913-014-0588-z

Gundim, R. S. (2018). Telemedicine and telehealth services and their sustainability. *Latin American Journal of Telehealth*, *5*(3). Retrieved from http://cetes.medicina.ufmg.br/revista/index.php/rlat/article/view/260

Gundim, R. S., & Wen, C. L. (2009). A Brazilian study of the sustainability of telemedicine centres. *Journal of Telemedicine and Telecare*, *15*(3), 159–159. https://doi.org/10.1258/jtt.2009.003017

Gundim, R. S., & Wen, C. L. (2011). A graphical representation model for telemedicine and telehealth center sustainability. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *17*(3), 164–168. https://doi.org/10.1089/tmj.2010.0064

Gupta, A., & Sao, D. (2011). The constitutionality of current legal barriers to telemedicine in the United States: Analysis and future directions of its relationship to national and international health care reform. *Health Matrix*, *21*(2), 385.

Gururajan, R., & Hafeez-Baig, A. (2014). An empirical study to determine factors that motivate and limit the implementation of ICT in healthcare environments. *BMC Medical Informatics and Decision Making*, *14*, 98.

Haddad, A. E. (2012). *Experiência Brasileira do Programa Nacional Telessaude Brasil* [The experience of the Brazian National Telehealth Program]. Retrieved from http://www.telessaude.uerj.br/resource/goldbook/pdf/2.pdf

Haddad, A. E., Silva, D. G. da, Monteiro, A., Guedes, T., & Figueiredo, A. M. (2016). Follow up of the legislation advancement along the implementation of the Brazilian Telehealth Programme. *Journal of the International Society for Telemedicine and EHealth*, *4*(0), e11 (1-7).

Haddad, A. E., Skelton-Macedo, M. C., Abdala, V., Bavaresco, C., Mengehel, D., Abdala, C. G., & Harzheim, E. (2015). Formative second opinion: Qualifying health professionals for the unified health system through the Brazilian Telehealth Program. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *21*(2), 138–142. https://doi.org/10.1089/tmj.2014.0001

Hage, E., Roo, J. P., van Offenbeek, M. A. G., & Boonstra, A. (2013). Implementation factors and their effect on e-Health service adoption in rural communities: A systematic literature review. *BMC Health Services Research*, *13*, 19. https://doi.org/10.1186/1472-6963-13-19

Halford, S., Lotherington, A. T., Obstfelder, A., & Dyb, K. (2010). Getting the whole picture?: New information and communication technologies in healthcare work and organization. *Information, Communication & Society*, *13*(3), 442–465. https://doi.org/10.1080/13691180903095856

Harris, M. F. (2012). Who gets the care in Medicare? *The Medical Journal of Australia*, *197*(11), 598–599. https://doi.org/10.5694/mja12.11532

Hartvigsen, G., & Pedersen, S. (2015). *Lessons learned from 25 years with telemedicine in Northern Norway*. Retrieved from http://www.ub.uit.no/munin/bitstream/handle/10037/8967/skaal.pdf?sequence=6

Harzheim, E., Katz, N., Ferri, C., Fernandes, J. G., & Barbosa, I. (2018). *Guia de Avaliação, Implantação e Monitoramento de Programas e Serviços em Telemedicina e Telessaúde* [A Guide to the evaluation, Implementation and Monitoring of Services and Programs in Telemedicine and Telehealth]. Retrieved from http://rebrats.saude.gov.br/images/MenuPrincipal/Guia_Avaliacao_telessaude_telemedicina.pdf

Hasvold, P. E., & Scholl, J. (2011). Flexibility in interaction: Sociotechnical design of an operating room scheduler. *International Journal of Medical Informatics*, *80*(9), 631.

Henderson, J. C., & Venkatraman, H. (1999). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal*, *38*(2/3), 472–484.

Hendy, J., & Barlow, J. (2012). The role of the organizational champion in achieving health system change. *Social Science & Medicine*, *74*(3), 348–355. https://doi.org/10.1016/j.socscimed.2011.02.009

Hendy, J., Chrysanthaki, T., Barlow, J., Knapp, M., Rogers, A., Sanders, C., … Newman, S. (2012). An organisational analysis of the implementation of telecare and telehealth: The whole systems demonstrator. *BMC Health Services Research*, *12*, 403. https://doi.org/10.1186/1472-6963-12-403

Herepath, A. (2014). In the loop: A realist approach to structure and agency in the practice of strategy. *Organization Studies*, *35*(6), 857–879. https://doi.org/10.1177/0170840613509918

Higa, K., Sheng, O., Hu, P., & Au, G. (2009). Organizational adoption and diffusion of technological innovations: A comparative case study on telemedicine in Hong Kong. *Proceedings of the Thirtieth Hawaii International Conference on System Sciences*. Presented at the Wailea, HI, USA. https://doi.org/10.1109/HICSS.1997.663375

Higa, K., Shin, B., & Au, G. (2006). Suggesting a diffusion model of telemedicine: A focus on Hong Kong's case. *Proceedings of the Thirtieth Hawaii International Conference on System Sciences*. Presented at the Wailea, HI, USA. https://doi.org/10.1109/HICSS.1997.663376

Higgins, C., Dunn, E., & Conrath, D. (1984). Telemedicine: An historical perspective. *Telecommunications Policy*, *8*(4), 307–313. https://doi.org/10.1016/0308-5961(84)90044-2

Hogenbirk, J. C., Brockway, P. D., Finley, J., Jennett, P., Yeo, M., Parker-Taillon, D., … Cradduck, T. (2006). Framework for Canadian telehealth guidelines: Summary of the environmental scan. *Journal of Telemedicine and Telecare, 12*(2), 64–70.

Horrocks, I. (2009). Applying the morphogenetic approach. *Journal of Critical Realism*, *8*(1), 35–62. https://doi.org/10.1558/jocr.v8i1.35

Hospital Moinhos de Vento. (2018). Instituições do Norte e Nordeste são selecionadas para projeto de telemedicina pediátrica do Hospital Moinhos de Vento [Organisations from the North and North East and are selected for pediatric telemedicine project at the Moinhos de Vento Hospital]. Retrieved March 20, 2019, from Hospital Moinhos de Vento website: http://www.hospitalmoinhos.org.br/noticia/instituicoes-norte-e-nordeste-sao-selecionadas-para-projeto-de-telemedicina-pediatrica-hospital-moinhos-de-vento/

Hsieh, H. L., & Tsai, C. H. (2013). An empirical study to explore the adoption of telehealth: Health belief model perspective. *Journal of Engineering Science and Technology Review*, *6*(2), 1–5.

Hu, P. (1998). *Management of telemedicine technology in healthcare organizations: Technology acceptance, adoption, evaluation, and their implications* (Doctoral dissertation). The University of Arizona. Retrieved from http://hdl.handle.net/10150/282579

Hu, P. J., Chau, P. Y. K., & Sheng, O. R. L. (2002). Adoption of telemedicine technology by health care organizations: An exploratory study. *Journal of Organizational Computing and Electronic Commerce*, *12*(3), 197–221. https://doi.org/10.1207/S15327744JOCE1203_01

Hu, P. J., Chau, P. Y. K., Sheng, O. R. L., & Tam, K. Y. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems*, *16*(2), 91–112.

Huang, J. C., & Lin, S.-P. (2014). Home telehealth acceptance model: The role of innovation. *African Journal of Business Management*, *8*(18), 791–800. https://doi.org/10.5897/AJBM2011.717

Hwang, J. Y., Kim, K. Y., & Lee, K. H. (2014). Factors that influence the acceptance of telemetry by emergency medical technicians in ambulances: An application of the Extended Technology

Acceptance model. *Telemedicine Journal and E-Health*, *20*(12), 1127–1134. https://doi.org/10.1089/tmj.2013.0345

Hyde, G., & Fielke, K. (2009). Sustainable tele-psychiatry: Walking the talk. *Australian And New Zealand Journal of Psychiatry*, *43*(s1), A3–A4.

International Standards Organisation. (2014). *ISO/TS 13131:2014—Health informatics—Telehealth services—Quality planning guidelines*. Retrieved from http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=53052

International Standards Organisation. (2018). *ISO 31000 Risk management*. Retrieved from http://www.iso.org/cms/render/live/en/sites/isoorg/home/standards/popular-standards/iso-31000-risk-management.html

Jack, C., & Mars, M. (2014). Telemedicine a need for ethical and legal guidelines in South Africa. *South African Family Practice*, *50*(2), 60–60d. https://doi.org/10.1080/20786204.2008.10873698

Jafari, S. M., Ali, N. A., Sambasivan, M., & Said, M. F. (2011). A respecification and extension of DeLone and McLean model of IS success in the citizen-centric e-governance. In *IEEE International Conference on Information Reuse Integration* (pp. 342–346). https://doi.org/10.1109/IRI.2011.6009571

Jagosh, J., Pluye, P., Wong, G., Cargo, M., Salsberg, J., Bush, P. L., … Macaulay, A. C. (2014). Critical reflections on realist review: Insights from customizing the methodology to the needs of participatory research assessment. *Research Synthesis Methods*, *5*(2), 131–141. https://doi.org/10.1002/jrsm.1099

James, R. (2010). *Trust and trustworthiness: A framework for successful design of telemedicine* (Unpublished doctoral dissertation). Nova Southeastern University, Fort Lauderdale, Florida.

Jean, C., Jankovic, M., Stal-le Cardinal, J., & Bocquet, J. (2015). Predictive modelling of telehealth system deployment. *Journal of Simulation*, *9*(2), 182–194. http://dx.doi.org.ezproxy.flinders.edu.au/10.1057/jos.2014.27

Jen-Hwa Hu, P. (2003). Evaluating telemedicine systems success: A revised model. In *Proceedings of the 36th Annual Hawaii International Conference on System Sciences* (8 pp.). https://doi.org/10.1109/HICSS.2003.1174379

Jennett, P., Yeo, M., Pauls, M., & Graham, J. (2003). Organizational readiness for telemedicine: Implications for success and failure. *Journal of Telemedicine and Telecare*, *9 Suppl 2*, S27-30. https://doi.org/10.1258/135763303322596183

Jones, L., Fraser, A., & Stewart, E. (2019). Exploring the neglected and hidden dimensions of large-scale healthcare change. *Sociology of Health & Illness*, *41*(7), 1221–1235. https://doi.org/10.1111/1467-9566.12923

Joshi, K. (1991). A model of users perspective on change—The case of information-systems technology implementation. *MIS Quarterly*, *15*(2), 229–242. https://doi.org/10.2307/249384

Kaldoudi, E., Chatzopoulou, A., & Vargemezis, V. (2009). An interpretive approach in the evaluation of homecare telematics interventions. In *Proceedings of the 2nd International Conference on Pervasive Technologies Related to Assistive Environments* (pp. 1–8). https://doi.org/10.1145/1579114.1579171

Kaspar, B. J. (2014). Legislating for a new age in medicine: Defining the telemedicine standard of care to improve healthcare in Iowa. *Iowa Law Review*, *99*(2), 839.

Kennedy, C., Blignault, I., Hornsby, D., & Yellowlees, P. (2001). Videoconferencing in the Queensland health service. *Journal of Telemedicine and Telecare*, *7*(5), 266–271. https://doi.org/10.1258/1357633011936516

Kennedy, C., & Yellowlees, P. (2000). A community-based approach to evaluation of health outcomes and costs for telepsychiatry in a rural population: Preliminary results. *Journal of Telemedicine and Telecare*, *6*(1_suppl), 155–157. https://doi.org/10.1258/1357633001934492

Kerleau, M., & Pelletier-Fleury, N. (2002). Restructuring of the healthcare system and the diffusion of telemedicine. *The European Journal of Health Economics*, *3*(3), 207–214. https://doi.org/10.1007/s10198-002-0131-8

Khasanshina, E. V., & Stachura, M. E. (2006). Socio-economical impact of telemedicine in Russian Federation. *International Journal of Economic Development*, *8*(3), 748.

Kidholm, K., Ekeland, A. G., Jensen, L. K., Rasmussen, J., Pedersen, C. D., Bowes, A., … Bech, M. (2012). A model for assessment of telemedicine applications: MAST. *International Journal of Technology Assessment in Health Care*, *28*(1), 44–51. http://dx.doi.org.ezproxy.flinders.edu.au/10.1017/S0266462311000638

Kiran, A. H. (2012). Responsible design. A conceptual look at interdependent design-use dynamics. *Philosophy & Technology*, *25*(2), 179.

Klecun-Dabrowska, E. (2002). Telehealth and information society: A critical study of emerging concepts in policy and practice. In *Proceedings of the 2nd International Conference on pervasive technologies related to assistive environments*. Retrieved from https://core.ac.uk/display/4187723

Klecun-Dabrowska, E., & Cornford, T. (2000). Telehealth acquires meanings: Information and communication technologies within health policy. *Information Systems Journal*, *10*(1), 41–63. https://doi.org/10.1046/j.1365-2575.2000.00074.x

Kluge, E. W. (2011). Ethical and legal challenges for health telematics in a global world: Telehealth and the technological imperative. *International Journal of Medical Informatics*, *80*(2), e1–e5. https://doi.org/10.1016/j.ijmedinf.2010.10.002

Kohnke, A., Cole, M. L., & Bush, R. G. (2014). Incorporating UTAUT predictors for understanding home care patients' and clinician's acceptance of healthcare telemedicine equipment. *Journal of Technology Management & Innovation*, *9*(2). Retrieved from https://doaj.org/article/65e0892d51614e55a0b01b1c5f1c01cd

Kolitsi, Z., & Iakovidis, I. (2000). Improving user acceptance of health-care telematics. *Journal of Telemedicine and Telecare*, *6*(suppl 2), 37–39. https://doi.org/10.1258/1357633001935491

Kowitlawakul, Y. (2008). *Technology Acceptance Model: Predicting nurses' acceptance of telemedicine technology* (Doctoral dissertation). George Mason University, Fairfax, Virginia. Retrieved from http://mars.gmu.edu/handle/1920/3058

Krupinski, E. A., Antoniotti, N., & Bernard, J. (2013). Utilization of the American Telemedicine Association’s clinical practice guidelines. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, *19*(11), 846–851. https://doi.org/10.1089/tmj.2013.0027

Krupinski, E. A., Patterson, T., Norman, C. D., Roth, Y., ElNasser, Z., Abdeen, Z., … Freedman, M. (2011). Successful models for telehealth. *Otolaryngologic Clinics of North America*, *44*, 1275–1288. https://doi.org/10.1016/j.otc.2011.08.004

Kyle, E., Aitken, P., Elcock, M., & Barneveld, M. (2012). Use of telehealth for patients referred to a retrieval service: Timing, destination, mode of transport, escort level and patient care. *Journal of Telemedicine and Telecare*, *18*(3), 147–150. https://doi.org/10.1258/jtt.2012.SFT106

Lacal, J. C. (2004). Proposed framework to measure the ROI of mobile tele-health solutions in the management of chronic diseases. In *IEMBS ’04. 26th Annual International Conference of the IEEE*, *2* (pp. 5367–5370). https://doi.org/10.1109/IEMBS.2004.1404498

Lampe, K., Mäkelä, M., Garrido, M. V., Anttila, H., Autti-Rämö, I., Hicks, N. J., … Kristensen, F. B. (2009). The HTA Core Model: A novel method for producing and reporting health technology assessments. *International Journal of Technology Assessment in Health Care, 25*(Supplement S2), 9–20. https://doi.org/10.1017/S0266462309990638

Latour, B. (2007). *Reassembling the social an introduction to actor-network-theory*. Oxford, UK: Oxford University Press.

Lecaj, I., Kucani, J., Qesteri, O., Osmani, K. L., Bekteshi, F., Azevedo, V., … Latifi, R. (2014). Cabo Verde telemedicine program: Initial results of nationwide implementation. *Telemedicine and E-Health*, *20*(11), 1027.

Lee, G. (2015). A telehealth technicality: Pennsylvania’s outdated insurance reimbursement policies deter investment in modern telehealth technology. *Pittsburgh Journal of Technology Law and Policy*, *15*(1), 115. https://doi.org/10.5195/tlp.2014.160

Le Goff-Pronost, M., & Sicotte, C. (2010). The added value of thorough economic evaluation of telemedicine networks. *The European Journal of Health Economics*, *11*(1), 45.

Lehoux, P., Sicotte, C., Denis, J. L., Berg, M., & Lacroix, A. (2002). The theory of use behind telemedicine: How compatible with physicians' clinical routines? *Social Science & Medicine (1982)*, *54*(6), 889–904.

Lerouge, C., & Garfield, M. J. (2013). Crossing the telemedicine chasm: Have the U.S. barriers to widespread adoption of telemedicine been significantly reduced? *International Journal of Environmental Research and Public Health*, *10*(12), 6472–6484. https://doi.org/10.3390/ijerph10126472

LeRouge, C., & Hevner, A. R. (2005). It's more than just use: An investigation of telemedicine use quality. In *Proceedings of the Annual Hawaii International Conference on System Sciences* (p. 150).

LeRouge, C., Hevner, A. R., Collins, R., Garfield, M., & Law, D. (2004). Telemedicine encounter quality: Comparing patient and provider perspectives of a socio-technical system. In *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*.

Leverington, S., & Bassa, A. R. (2019). *A state-wide telerehabilitation service for South Australia*. Paper presented at the Australian Telehealth Conference, Brisbane. Retrieved from https://www.hisa.org.au/slides/atc19/ScottLeverington.pdf

Levi-Strauss, C. (1972). *The savage mind*. London: Weidenfeld and Nicolson.

Lewin, K. (1943). Defining the "field at a given time". *Psychological Review*, *50*(3), 292–310. https://doi.org/10.1037/h0062738

Lewis, S., Willis, K., & Franklin, N. (2015). Explainer: Why do Australians have private health insurance? Retrieved from *The Conversation* website: https://theconversation.com/explainer-why-do-australians-have-private-health-insurance-38788

Li, H. K. (1999). Telemedicine and ophthalmology. *Survey of Ophthalmology*, *44*(1), 61–72. https://doi.org/10.1016/S0039-6257(99)00059-4

Liamputtong, P. (2019). *Handbook of research methods in health social sciences*. Singapore: Springer Singapore.

Lima Verde Brito, T. (2016). *Análise da Colaboração nos Grupos de Interesse Especial (SIG) da Rede Universitária de Telemedicina (RUTE)* [An Analysis of Special Interest Groups in the University Telemedicine Network]. Universidade Federal de São Paulo.

Lin, F., & Hsieh, P. (2014). Analyzing the sustainability of a newly developed service: An activity theory perspective. *Technovation*, *34*(2), 113–125. https://doi.org/10.1016/j.technovation.2013.08.004

Linderoth, H. (2002). Managing telemedicine: From noble ideas to action. *Journal of Telemedicine and Telecare*, *8*, 143–150.

Linderoth, H. (2014). The role of technological frames of reference and institutional logics in the use of ICT. In *Proceedings Of The 25th Australasian Conference On Information Systems, 8th - 10th December, Auckland, New Zealand*. Retrieved from http://hdl.handle.net/10292/8079

Linderoth, H., & Pellegrino, G. (2005). Frames and inscriptions: Tracing a way to understand IT-dependent change projects. *International Journal of Project Management*, *23*(5), 415–420. doi:10.1016/j.ijproman.2005.01.005

Liu, C. (2011). Key factors influencing the intention of telecare adoption: An institutional perspective. *Telemedicine and E-Health*, *17*(4), 288.

Liu, L., Cruz, A., Rincon, A., Buttar, V., Ranson, Q., & Goertzen, D. (2015). What factors determine therapists' acceptance of new technologies for rehabilitation a study using the Unified Theory of Acceptance and Use of Technology (UTAUT). *Disability & Rehabilitation, 37*(5), 447–455. https://doi.org/10.3109/09638288.2014.923529

Lluch, M., & Abadie, F. (2013). Exploring the role of ICT in the provision of integrated care—Evidence from eight countries. *Health Policy (Amsterdam, Netherlands)*, *111*(1), 1–13. https://doi.org/10.1016/j.healthpol.2013.03.005

Loane, M., & Wootton, R. (2002). A review of guidelines and standards for telemedicine. *Journal of Telemedicine and Telecare*, *8*(2), 63–71. https://doi.org/10.1258/1357633021937479

Luxton, D., Sirotin, P., & Mishkind, M. (2010). Safety of telemental healthcare. *Telemedicine And E-Health*, *16*(6).

MacFarlane, A., Murphy, A. W., & Clerkin, P. (2006). Telemedicine services in the Republic of Ireland: An evolving policy context. *Health Policy*, *76*(3), 245–258. https://doi.org/10.1016/j.healthpol.2005.06.006

MacKinnon, M. (1997). Information technology in medicine. *Medical Journal of Australia*, *167*(11).

Macri, J. (2016). Australia's health system: Some issues and challenges. *Journal of Health & Medical Economics*, *2*(2). Retrieved from https://health-medical-economics.imedpub.com/australias-health-system-some-issuesand-challenges.php?aid=8344

Maeder, A., Poultney, N., Morgan, G., & Lippiatt, R. (2015). Patient compliance in home-based self-care telehealth projects. *Journal of Telemedicine and Telecare*, *21*(8), 439–442. https://doi.org/10.1177/1357633X15612382

Magenau, J. L. (1997). Digital diagnosis: Liability concerns and state licensing issues are inhibiting the progress of telemedicine. *Communications and the Law*, *19*(4), 25–43.

Maia, R. S., Wangenheim, A. von, & Nobre, L. F. (2006). A statewide telemedicine network for public health in Brazil. In *19th IEEE Symposium on Computer-Based Medical Systems (CBMS'06)*, (pp. 495–500). https://doi.org/10.1109/CBMS.2006.29

Maiga, G., & Namagembe, F. (2012). *A user based model for adoption of telemedicine by pediatricians in resource constrained environments*. Retrieved from http://hdl.handle.net/10570/2015

Mair, F., Finch, T., May, C., Hiscock, J., Beaton, S., Goldstein, P., & McQuillan, S. (2007). Perceptions of risk as a barrier to the use of telemedicine. *Journal of Telemedicine and Telecare*, *13*(suppl 1), 38–39. https://doi.org/10.1258/135763307781645158

Maldonado, J. M. S. de V., Marques, A. B., & Cruz, A. (2016). Telemedicine: Challenges to dissemination in Brazil. *Cadernos de Saúde Pública*, *32*(suppl 2). https://doi.org/10.1590/0102-311X00155615

Manzano, A. (2016). The craft of interviewing in realist evaluation. *Evaluation*, 1356389016638615. https://doi.org/10.1177/1356389016638615 mapsopensource. (2019a). *Map of Australia*. Retrieved from http://blog.mapsopensource.com/australia-map-black-and-white.html

mapsopensource. (2019b). *Map of Brazil*. Retrieved from http://mapsopensource.com/brazil-map-black-and-white.html

Markus, M. L. (1983). Power, politics, and MIS implementation. *Communications of the ACM*, *26*(6), 430–444. https://doi.org/10.1145/358141.358148

Martinhão, M. S. (2017). *ICT in health survey on the use of information and communication technologies in Brazilian healthcare facilities, 2017*. Retrieved from http://cetic.br/media/docs/publicacoes/2/tic_saude_2016_livro_eletronico.pdf

Martin-Khan, M., Fatehi, F., Kezilas, M., Lucas, K., Gray, L. C., & Smith, A. C. (2015). Establishing a centralised telehealth service increases telehealth activity at a tertiary hospital. *BMC Health Services Research*, *15*. https://doi.org/10.1186/s12913-015-1180-x

Massuda, A., Hone, T., Leles, F. A. G., Castro, M. C. de, & Atun, R. (2018). The Brazilian health system at crossroads: Progress, crisis and resilience. *BMJ Global Health*, *3*(4), e000829. https://doi.org/10.1136/bmjgh-2018-000829

Mathews, K. A., Elcock, M. S., & Furyk, J. S. (2008). The use of telemedicine to aid in assessing patients prior to aeromedical retrieval to a tertiary referral centre. *Journal of Telemedicine and Telecare*, *14*(6), 309–314. https://doi.org/10.1258/jtt.2008.080417

Mattos, S. D., Hazin, S. M., Regis, C. T., de Araujo, J. S. S., Albuquerque, F. C., Moser, L., … de Lima, J. (2015). A telemedicine network for remote paediatric cardiology services in north-east Brazil. *Bulletin of The World Health Organization*, *93*(12), 881–887. https://doi.org/10.2471/BLT.14.148874

Maxwell, J. (2012). What is realism, and why should qualitative researchers care? In *A Realist Approach for Qualitative Research* (p. 222). Retrieved from https://d1pbog36rugm0t.cloudfront.net/-/media/ualberta/faculties-and-programs/centres-institutes/international-institute-of-qualitative-methods/webinars/master-class/2017/joseph-a-maxwell-realism-in-qualitative-inquiry.mp4

May, C. (2006). A rational model for assessing and evaluating complex interventions in health care. *BMC Health Services Research*, *6*, 86. https://doi.org/10.1186/1472-6963-6-86

May, C. (2013a). Agency and implementation: Understanding the embedding of healthcare innovations in practice. *Social Science & Medicine*, *78*, 26–33. https://doi.org/10.1016/j.socscimed.2012.11.021

May, C. (2013b). Towards a general theory of implementation. *Implementation Science*, *8*, 18.

May, C., & Ellis, N. T. (2001). When protocols fail: Technical evaluation, biomedical knowledge, and the social production of `facts' about a telemedicine clinic. *Social Science & Medicine*, *53*(8), 989.

May, C., & Finch, T. (2009). Implementing, embedding, and integrating practices: An outline of Normalization Process Theory. *Sociology*, *43*(3), 535–554. https://doi.org/10.1177/0038038509103208

May, C., Gask, L., Atkinson, T., Ellis, N., Mair, F., & Esmail, A. (2001). Resisting and promoting new technologies in clinical practice: The case of telepsychiatry. *Social Science & Medicine*, *52*(12), 1889–1901. https://doi.org/10.1016/S0277-9536(00)00305-1

May, C., Harrison, R., Finch, T., MacFarlane, A., Mair, F., & Wallace, P. (2003). Understanding the normalization of telemedicine services through qualitative evaluation. *Journal of the American Medical Informatics Association*, *10*, 596–604.

May, C., Mair, F., Finch, T., Macfarlane, A., Dowrick, C., Treweek, S., … Montori, V. (2009). Development of a theory of implementation and integration: Normalization Process Theory. *Implementation Science*, *4*. https://doi.org/10.1186/1748-5908-4-29

May, C., Mort, M., Williams, T., Frances, M., & Gask, L. (2003). Health technology assessment in its local contexts: Studies of telehealthcare. *Social Science & Medicine*, *57*, 697–710.

May, C., Rapley, T., Moreira, T., Finch, T., & Heaven, B. (2006). Technogovernance: Evidence, subjectivity, and the clinical encounter in primary care medicine. *Social Science & Medicine*, *62*(4), 1022–1030. https://doi.org/10.1016/j.socscimed.2005.07.003

Mayoka, K. G., Rwashana, A. S., Mbarika, V. W., & Isabalija, S. (2012). A framework for designing sustainable telemedicine information systems in developing countries. *Journal of Systems and Information Technology*, *14*(3), 200–219. https://doi.org/10.1108/13287261211255329

McCrossin, R. (2001). Successes and failures with grand rounds via videoconferencing at the Royal Children's Hospital in Brisbane. *Journal of Telemedicine and Telecare*, *7*(suppl 2), 25–28. https://doi.org/10.1258/1357633011937047

McDonald, K. (2015a). Queensland sees big increase in outpatient services through telehealth. *Pulse+IT.* Retrieved May 23, 2017 from https://www.pulseitmagazine.com.au:443/australian-ehealth/2653-queensland-sees-big-increase-in-outpatient-services-through-telehealth

McDonald, K. (2015b). Why is ehealth interoperability so hard? *Pulse IT*. Retrieved from https://www.pulseitmagazine.com.au/news/australian-ehealth/2271-why-is-ehealth-interoperability-so-hard

Mcevoy, R., Ballini, L., Maltoni, S., O'Donnell, C. A., Mair, F. S., & Macfarlane, A. (2014). A qualitative systematic review of studies using the normalization process theory to research implementation processes. *Implementation Science*, *9*, 2.

Mclaren, P., & Ball, C. (1995). Telemedicine—Lessons remain unheeded. *British Medical Journal*, *310*(6991), 1390–1391.

McMahon, F. (2012). *Telehealth projects: A practical guide.* Victoria, British Columbia, Canada: British Columbia Ministry of Health Services.

Medeiros, R. A. (2009). *Study of three cases of telemedicine in Brazil for the periods 2005 and 2006: Context and developments* (Doctoral dissertation). Universidade Federal de São Paulo (UNIFESP), Brazil. Retrieved from http://repositorio.unifesp.br/handle/11600/9557

Medical Board of Australia. (2013). *Inter-jurisdictional technology based patient consultations*. Retrieved from https://www.medicalboard.gov.au/Codes-Guidelines-Policies/FAQ/Information-interjurisdictional-technology-consultations.aspx

Medical Board of Australia. (2016). *Guidelines for technology based consultations*. Retrieved from https://www.medicalboard.gov.au/Codes-Guidelines-Policies/Technology-based-consultation-guidelines.aspx

Melo, I. (2019). Entidades pedem revisão de resolução do CFM sobre telemedicina e defendem ampliação do debate [Organisations request revision of the Federal Medical Council resolution on Telemedicine and advocate broadening the debate]. Retrieved March 21, 2019, from GaúchaZH website: https://gauchazh.clicrbs.com.br/saude/noticia/2019/02/entidades-pedem-revisao-de-resolucao-do-cfm-sobre-telemedicina-e-defendem-ampliacao-do-debate-cjrsermr4013s01td7wsxuci5.html

Menachemi, N., Burke, D., & Ayers, D. (2004). Factors affecting the adoption of telemedicine—A multiple adopter perspective. *Journal of Medical Systems*, *28*, 617–632. https://doi.org/10.1023/B:JOMS.0000044964.49821.df

Messina, L. A., & Filho, J. L. R. (Eds.). (2013). *Impactos da Rede Universitária de Telemedicina, Phase 1 2006-2009* [The impacts of Phase 1 of the University Telemedicine network, 2006-2009]. Retrieved from http://www.e-papers.com.br

Meyer, S., & Ward, P. (2014). “How to” use social theory within and throughout qualitative research in healthcare contexts. *Sociology Compass*, *8*(5), 525.

Meyer, S., Ward, P., Coveney, J., & Rogers, W. (2008). Trust in the health system: An analysis and extension of the social theories of Giddens and Luhmann. *Health Sociology Review*, *17*(2), 177–186.

Mezni, H., & Zeribi-Benslimane, O. (2008). *Determinants of the individual acceptance of the telemedicine*. Paper presented at 3rd International Conference on Information and Communication Technologies: From Theory to Applications. https://doi.org/10.1109/ICTTA.2008.4529929

Mieczakowski, A., King, J., & Fehnert, B. (2014). A design-led research approach to contextual evaluation of socio-psychological factors in the development of telehealth devices. In C.

Stephanidis & M. Antona (Eds.), *Universal access in human-computer interaction. Aging and assistive environments* (Vol. 8515, pp. 321-332). Cham, Switzerland: Springer.

Miner, A. S., Bassof, P., & Moorman, C. (2001). Organizational improvisation and learning: A field study. *Administrative Science Quarterly*, *46*(2), 304–337. https://doi.org/10.2307/2667089

Ministério da Saúde. (2011a). Programa Nacional Telessaúde Brasil Redes [The National Prgram of the Brazilan Telehealth Network]. Retrieved July 10, 2018, from http://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt2546_27_10_2011.html

Ministério da Saúde. (2011b). Regulamenta o uso de padrões de interoperabilidade e informação em saúde para sistemas de informação em saúde no âmbito [Regulations for the use of interoperability standards in the context of health information systems]. Retrieved July 10, 2018, from http://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt2073_31_08_2011.html

Ministerio de Saude. (2016). *Plano Nacional de Saude 2016-2019*. [The National Plan for Health]. Retrieved from http://conselho.saude.gov.br/ultimas_noticias/2016/docs/planonacionalsaude_2016_2019.pdf

Ministério da Saúde. (2018a). *Portal UNA-SUS*. [Portal for *UNA-SUS*]. Retrieved July 10, 2018, from https://www.unasus.gov.br/

Ministério da Saúde. (2018b). *TabNet Win32 3.0: CNES - Estabelecimentos por Tipo—Brasil*. [Facility types - *TabNet Win32 3.0: CNES]* Retrieved August 20, 2018, from http://tabnet.datasus.gov.br/cgi/deftohtm.exe?cnes/cnv/estabbr.def

Ministério da Saúde, & Fundação Oswaldo Cruz. (2018). *Contas do SUS na perspectiva da contabilidade internacional: Brasil, 2010-2014* [Finances of the Universal health Systems from an international accounting perspective]. Retrieved from http://bvsms.saude.gov.br/bvs/publicacoes/contas_SUS_perspectiva_contabilidade_internacional_2010_2014.pdf

Ministério da Saúde, & Universidade Federal do Rio Grande do Sul. (2012). *Manual of telehealth for primary health care*. Retrieved from http://189.28.128.100/dab/docs/portaldab/publicacoes/manual_telessaude.pdf

Mistry, H. (2012). Systematic review of studies of the cost-effectiveness of telemedicine and telecare. Changes in the economic evidence over twenty years. *Journal of Telemedicine and Telecare*, *18*(1), 1–6. https://doi.org/10.1258/jtt.2011.110505

Mitchell, J. (1998). *Fragmentation to integration: National scoping study of the telemedicine industry in Australia*. Retrieved from http://www.jma.com.au/view/publications/health-innovation

Mitchell, J. (1999a). *From telehealth to E-health: The unstoppable rise of E-health*. Retrieved from http://pandora.nla.gov.au/pan/12789/20131205-1637/www.archive.dcita.gov.au/1999/09/rise.html

Mitchell, J. G. (1999b). The uneven diffusion of telemedicine services in Australia. *Journal of Telemedicine and Telecare*, *5 Suppl 1*, S45-7.

Mitchell, P. H. (2008). Defining patient safety and quality care. In R. G. Hughes (Ed.), *Patient safety and quality: An evidence-based handbook for nurses* (pp. 1-5). Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK2681/

Moffatt, J. J., & Eley, D. S. (2011). Barriers to the up-take of telemedicine in Australia—A view from providers. *Rural and Remote Health*, *11*(2), 1581.

Momentum. (2014). *Personalised Blueprint for telemedicine deployment*. Retrieved from http://www.telemedicine-momentum.eu/wp-content/uploads/2015/02/D3.4_v1.0_ValidatedBlueprint.pdf

Money, R. N. (2017, April 3). Should Australians be able to opt out of Medicare? This professor thinks so [Text]. *ABC News.* Retrieved June 6, 2018, from http://www.abc.net.au/news/2017-04-03/we-should-be-able-to-opt-out-of-medicare-says-francesco-paolucci/8397664

Monteiro, A. (2010). *The Brazilian telemedicine pediatric radiology network*. Retrieved from http://dx.doi.org/10.1594/ecr2010/C-2907

Monteiro, A., & Neves, J. P. (Eds.). (2015). *The history of telehealth in the city and state of Rio de Janerio*. Retrieved from http://telessaude.uerj.br/livro

Mori, A. R., Albano, V., Contenti, M., & Mercurio, G. (2016). IPICT - An explanatory scheme about the innovation phenomena towards integrated care enhanced by digital technologies. *Journal of the International Society for Telemedicine and EHealth*, *4*(0), 3-1-11).

Morrison, D., & Mair, F. S. (2011). Telehealth in practice: Using Normalisation Process Theory to bridge the translational gap. *Primary Care Respiratory Journal*, *20*(4), 351–352. https://doi.org/10.4104/pcrj.2011.00092

Morrison, J. G. (2014). *Understanding the work of telehealth implementation using Normalization Process Theory* (Doctoral dissertation). Simon Fraser University, Burnaby, Canada. Retrieved from http://summit.sfu.ca/item/14010

Mort, M., May, C., & Williams, T. (2003). Remote doctors and absent patients: Acting at a distance in telemedicine? *Science, Technology, & Human Values*, *28*(2), 274–295. https://doi.org/10.1177/0162243902250907

Mort, M., Roberts, C., Pols, J., Domenech, M., Moser, I., & The EFORTT investigators. (2013). Ethical implications of home telecare for older people: A framework derived from a multisited participative study. *Health Expectations*, *18*(3), 438–449. https://doi.org/10.1111/hex.12109

Moura, L. A. (2016). The need for a strategy for telehealth. *Journal of the International Society for Telemedicine and EHealth*, *4*(0), e2 (1-7).

National Broadband Strategy Implementation Group. (2005). *Broadband connectivity in the health sector*. Commonwealth of Australia.

National Health and Medical Research Council. (2019). *Outcomes of funding rounds*. Retrieved March 4, 2019, from https://nhmrc.gov.au/funding/data-research/outcomes-funding-rounds

National Health Information Management Advisory Council. (2001). *Health online: A health information action plan for Australia* (2nd ed.). Retrieved from https://ozhealthithistory.wikispaces.com/file/view/actionp_2.pdf/182746001/actionp_2.pdf

National ICT Australia. (2010). *Telemedicine in the context of the National Broadband Network*. Retrieved from https://www.nicta.com.au/content/uploads/2015/02/TelehealthNBN.pdf

National Office for the Information Economy. (2002). *Broadband in health: Drivers, impediments and benefits*. Commonwealth of Australia.

National Rural Health Alliance. (2011). *Submission to the Department of Health and Ageing on Medicare rebates for online consultations—Telehealth initiative*. Retrieved from http://ruralhealth.org.au/sites/default/files/documents/nrha-policy-document/submission/sub-ma-rebates-telehealth-02-feb-11.pdf

National Rural Health Alliance. (2013). *How many doctors are there in rural Australia?* Retrieved from https://www.ruralhealth.org.au/sites/default/files/publications/nrha-factsheet-doctor-numbers.pdf

National Stroke Foundation. (2011). *Connecting health services with the future: Modernising Medicare by providing rebates for online consultations*. Retrieved from http://australianstrokecoalition.com.au/site/media/Connecting-health-services-with-the-future-modernising-Medicare-by-providing-rebates-for-online-consultations-January-2011.pdf

Nettleton, S., Burrows, R., & Watt, I. (2008). Regulating medical bodies? The consequences of the ‘modernisation’ of the NHS and the disembodiment of clinical knowledge. *Sociology of Health & Illness*, *30*(3), 333–348. https://doi.org/10.1111/j.1467-9566.2007.01057.x

Neufeld, J. D., Doarn, C. R., & Aly, R. (2015). State policies influence Medicare telemedicine utilization. *Telemedicine and E-Health*, *22*(1), 70–74. https://doi.org/10.1089/tmj.2015.0044

Newman, L., Bidargaddi, N., & Schrader, G. (2016). Service providers’ experiences of using a telehealth network 12 months after digitisation of a large Australian rural mental health service. *International Journal of Medical Informatics*, *94*, 8–20. https://doi.org/10.1016/j.ijmedinf.2016.05.006

New South Wales Health. (2014). *Telehealth resource package*. New South Wales Agency for Clinical Innovation.

Nicolini, D. (2006). The work to make telemedicine work: A social and articulative view. *Social Science & Medicine*, *62*, 2754–2767.

Nicolini, D. (2007). Stretching out and expanding work practices in time and space: The case of telemedicine. *Human Relations*, *60*(6), 889–920. https://doi.org/10.1177/0018726707080080

Nicolini, D. (2010). Medical innovation as a process of translation: A case from the field of telemedicine. *British Journal of Management*, *21*(4), 1011–1026. https://doi.org/10.1111/j.1467-8551.2008.00627.x

Nobre, L. F., & Von Wangenheim, A. (2012). Development and Implementation of a statewide telemedicine/telehealth system in the state of Santa Catarina, Brazil. In K. Ho, S. Jarvis-Selinger, H. Novak Lauscher, J. Cordeiro, & R. Scott (Eds.), *Technology enabled knowledge translation for eHealth: Principles and practice* (pp. 379-400). New York, NY: Springer.

Nohr, L. E. (2000). Global medicine and licensing. *Journal of Telemedicine and Telecare*, *6*(suppl 1), 170–172. https://doi.org/10.1258/1357633001934564

Nov, O., & Schecter, W. (2012). Dispositional resistance to change and hospital physicians' use of electronic medical records: A multidimensional perspective. *Journal of The American Society for Information Science and Technology*, *63*(4), 648–656. https://doi.org/10.1002/asi.22602

Obstfelder, A., Engeseth, K., & Wynn, R. (2007). Characteristics of successfully implemented telemedical applications. *Implementation Science*, *2*, 11. https://doi.org/10.1186/1748-5908-2-25

Oh, H., Rizo, C., Enkin, M., & Jadad, A. (2005). What Is eHealth (3): A systematic review of published definitions. *Journal of Medical Internet Research*, *7*(1). https://doi.org/10.2196/jmir.7.1.e1

Okoli, C. (2015a). A guide to conducting a standalone systematic literature review. *Communications of the Association for Information Systems*, *37*(1). Retrieved from http://aisel.aisnet.org/cais/vol37/iss1/43

Okoli, C. (2015b). The view from giants' shoulders: Developing theory with theory-mining systematic literature reviews. *SKEMA Business School*. Retrieved from http://papers.ssrn.com/abstract=2699362

Oliveira, T., & Martins, M. F. (2011). Literature review of information technology adoption models at firm level. *Electronic Journal of Information Systems Evaluation*, *14*(1), 110–121.

Or, C., Dohan, M., & Tan, J. (2014). Understanding critical barriers to implementing a clinical information system in a nursing home through the lens of a socio-technical perspective. *Journal of Medical Systems*, *38*(9), 1–10. https://doi.org/10.1007/s10916-014-0099-9

Organisation for Economic Cooperation and Development. (2018). *Brazil—Basic socioeconomic indicators*. Retrieved from https://www.oecd.org/regional/regional-policy/profile-Brazil.pdf

Orlikowski, W. J., & Gash, D. C. (1994). Technological frames: Making sense of information technology in organizations. *ACM Transactions on Information Systems (TOIS)*, *12*(2), 174–207. https://doi.org/10.1145/196734.196745

Orruño, E., Gagnon, M. P., Asua, J., & Abdeljelil, A. B. (2011). Evaluation of teledermatology adoption by health-care professionals using a modified Technology Acceptance Model. *Journal of Telemedicine and Telecare*, *17*(6), 303–307. https://doi.org/10.1258/jtt.2011.101101

O'Shannessy, L. (2000). Using the law to enhance provision of telemedicine. *Journal of Telemedicine and Telecare*, *6*(Suppl 1), 59–62. https://doi.org/10.1258/1357633001934168

Oudshoorn, N. (2008). Diagnosis at a distance: The invisible work of patients and healthcare professionals in cardiac telemonitoring technology. *Sociology of Health & Illness*, *30*(2), 272–288. https://doi.org/10.1111/j.1467-9566.2007.01032.x

Oudshoorn, N. (2012). How places matter: Telecare technologies and the changing spatial dimensions of healthcare. *Social Studies of Science*, *42*(1), 121–142. https://doi.org/10.1177/0306312711431817

Ozawa, S., & Sripad, P. (2013). How do you measure trust in the health system? A systematic review of the literature. *Social Science & Medicine*, *91*, 10–14. https://doi.org/10.1016/j.socscimed.2013.05.005

Paim, J., Travassos, C., Almeida, C., Bahia, L., & Macinko, J. (2011). The Brazilian health system: History, advances, and challenges. *Lancet (London, England)*, *377*(9779), 1778–1797. https://doi.org/10.1016/S0140-6736(11)60054-8

Paiva, C. H. A., & Teixeira, L. A. (2014). Health reform and the creation of the Sistema Único de Saúde: Notes on contexts and authors. *História, Ciências, Saúde-Manguinhos*, *21*(1), 15–36. https://doi.org/10.1590/S0104-59702014000100002

Pak, C. (2013). *Predicting adoption of telemedicine by VA mental health professionals* (doctoral dissertation). The University of New Mexico. Retrieved from http://hdl.handle.net/1928/23573

Pappas, Y., & Seale, C. (2009). The opening phase of telemedicine consultations: An analysis of interaction. *Social Science & Medicine*, *68*(7), 1229–1237. https://doi.org/10.1016/j.socscimed.2009.01.011

Parmelli, E., Flodgren, G., Beyer, F., Baillie, N., Schaafsma, M. E., & Eccles, M. P. (2011). The effectiveness of strategies to change organisational culture to improve healthcare performance: A systematic review. *Implementation Science*, *6*, 33. https://doi.org/10.1186/1748-5908-6-33

Patel, R. N., & Antonarakis, G. (2013). Factors influencing the adoption and implementation of teledentistry in the UK, with a focus on orthodontics. *Community Dentistry and Oral Epidemiology*, *41*(5), 424–431. https://doi.org/10.1111/cdoe.12029

Pawson, R. (2003). Nothing as practical as a good theory. *Evaluation*, *9*(4), 471–490.

Pawson, R. (2013). *The science of evaluation: A realist manifesto*. London: SAGE Publications.

Pawson, R. (2015). The ersatz realism of critical realism: A reply to Porter. *Evaluation*, 1356389015605206.

Pawson, R, 2017. Re: Open and closed system consequences. Realist and Meta-narrative Evidence Synthesis: Evolving Standards. 12 March 2017. Available from: https://www.jiscmail.ac.uk/cgi-bin/webadmin?A2=ind1703&L=RAMESES&O=D&P=16886 [Accessed 25 February 2020].

Pawson, R., Greenhalgh, T., Harvey, G., & Walshe, K. (2004). *Realist synthesis: An introduction*. Retrieved from http://www.ccsr.ac.uk/methods/publications/documents/RMPmethods2.pdf

Pawson, R., & Manzano-Santaella, A. (2012). A realist diagnostic workshop. *Evaluation*, *18*(2), 176–191. https://doi.org/10.1177/1356389012440912

Pawson, R., & Tilley, N. (1997). *Realistic evaluation*. London; Thousand Oaks, CA: Sage.

Pawson, R., & Tilley, N. (2004). *Realist evaluation*. Retrieved from http://www.communitymatters.com.au/RE_chapter.pdf

Peddle, K. (2007). Telehealth in context: Socio-technical barriers to telehealth use in Labrador, Canada. *Computer Supported Cooperative Work (CSCW)*, *16*(6), 595.

Pereira, F., Schuh, A. A., & Fife, E. (1997). *Telemedicine: An inquiry in the economic and social dynamics of communications technologies in the medical field*. Paper presented at the Proceedings of WebNet 97 - World Conference on the WWW, Internet & Intranet, Toronto, Toronto, Canada. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.458.8027

Perkovic, V., Turnbull, F., & Wilson, A. (2014). Is it time for Medi-change? *The Medical Journal of Australia*, *200*(10), 566–567. https://doi.org/10.5694/mja14.00427

Petersen, L. S., Bertelsen, P., & Bjørnes, C. (2013). Cooperation and communication challenges in small-scale eHealth development projects. *International Journal of Medical Informatics*, *82*(12), e375–e385. https://doi.org/10.1016/j.ijmedinf.2013.03.008

Petersson, J. (2011). Medicine at a distance in Sweden: Spatiotemporal matters in accomplishing working telemedicine. *Science Studies*, *24*(2), 43–62.

Pfeil, J. N. (2018). *Avaliação da regulação de consultas médicas especializadas baseada em protocolo teleconsultoria* [Evaluation of the triaging of specialist medical consultations using a tele-advice protocol]. (Doctoral dissertation). Federal University of Rio Grande do Sul, Brazil. Retrieved from https://lume.ufrgs.br/handle/10183/179789

Piccoli, M. F., Amorim, B. D. B., Wagner, H. M., & Nunes, D. H. (2015). Teledermatology protocol for screening of skin cancer. *Anais Brasileiros de Dermatologia*, *90*(2), 202–210. https://doi.org/10.1590/abd1806-4841.20153163

Picot, J. (2000). Meeting the need for educational standards in the practice of telemedicine and telehealth. *Journal of Telemedicine and Telecare*, *6*, 59–62.

Pols, J., & Willems, D. (2011). Innovation and evaluation: Taming and unleashing telecare technology. *Sociology of Health & Illness*, *33*(3), 484–498. https://doi.org/10.1111/j.1467-9566.2010.01293.x

Poole, M. S., Deng, L., Brown, P., Moorad, A., Forducey, S., & Smeltzer, S. (2004). Trust, trait theory, and collaboration in telemedicine: An empirical test. In *Proceedings of the 37th Hawaii International Conference on System Sciences*.

Porpora, D. V. (2015). *Reconstructing sociology: The critical realist approach*. Cambridge, UK: Cambridge University Press.

Porter, S. (2015a). Realist evaluation: An immanent critique. *Nursing Philosophy*, *16*(4), 239–251. https://doi.org/10.1111/nup.12100

Porter, S. (2015b). The uncritical realism of realist evaluation. *Evaluation*, *21*(1), 65–82. https://doi.org/10.1177/1356389014566134

QSR International. (2019). *NVivo*. Retrieved August 25, 2019, from https://www.qsrinternational.com/nvivo/what-is-nvivo

Queensland Audit Office. (2018). *Digitising public hospitals* (No. 10). Retrieved from https://www.qao.qld.gov.au/reports-parliament/digitising-public-hospitals

Queensland Government. (2012). *Better health for the bush*. Retrieved from https://www.health.qld.gov.au/__data/assets/pdf_file/0027/436815/better-health-bush.pdf

Queensland Government. (2014). *Inquiry into telehealth services in Queensland*. Retrieved from http://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2014/5414T5969.pdf

Queensland Health. (2006). *Statewide telehealth services strategic plan* (unpublished internal report). Queensland Government.

Queensland Health. (2017). *Digital health strategic vision for Queensland 2026*. Retrieved from https://www.health.qld.gov.au/__data/assets/pdf_file/0016/645010/digital-health-strat-vision.pdf

Queensland Health. (2019). *Queensland Health Telehealth Program*. Retrieved February 15, 2019 from http://clinicalexcellence.qld.gov.au/improvement-exchange/queensland-health-telehealth-program

Radhakrishnan, K., Xie, B., & Jacelon, C. S. (2015). Unsustainable home telehealth: A Texas qualitative study. *The Gerontologist, 0*(0). https://doi.org/10.1093/geront/gnv050

Ramirez, D. (2014). *Telemedicine architectural framework: A set of models and toolkits aimed to telemedicine success*. Paper presented at the American Telemedicine Association Annual Meeting, Baltimore, MD, USA. https://doi.org/10.13140/2.1.1055.1681

Ramos, V. (2010). Contributions to the history of telemedicine of the TICs. In *Second Region 8 IEEE Conference on the History of Communications* (pp. 1–5). https://doi.org/10.1109/HISTELCON.2010.5735269

Reckwitz, A. (2002). Toward a theory of social practices: A development in culturalist theorizing. *European Journal of Social Theory*, *5*(2), 243–263. https://doi.org/10.1177/13684310222225432

Rho, M., Choi, I., & Lee, J. (2014). Predictive factors of telemedicine service acceptance and behavioral intention of physicians. *International Journal of Medical Informatics*, *83*(8), 559–571. https://doi.org/10.1016/j.ijmedinf.2014.05.005

Rho, M. J., Kim, H. S., Chung, K., & Choi, I. Y. (2014). Factors influencing the acceptance of telemedicine for diabetes management. *Cluster Computing*, *18*(1), 321–331. https://doi.org/10.1007/s10586-014-0356-1

Ribas, L. (2017). Teledermatologia em Florianópolis completa um ano de implantação com resultados positivos [Teledermatology in Florianópolis completes a year of operation with positive results]. Retrieved April 30, 2018, from http://site.telemedicina.ufsc.br/teledermatologia-em-florianopolis-completa-um-ano-de-implantacao-com-resultados-positivos/

Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied policy research. In A. Bryman & R. G. Burgess (Eds.), Analyzing qualitative data (pp. 173–194). Routledge.

Robinson, D., Savage, G., & Campbell, K. S. (2003). Organizational learning, diffusion of innovation, and international collaboration in telemedicine. *Health Care Management Review*, *28*(1), 68–78.

Rodrigues, J. C. (2015). Conta-Satélite de Saúde 2010-2015: Em 2015, 9,1% do PIB foram gastos no consumo de bens e serviços de saúde [In 2015 9.1% of GDP was spent on health goods and services]. Retrieved January 27, 2020, from https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/18915-conta-satelite-de-saude-release

Rogers, E. M. (1971). *Diffusion of innovations* (2nd ed.). New York: Free Press.

Rosengren, D., Blackwell, N., Kelly, G., Lenton, L., & Glastonbury, J. (1998). The use of telemedicine to treat ophthalmological emergencies in rural Australia. *Journal of Telemedicine and Telecare*, *4*(1_suppl), 97–99. https://doi.org/10.1258/1357633981931650

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social Learning Theory and the Health Belief Model. *Health Education & Behavior*, *15*(2), 175–183. https://doi.org/10.1177/109019818801500203

Royal Australian and New Zealand College of Psychiatrists. (2011). *Connecting health services with the future: Modernising Medicare by providing rebates for online consultations*. Retrieved from https://www.ranzcp.org/Files/Resources/Submissions/sub53-pdf.aspx

Royal Australian and New Zealand College of Psychiatrists. (2013). *Professional practice standards and guides for telepsychiatry.* Retrieved from https://www.ranzcp.org/files/resources/practice-resources/ranzcp-professional-practice-standards-and-guides.aspx

Royal Australian and New Zealand College of Radiologists. (2007). *Position statement on international clinical teleradiology*. Royal Australian and New Zealand College of Radiologists (RANZCR).

Royal Australian College of General Practitioners. (2011). *Standards for general practices offering video consultations*. Retrieved from https://gp2u.com.au/static/documents/RACGP_Standards_for_general_practices_offering_video_consultations.pdf

Royal Australian College of General Practitioners. (2013). *Guidelines for interprofessional collaboration between general practitioners and other medical specialists providing video consultations*. Retrieved from http://www.racgp.org.au/your-practice/guidelines/interprofessional/

Royal Australian College of General Practitioners. (2014a). *Guidelines for interprofessional collaboration between general practitioners and other medical specialists providing video consultations. Emergency Medicine Appendix.* Retrieved from https://www.racgp.org.au/FSDEDEV/media/documents/Running%20a%20practice/Technology/Video%20consultations/Interprofessional-collaboration-guidelines-Emergency-Medicine-Appendix.pdf

Royal Australian College of General Practitioners. (2014b). *Implementation guidelines for video consultations in general practice.* Retrieved from https://www.racgp.org.au/running-a-practice/technology/telehealth/guidelines-and-standards/implementation-guidelines-for-video-consultations

Royal Australian College of General Practitioners. (2018). *Telehealth in drought affected areas now covered by Medicare rebates.* Retrieved March 5, 2019, from https://www1.racgp.org.au/newsgp/professional/telehealth-in-drought-affected-areas-now-covered-b

Royal Australian College of General Practitioners. (2019). *RACGP technology survey*. Retrieved from https://www.racgp.org.au/FSDEDEV/media/documents/Running%20a%20practice/Technology/Member%20engagement/RACGP-Technology-Survey-2018-results-updated.pdf

Rufo, R. Z. (2012). Use of change management theories in gaining acceptance of telemedicine technology. *Critical Care Nursing Quarterly*, *35*(4), 322–327. https://doi.org/10.1097/CNQ.0b013e3182684f67

Rural Doctors Association of Australia. (2011). *Submission on the Rebates for Online Consultations Discussion Paper*. Retrieved from http://www.rdaa.com.au/sites/default/files/public/RDAA%2520submission%2520-%2520Rebates%2520for%2520Online%2520Consultations%2520at%252013.1.11_20110203115353.pdf

Rural Doctors Association of Australia. (2014). *Telehealth key principles*. Retrieved from http://www.rdaa.com.au/sites/default/files/public/Telehealth%2520PUBLICATION%2520DRAFT_20150514114116.pdf

Russell, B. (2012). Professional call centres, professional workers and the paradox of the algorithm: The case of telenursing. *Work, Employment & Society*, *26*(2), 195–210. https://doi.org/10.1177/0950017011433155

Russell, B., Smith, C., Valsecchi, R., & Bäck, M. A. (2015). System, society and dominance effects in the adoption of tele-health: A tri-country comparison. *Economic and Industrial Democracy*, 0143831X15579287. https://doi.org/10.1177/0143831X15579287

Russell, B., & Taylor, A. (2011). Mobile digital breast screening: An evaluation of the Queensland experience. *Electronic Journal of Health Informatics*, *7*(1), 4.

Russell, K. W., Saffle, J. R., Theurer, L., & Cochran, A. L. (2015). Transition from grant funding to a self-supporting burn telemedicine program in the western United States. *The American Journal of Surgery*, *210*(6), 1037–1044. https://doi.org/10.1016/j.amjsurg.2015.08.003

Ruston, A., Smith, A., & Fernando, B. (2012). Chronic illness, self-management, and technology: Type 1 diabetes patients' views of the use of technology to communicate with health professionals about their disease. *Patient Intelligence*, *4*, 71.

Sabesan, S., Allen, D. T., Caldwell, P., Loh, P. K., Mozer, R., Komesaroff, P. A., … the Royal Australasian College of Physicians Telehealth Working Group. (2014). Practical aspects of telehealth: Establishing telehealth in an institution. *Internal Medicine Journal*, *44*(2), 202–205. https://doi.org/10.1111/imj.12339

Santos, T. R., Penm, J., Baldoni, A. O., Ayres, L. R., Moles, R., & Sanches, C. (2018). Hospital pharmacy workforce in Brazil. *Human Resources for Health*, *16*. https://doi.org/10.1186/s12960-017-0265-5

Savage, B. (2009). Automation in hospitals and healthcare. In S. Y. Nof (Ed.), *Springer handbook of automation* (pp. 1379–1396). https://doi.org/10.1007/978-3-540-78831-7_77

Savaris, A., & Von Wangenheim, A. (2017). O Sistema Integrado Catarinense de Telemedicina e Telessaúde (STT/SC) [The Catarinense Integrated Telemedicine and Telehealth System (STT/SC)]. *Revista Catarinense de Saúde Da Família*, *7*, 66.

Schrader, G. (2013). *An evaluation of the country mental health digital telehealth network* (unpublished internal report). Adelaide, South Australia: Flinders University.

Scheffer, M. (2018). *Demografia Médica no Brasil 2018*. Retrieved from https://portal.cfm.org.br/index.php?option=com_content&view=article&id=27509:2018-03-21-19-29-36&catid=3

Schoonenboom, J. (2015). The realist survey: How respondents' voices can be used to test and revise correlational models. *Journal of Mixed Methods Research.* https://doi.org/10.1177/1558689815610997

Scott, R. E., McCarthy, F. G., Jennett, P. A., Perverseff, T., Lorenzetti, D., Saeed, A., … Yeo, M. (2007). Telehealth outcomes. *Journal of Telemedicine and Telecare*, *13*(suppl 2), 33–35. https://doi.org/10.1258/135763307782213598

Scott, S. D., Plotnikoff, R. C., Karunamuni, N., Bize, R., & Rodgers, W. (2008). Factors influencing the adoption of an innovation: An examination of the uptake of the Canadian Heart Health Kit. *Implementation Science*, *3*(1), 41. https://doi.org/10.1186/1748-5908-3-41

Secretaria de Estado da Saúde de Santa Catarina. (2016). *231—08/12—Serviço de Telemedicina de Santa Catarina* [The Telemedicine Service of Santa Catarina]. Retrieved from http://www.saude.sc.gov.br/index.php/legislacao/deliberacoes-cib/deliberacoes-2016-cib?format=html&limit=20&limitstart=20

Shaw, J., Gray, C. S., Baker, G. R., Denis, J.-L., Breton, M., Gutberg, J., … Wodchis, W. (2018). Mechanisms, contexts and points of contention: Operationalizing realist-informed research for complex health interventions. *BMC Medical Research Methodology*, *18*(1), 178. https://doi.org/10.1186/s12874-018-0641-4

Shaw, J., Shaw, S., Wherton, J., Hughes, G., & Greenhalgh, T. (2017). Studying scale-up and spread as social practice: Theoretical introduction and empirical case study. *Journal of Medical Internet Research*, *19*(7), e244. https://doi.org/10.2196/jmir.7482

Shulver, W., Killington, M., & Crotty, M. (2016). ‘Massive potential’ or ‘safety risk’? Health worker views on telehealth in the care of older people and implications for successful normalization. *BMC Medical Informatics and Decision Making*, *16*(131). https://doi.org/10.1186/s12911-016-0373-5

Siegal, G. (2011). Telemedicine: Licensing and other legal issues. *Otolaryngologic Clinics of North America*, *44*(6), 1375–1384. https://doi.org/10.1016/j.otc.2011.08.011

Silva, A. B. (2017). *Telessaúde no Brasil: Conceitos e aplicações* [Telehealth in Brazil: Concepts and applications]. Editora DOC Comércio e Serviços Ltda.

Silva, A. B., Carneiro, A. C. M., & Síndico, S. R. F. (2015). Regras do governo brasileiro sobre serviços de telessaúde: Revisão integrativa. [Brazilian Government rules for telehealth services: An integrated review]. *Planejamento e Políticas Públicas*, *0*(44) [?]. Retrieved from http://www.ipea.gov.br/ppp/index.php/PPP/article/view/440

Silva, A. B., & Moraes, I. H. S. de. (2012). The case of Telemedicine University Network: Analysis of telehealth entry in the Brazilian political agenda. *Physis: Revista de Saude Coletiva, 22*(3), 1211–1235. http://dx.doi.org.ezproxy.flinders.edu.au/10.1590/S0103-7331201200030001

Silva, M. M. (2011). *Investigation into the determinants behind the slow adoption and utilization of telehealth specialty care within the Center for Connected Health Policy Specialty Care Safety Net Initiative* (Doctoral dissertation). University of California. Retrieved from http://search.proquest.com.ezproxy.flinders.edu.au/docview/944325534/abstract/958495533EAF4620PQ/1

Singh, R., Mathiassen, L., Stachura, M. E., & Astapova, E. V. (2010). Sustainable rural telehealth innovation: A public health case study. *Health Services Research*, *45*(4), 985.

Siwicki, B. (1999). Telemedicine providers' progress impeded at the border. The need for physicians to obtain a medical license in every state in which they practice slows the growth of telemedicine. *Health Data Management*, *7*(5), 94–98.

Smith, A. C., Caffery, L. J., Saunders, R., Bradford, N. K., & Gray, L. C. (2014). Generating new telehealth services using a whole of community approach: Experience in regional Queensland. *Journal of Telemedicine and Telecare*, *20*(7), 365–369. https://doi.org/10.1177/1357633X14552371

Smith, A. C., & Gray, L. (2009). Telemedicine across the ages. *Medical Journal of Australia*, *190*(1), 15–19.

Smith, A. C., Isles, A., Mccrossin, R., Westhuyzen, J. V. D., Williams, M., Woollett, H., & Wootton, R. (2016). The point-of-referral barrier—A factor in the success of telehealth. *Journal of Telemedicine and Telecare*. https://doi.org/10.1258/1357633011937227

Smith, C., & Elger, T. (2012). *Critical realism and interviewing subjects*. Retrieved from https://repository.royalholloway.ac.uk/items/227fa20a-3bd7-840c-8ac4-13c20c2f744f/9/Smith_Chris_Critical_Realism_and_Interviewing_SOM_Working_Paper.pdf

Smith, C., & Meiksins, P. (1995). System, society and dominance effects in cross-national organisational analysis. *Work, Employment & Society*, *9*(2), 241–267. https://doi.org/10.1177/095001709592002

Smith, J., & Firth, J. (2011). Qualitative data analysis: The framework approach. *Nurse Researcher*, *18*(2), 52.

Snoeijs, S., Boerma, W., Schellevis, F. G., & Rijken, P. M. (2015). Improving patient-centredness of care practices for people with multimorbidity. *The European Journal of Public Health*, *25*(suppl 3), ckv168.038. https://doi.org/10.1093/eurpub/ckv168.038

Snoswell, C. L., Caffery, L. J., Whitty, J. A., Soyer, H. P., & Gordon, L. G. (2018). Cost-effectiveness of skin cancer referral and consultation using teledermoscopy in Australia. *JAMA Dermatology*, *154*(6), 694–700. https://doi.org/10.1001/jamadermatol.2018.0855

Soar, J. (2011). *Enhancing healthcare in home and community settings through telecare and telehealth*. Retrieved from https://core.ac.uk/display/11047801

Soroush, L. (2011). *An exploratory investigation of usage of digital stethoscope by clinicians in telehealth setting through Information Systems success model* (Doctoral dissertation). University of Southern Queensland, Toowoomba, Australia.

Sousa, N. L., Macedo, K. P. S., Martins, J. V. F., & Galvão, M. L. dos S. (2019). Integração do telessaúde com a central de regulação ambulatorial no estado no Ceará: Um relato de experiência [Integration of telehealth with the ambulance call centre in the sate of Ceará: A report]. *Latin American Journal of Telehealth*. Retrieved from http://cetes.medicina.ufmg.br/revista/index.php/rlat/article/view/273

South Australian Health. (2013). *Guidelines for sub-acute services offering digital telehealth network consultations*. Retrieved from https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+services/rehabilitation+services/telerehabilitation/telerehabilitation?contentIDR=c729d48041873a7285b8855f8c50f44b&useDefaultText=1&useDefaultDesc=1

Stanberry, B. (2000). Telemedicine: Barriers and opportunities in the 21st century. *Journal of Internal Medicine*, *247*(6), 615–628. https://doi.org/10.1046/j.1365-2796.2000.00699.x

Stanberry, B. (2006). Legal and ethical aspects of telemedicine. *Journal of Telemedicine and Telecare*, *12*(4), 166–175.

Strachan, K. (2001). Overview of SA telemedicine. *South African Medical Journal*, *91*(7), 554–556.

Stroetmann, K. A., Kubitschke, L., Robinson, S., Stroetmann, V., Cullen, K., & McDaid, D. (2010). *How can telehealth help in the provision of integrated care?* Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0011/120998/E94265.pdf

Su, S., Tsai, C., & Hsu, W. (2013). Extending the TAM model to explore the factors affecting intention to use telecare systems. *Journal of Computers*, *8*(2). Retrieved from https://doaj.org/article/5ab4fdfafe6b45bea899bd1b3a8bfc0e

Sugarhood, P., Wherton, J., Procter, R., Hinder, S., & Greenhalgh, T. (2014). Technology as system innovation: A key informant interview study of the application of the diffusion of innovation model to telecare. *Disability and Rehabilitation: Assistive Technology, 9*(1), 79–87. https://doi.org/10.3109/17483107.2013.823573

Sutherland, K. (2013). Applying Lewin's change management theory to the implementation of bar-coded medication administration. *Canadian Journal of Nursing Informatics*, *8*(1–2). Retrieved from http://search.proquest.com.ezproxy.flinders.edu.au/docview/1698428361/abstract/6DAE71938F7F4DEEPQ/1

Swensen, S. J., Meyer, G. S., Nelson, E. C., Hunt, G. C., Pryor, D. B., Weissberg, J. I., … Berwick, D. M. (2010). Cottage industry to postindustrial care—The revolution in health care delivery. *New England Journal of Medicine*, *362*(5), e12. https://doi.org/10.1056/NEJMp0911199

Swerissen, H., Duckett, S., & Moran, G. (2018). *Mapping primary care in Australia* (Grattan Institute Report No. 2018-09). Retrieved from https://grattan.edu.au/wp-content/uploads/2018/07/906-Mapping-primary-care.pdf

Taylor, A. (1978). Technology, skill and class colur bars in South Africa. (Unpublished master's thesis). University of Salford, Salford, UK.

Taylor, A. (1998). *Service delivery network and rural and remote network expansion* [Business case] (unpublished internal report). Brisbane, Australia: Queensland Health.

Taylor, A. (2005). *Outbacknet@qld, Northern.Net@qld, Broadband to the Bush*. Paper presented at the QUESTNet 2005, Coolum, Queensland, Australia. Retrieved from http://archive.questnet.edu.au/questnet2005/index.html

Taylor, A. (2015). Applying international guidelines for telehealth services – A case study. In A. Maeder & J. Warren (Eds.), *Proceedings of the 8th Australasian Workshop on Health Informatics and Knowledge Management (HIKM 2015)* (pp. 87–95). https://doi.org/10.13140/RG.2.2.13263.69286

Taylor, A., Calvo, M., Meurer, M., & Von Wangenheim, A. (2018). *Supporting universal healthcare: Brazilian telehealth programs*. Paper presented at the Successes and Failures in Telehealth, Darwin, Australia. https://doi.org/10.13140/RG.2.2.24259.66084

Taylor, A., Morris, G., Pech, J., Rechter, S., Carati, C., & Kidd, M. (2015). Home telehealth video conferencing: Perceptions and performance. *JMIR MHealth UHealth*, *3*(3), e90. https://doi.org/10.2196/mhealth.4666

Taylor, A., Morris, G., Tieman, J., Currow, D., Kidd, M., & Carati, C. (2015). Building an architectural component model for a telehealth service. *E-Health Telecommunication Systems and Networks*, *04*(03), 35–44. https://doi.org/10.4236/etsn.2015.43004

Taylor, A., Wade, V., Morris, G., Pech, J., Rechter, S., Kidd, M., & Carati, C. (2015). Technology support to a telehealth in the home service: Qualitative observations. *Journal of Telemedicine and Telecare*, 1357633X15601523. https://doi.org/10.1177/1357633X15601523

Taylor, J., Coates, E., Brewster, L., Mountain, G., Wessels, B., & Hawley, M. S. (2015). Examining the use of telehealth in community nursing: Identifying the factors affecting frontline staff acceptance and telehealth adoption. *Journal of Advanced Nursing*, *71*(2), 326–337. https://doi.org/10.1111/jan.12480

Taylor, P. R. (2013). An approach to designing viable and sustainable telehealth services. *Studies in Health Technology and Informatics*, *188*, 108–113. https://doi.org/10.3233/978-1-61499-266-0-108

Telehealth Quality Group. (2018). *Code of practice for telehealth services*. Retrieved from https://telehealth.global/download/2018-19-INTERNATIONAL-TELEHEALTH-CODE-OF-PRACTICE.pdf

TelessaúdeRS. (2012). *Programa Nacional Telessaúde Brasil Redes* [The Brazilian National Telehealth Network]. Paper presented at the Porto Alegre, Brazil. Retrieved from http://189.28.128.100/dab/docs/portaldab/documentos/apres_tsrs_abr13_evento_dab_1.pdf

TelessaúdeRS. (2017). TelessaúdeRS/UFRGS - Núcleo de Telessaúde do Rio Grande do Sul [The Rio Grande Telehealth Centre]. Retrieved May 10, 2017, from TelessaúdeRS-UFRGS website: https://www.ufrgs.br/telessauders/

TelessaúdeRS. (2018). Revisão do Protocolo de Neurologia Adulto [Revision of the Adult Neurological Protocol]. Retrieved April 25, 2019, from TelessaúdeRS-UFRGS website: https://www.ufrgs.br/telessauders/noticias/revisao-do-protocolo-de-neurologia-adulto/

TelessaúdeSC. (2017). Revista Catarinense de Saúde da Família [Catarinense Magazine of Family Health]. Retrieved July 1, 2018, from http://portalses.saude.sc.gov.br/index.php?option=com_content&view=article&id=5438&Itemid=692

TelessaúdeSC. (2019). Telemedicina e Telessaúde SC - Soluções inovadoras para saúde pública [Telemedicine and Telehealth in Santa Catarina – Innovative solutions for public health]. Retrieved March 20, 2019, from Sistema Catarinense de Telemedicina e Telessaúde website: https://telessaude.ufsc.br/

Telligen. (2014). *Telehealth Start-up and Resource Guide*. Retrieved from https://www.healthit.gov/sites/default/files/telehealthguide_final_0.pdf

Thatcher, M. P. (2016). *A framework of information technology governance controls in acute healthcare* (Doctoral dissertation). Queensland University of Technology, Brisbane, Australia. Retrieved from https://eprints.qut.edu.au/96213/1/Malcolm_Thatcher_Thesis.pdf

The Open University and JISC. (2019). *About CORE*. Retrieved October 26, 2019, from https://core.ac.uk/about/

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*, 45. https://doi.org/10.1186/1471-2288-8-45

Thomas, P. E. (2012). Reflections on the role of less-than-comprehensive (exclusionary) private health insurance hospital products in the Australian healthcare system. *Australian Health Review*, *36*. Retrieved from https://search-proquest-com.ezproxy.flinders.edu.au/docview/1326421102?rfr_id=info%3Axri%2Fsid%3Aprimo

Thrall, J. H., & Boland, G. (1998). Telemedicine in practice. *Seminars in Nuclear Medicine*, *28*(2), 145–157. https://doi.org/10.1016/S0001-2998(98)80004-4

Tieman, J. J., Morgan, D. D., Swetenham, K., To, T. H. M., & Currow, D. C. (2014). Designing clinically valuable telehealth resources: Processes to develop a community-based palliative care prototype. *JMIR Research Protocols*, *3*(3), e41. https://doi.org/10.2196/resprot.3266

Tieman, J., Swetenham, K., Morgan, D., To, T., Currow, D., Tieman, J., … Currow, D. (2016). Using telehealth to support end of life care in the community: A feasibility study. *BMC Palliative Care*, *15*. https://doi.org/10.1186/s12904-016-0167-7

Todnem By, R. (2005). Organisational change management: A critical review. *Journal of Change Management*, *5*(4), 369–380. https://doi.org/10.1080/14697010500359250

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, *19*(6), 349–357. https://doi.org/10.1093/intqhc/mzm042

Tran, V. N. (2015). *Adoption of telemedicine in Vietnam: Case study Newtel* (Graduate dissertation) (Turun ammattikorkeakoulu). Retrieved from http://www.theseus.fi/handle/10024/103601

Triandis, H. C. (1980). Values, attitudes and interpersonal behaviour. In M. M. Page (Ed.), *Nebraska Symposium on Motivation, 1979: Beliefs, attitudes and values*. Lincoln: University of Nebraska Press.

Trichili, H., Dhibi, M., & Solaiman, B. (2008). Telemedicine in developing countries; Case of Tunisia. In *3rd International Conference on Information and Communication Technologies: From Theory to Applications* (pp. 1–4). https://doi.org/10.1109/ICTTA.2008.4529925

Trott, P., & Blignault, I. (1998). Cost evaluation of a telepsychiatry service in northern Queensland. *Journal of Telemedicine and Telecare*, *4*(1_suppl), 66–68. https://doi.org/10.1258/1357633981931515

Tsai, C. (2014). Integrating Social Capital Theory, Social Cognitive Theory, and the Technology Acceptance Model to explore a behavioral model of telehealth systems. *International Journal of Environmental Research and Public Health*, *11*(5), 4905–4925. https://doi.org/10.3390/ijerph110504905

Tudor Hart, J. (2000). In a market-driven society, where can justice grow? *Medicine and Humanity*, *2001*, 31–40.

Turner, J. W., Robinson, J. D., Alaoui, A., Winchester, J., Neustadtl, A., Levine, B. A., … Mun, S. (2003). Media attitudes vs. use: The contribution of context to the communication environment in telemedicine. *Health Care Management Review*, *28*(2), 95–106.

Ulucanlar, S., Faulkner, A., Peirce, S., & Elwyn, G. (2013). Technology identity: The role of sociotechnical representations in the adoption of medical devices. *Social Science & Medicine*, *98*, 95–105. https://doi.org/10.1016/j.socscimed.2013.09.008

Umpierre, R. (2019). *Tackling OPD waiting lists with teleconsultations and tele-ophthalmology – The experience in Brazil*. Paper presented at the Successes and Failures in Telehealth, Gold Coast, Australia. Retrieved from https://event.icebergevents.com.au/uploads/contentFiles/files/2019-SFT/Roberto%20Umpierre.pdf

Urtubey, X., & Petrich, M. (2002). Argentina's national telemedicine programme: Reasons for a premature failure. *Journal of Telemedicine and Telecare*, *8*(suppl 3), 69–71. https://doi.org/10.1258/13576330260440916

van Dyk, L., Fortuin, J., & van Zyl, A. J. (2011). *A multi-dimensional visual map for the measurement and comparison of telemedicine systems*. Retrieved from http://hdl.handle.net/10019.1/48846

van Dyk, L., Groenewald, M., & Abrahams, J. F. (2010). Towards a regional innovation system for telemedicine in South Africa. In *Proceedings of Second International Conference on Ehealth, Telemedicine, and Social Medicine* (pp. 1–4). https://doi.org/10.1109/eTELEMED.2010.8

van Offenbeek, M., Boonstra, A., & Seo, D. (2013). Towards integrating acceptance and resistance research: Evidence from a telecare case study. *European Journal of Information Systems*, *22*(4), 434–454. https://doi.org/10.1057/ejis.2012.29

Vassilev, I., Rowsell, A., Pope, C., Kennedy, A., O'Cathain, A., Salisbury, C., & Rogers, A. (2015). Assessing the implementability of telehealth interventions for self-management support: A realist review. *Implementation Science*, *10*(59).

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, *46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425–478.

Venkatesh, V., Speier, C., & Morris, M. G. (2002). User acceptance enablers in individual decision making about technology: Toward an integrated model. *Decision Sciences*, *33*(2), 297–316. https://doi.org/10.1111/j.1540-5915.2002.tb01646.x

Viana, A. L. d'Ávila, da Silva, H. P., & Yi, I. (2017). Universalizing health care in Brazil: Opportunities and challenges. In I. Yi (Ed.), *Towards universal health care in emerging economies* (pp. 181–211). https://doi.org/10.1057/978-1-137-53377-7_7

Victorian Department of Human Services. (2015). *Medico-legal aspects of telehealth services for Victorian public health services*. Victorian Department of Human Services.

Vitacca, M., Mazzù, M., & Scalvini, S. (2009). Socio-technical and organizational challenges to wider e-Health implementation. *Chronic Respiratory Disease*, *6*(2), 91–97. https://doi.org/10.1177/1479972309102805

Volkoff, O., Strong, D. M., & Elmes, M. B. (2007). Technological embeddedness and organizational change. *Organization Science; Linthicum*, *18*(5), 832–848.

Von Wangenheim, A., & Nunes, D. H. (2018). *Direct impact on costs of the teledermatology-centered patient triage in the state of Santa Catarina Analysis of the 2014-2018 Data*. doi:10.13140/RG.2.2.20044.92807

Vuononvirta, T., Timonen, M., Keinänen-Kiukaanniemi, S., Timonen, O., Ylitalo, K., Kanste, O., & Taanila, A. (2011). The compatibility of telehealth with health-care delivery. *Journal of Telemedicine and Telecare*, *17*(4), 190–194. https://doi.org/10.1258/jtt.2010.100502

Wade, V. A. (2013). *What is needed for telehealth to deliver sustainable value to the routine operations of health care in Australia?* (Doctoral dissertation). University of Adelaide, Australia. Retrieved from https://digital.library.adelaide.edu.au/dspace/bitstream/2440/83508/8/02whole.pdf

Wade, V. A. (2014). Uptake of telehealth services funded by Medicare in Australia. *Australian Health Review*, *38*(5), 528–532. https://doi.org/10.1071/AH14090

Wade, V. A., & Eliott, J. (2012). The role of the champion in telehealth service development: A qualitative analysis. *Journal of Telemedicine and Telecare*, *18*, 490–492. https://doi.org/10.1258/jtt.2012.GTH115

Wade, V. A., Eliott, J. A., & Hiller, J. E. (2012). A qualitative study of ethical, medico-legal and clinical governance matters in Australian telehealth services. *Journal of Telemedicine and Telecare*, *18*(2), 109–114. https://doi.org/10.1258/jtt.2011.110808

Wade, V. A., Eliott, J. A., & Hiller, J. E. (2014). Clinician acceptance is the key factor for sustainable telehealth services. *Qualitative Health Research*, *24*(5), 682–694. https://doi.org/10.1177/1049732314528809

Wade, V., Eliott, J., Karnon, J., & Elshaug, A. G. (2010). A qualitative study of sustainability and vulnerability in Australian telehealth services. *Studies in Health Technology and Informatics*, *161*, 190–201.

Wade, V., Gray, L., & Carati, C. (2016). Theoretical frameworks in telemedicine research. *Journal of Telemedicine and Telecare*, 1357633X15626650. https://doi.org/10.1177/1357633X15626650

Wade, V., & Stocks, N. (2017). The use of telehealth to reduce inequalities in cardiovascular outcomes in Australia and New Zealand: A critical review. *Heart, Lung and Circulation*, *26*(4), 331–337. https://doi.org/10.1016/j.hlc.2016.10.013

Wade, V. A., Taylor, A., Kidd, M. R., & Carati, C. (2016). Transitioning a home telehealth project into a sustainable, large-scale service: A qualitative study. *BMC Health Services Research*, *16*, 183. https://doi.org/10.1186/s12913-016-1436-0

Walker, J., & Whetton, S. (2002). The diffusion of innovation: Factors influencing the uptake of telehealth. *Journal of Telemedicine and Telecare*, *8*, 73–75.

Walsham, G., & Sahay, S. (1999). GIS for district-level administration in India: Problems and opportunities. *MIS Quarterly*, *23*(1), 39–65.

Wang, X., Zhang, Z., Zhao, J., & Shi, Y. (2019). Impact of Telemedicine on Healthcare Service System Considering Patients' Choice. *Discrete Dynamics in Nature and Society; New York*, *2019*. http://dx.doi.org.ezproxy.flinders.edu.au/10.1155/2019/7642176

Ward, P. R., Attwell, K., Meyer, S. B., Rokkas, P., & Leask, J. (2017a). Understanding the perceived logic of care by vaccine-hesitant and vaccine-refusing parents: A qualitative study in Australia. *PLOS ONE*, *12*(10), e0185955. https://doi.org/10.1371/journal.pone.0185955

Ward, P. R., Attwell, K., Meyer, S., Rokkas, P., & Leask, J. (2017b). Risk, responsibility and negative responses: A qualitative study of parental trust in childhood vaccinations. *Journal of Risk Research*. https://doi.org/10.1080/13669877.2017.1391318

Ward, P. R., Rokkas, P., Cenko, C., Pulvirenti, M., Dean, N., Carney, A. S., & Meyer, S. (2017). 'Waiting for' and 'waiting in' public and private hospitals: A qualitative study of patient trust in South Australia. *BMC Health Services Research*, *17*, 333. https://doi.org/10.1186/s12913-017-2281-5

Ward, R. (2013). The application of technology acceptance and diffusion of innovation models in healthcare informatics. *Health Policy and Technology*, *2*(4), 222–228. https://doi.org/10.1016/j.hlpt.2013.07.002

Watson, J., Gasser, L., Blignaultr, I., & Collins, R. (2001). Taking telehealth to the bush: Lessons from North Queensland. *Journal of Telemedicine and Telecare*, *7*(suppl 2), 20–23. https://doi.org/10.1258/1357633011937344

Western Australia Country Health Service. (2012). *Statewide telehealth service use policy*. Retrieved from https://ww2.health.wa.gov.au/~/media/Files/Corporate/Policy%20Frameworks/Information%20and%20Communications%20Technology/Policy/Statewide%20Telehealth%20Service%20Use%20Policy/OD489-Statewide-Telehealth-Service-Use-Policy.pdf

Westhorp, G., Prins, E., Kusters, C., Hultink, M., Guijt, I., & Brouwers, J. (2011). Realist Evaluation: An overview. Presented at the Realist Evaluation, Wageningen, Netherlands. Retrieved from https://core.ac.uk/download/pdf/29235281.pdf

Westhorp, G. (2018). Understanding mechanisms in realist evaluation and research. In N. Emmel, J. Greenhalgh, A. Manzano, M. Monaghn, & S. Dalkin (Eds.), *Doing realist research* (pp. 41-58. London: SAGE Publications.

Whitehall, J., Bliganault, I., French, C., Carson, V., & Patole, S. (1998). Telemedicine in Neonatology: Lessons from North Queensland. *Australian Journal of Rural Health*, *6*(3), 140–143. https://doi.org/10.1111/j.1440-1584.1998.tb00300.x

Whitten, P., & Cornacchione, J. (2010). The multiple contexts of borders that impact telemedicine as a healthcare delivery solution. *Journal of Borderlands Studies*, *25*(3–4), 206–218. https://doi.org/10.1080/08865655.2010.9695782

Whitten, P., Holtz, B., & Nguyen, L. (2010). Keys to a successful and sustainable telemedicine program. *International Journal of Technology Assessment in Health Care*, *26*(2), 211–216. https://doi.org/10.1017/S026646231000005X

Whitten, P., Sypher, B. D., & Patterson, J. D. (2000). Transcending the technology of telemedicine: An analysis of telemedicine in North Carolina. *Health Communication*, *12*(2), 109–135. https://doi.org/10.1207/S15327027HC1202_1

Williams, C. K., & Karahanna, E. (2013). Causal explanation in the coordinating process: A critical realist case study of federated IT governance structures (Case study). *MIS Quarterly*, *37*(3), 933.

Williams, M. (2014). Probability and Models. In P. K. Edwards, J. O'Mahoney, & S. Vincent (Eds.), Studying organizations using crtical realism. Oxford University Press.

Williams, P. (2002). The competent boundary spanner. *Public Administration*, *80*(1), 103–124. https://doi.org/10.1111/1467-9299.00296

Williams, T., May, C., Mair, F., Mort, M., & Gask, L. (2003). Normative models of health technology assessment and the social production of evidence about telehealth care. *Health Policy*, *64*(1), 39–54. https://doi.org/10.1016/S0168-8510(02)00179-3

Willis, E. (2006). Introduction: Taking stock of medical dominance. *Health Sociology Review*, *15*(5), 421–431.

Wootton, R., Blignault, I., & Cignoli, J. (2003). A national survey of telehealth activity in Australian hospitals. *Journal of Telemedicine and Telecare*, *9*(suppl 2), 73–75. https://doi.org/10.1258/135763303322596345

World Health Organisation. (2018). *Global health expenditure database*. Retrieved August 28, 2019, from https://apps.who.int/nha/database

Wynn, D., & Williams, C. (2012). Principles for conducting critical realist case study research in information systems. *MIS Quarterly*, *36*(3), 787.

Xue, Y., & Liang, H. (2007). Analysis of telemedicine diffusion: The case of China. In *IEEE Transactions on Information Technology in Biomedicine: A Publication of the IEEE Engineering in Medicine and Biology Society*, *11*(2), 231–233.

Yam, R. (2012). *A practical extension of technology acceptance model for adopting real-time telemedicine system* (Doctoral dissertation). University of Keio, Tokyo, Japan. Retrieved from http://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40002001-00002011-0051

Yellowlees, P. (2001). An analysis of why telehealth systems in Australia have not always succeeded. *Journal of Telemedicine and Telecare*, *7*(suppl 2), 29–31. https://doi.org/10.1258/1357633011937056

Zachariadis, M., Scott, S., & Barrett, M. (2013). Methodological implications of critical realism for mixed-methods research. *MIS Quarterly*, *37*(3), 855.

Zailani, S., Gilani, M., Nikbin, D., & Iranmanesh, M. (2014). Determinants of telemedicine acceptance in selected public hospitals in Malaysia: Clinical perspective. *Journal of Medical Systems*, *38*(9), 1–12. https://doi.org/10.1007/s10916-014-0111-4

Zanaboni, P., & Wootton, R. (2012). Adoption of telemedicine: From pilot stage to routine delivery. *BMC Medical Informatics and Decision Making*, *12*, 1.

Zotero. (2019). Retrieved August 25, 2019, from Zotero: Your personal research assistant website: https://www.zotero.org/

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. New York: Public Affairs.

APPENDICES

APPENDIX A. LITERATURE CATEGORISATION (INITIAL)

Theory	Items		Theory	Items
6. Theory			6.16 Normalisation Process	23
6.1 Acceptance and use of technology	12		6.17 Organisational Change	23
6.1.1 Acceptance	13		6.17.1 Factors	4
6.1.2 Adoption	6		6.17.2 Structure	8
6.2 Actor Network	5		6.18 Planned behavior	28
6.2.1 Frame	5		6.19 Power	13
6.2.2 Development	13		6.20 Science and Technology	28
6.2.3 Actor	12		6.21 Social Capital	9
6.3 Adoption	0		6.22 Social Construction	9
6.3.1 Factors	16		6.23 Sociotechnical	53
6.3.2 Adoption	30		6.23.1 Factors	17
6.4 Change management	14		6.23.2 Barriers	4
6.4.1 Implementation	18		6.23.3 Sustainability	7
6.5 Cognitive Theory	0		6.23.4 Adoption	8
6.5.1 Behaviour	19		6.23.5 Innovation	12
6.5.2 Belief	17		6.23.6 Socioeconomic	11
6.5.3 Communication	14		6.23.7 Sociotechnical	29
6.5.4 Care	9		6.24 Structuration	13
6.5.4 Design	2		6.25 Systems Theory	20
6.5.5 Expectations	2		6.26 Technology Acceptance Model	26
6.6 Diffusion of Innovations	64		6.26.1 Acceptance	79
6.6.1 Acceptance	14		6.26.2 Factors	74
6.6.2 Factors	2		6.26.3 Barriers	6
6.6.3 Barriers	23		6.26.4 Sustainability	2
6.6.4 Sustainability	1		6.26.5 Adoption	30
6.6.5 Adoption	1		6.26.6 Diffusion	5
6.6.6 Diffusion	41		6.26.7 Innovation	6
6.6.7 Innovation	61		6.26.8 Implementation	17
6.6.9 Implementation	12		6.26.9 Prediction	15
6.7 Economic Analysis	38		6.27 Use and gratification	12
6.7.1 Cost	34		7. Author Related	0
6.8 Evidence based medicine	93		7.1 Feenburg	17
6.9 Framing	15		7.2 Greenhalgh	197
6.10 Gatekeeping	8		7.3 May Carl	77
6.11 General Theroy	10		7.4 Pawson	29
6.12 Health Economics	30		7.5 Rogers EM	96
6.12.1 Funding	9		8. Methods	49
6.12.2 Costs	22		8.1 Critical Realism	25
6.12.3 Benefits	14		8.2 Ethnography	8
6.12.4 Service	9		8.3 Evaluation	42
6.12.5 Economics	11		8.4 Literature	9
6.13 History	77		8.5 NPT	1
6.14 Labour Process	10		8.6 Realist Review	35
6.15 Marxism	10		8.7 Systematic Reviews	39
6.15 Network Theory	16		9. Sustainability	46
			Total	**2093**

APPENDIX B. REVISED LIST OF LITERATURE SEARCH TERMS

Query name	Secondary Search Term	In the Title or Any field
6.1.1a Actor	"Actor"	Title
6.1.2b Culture	culture	Title
6.1.4a Frames	"frame" OR "framing"	Title
6.1.5a History	history	Title
6.1.6b Law, Ethics	law OR "legal" OR "ethics" OR "ethical" OR "liable" OR "liability" OR "privacy"	Title
6.1.7b Networks	actor network	Title
6.2.1b Acceptance	acceptance	Title
6.2.2a Adoption	adoption	Title
6.2.3a Barriers	barrier	Title
6.2.5a Factors	factors	Title
6.2.6a Implementation	implementation	Title
6.2.7a Prediction	prediction	Title
6.3.1a Behaviour	behaviour	Title
6.3.2a Belief	belief	Title
6.3.4a Communication	communication	Title
6.3.5a Design	design	Title
6.3.7a Risk, Safety, Quality	risk OR "safety" OR "quality"	Title
6.3.8a Use and gratification	usability OR "satisfaction"	Title
6.3.8b Planned behaviour	planned behaviour	Title
6.4.1a Acceptance	innovation AND "acceptance"	Title
6.4.3a Barriers	barrier	Title
6.4.4a Diffusion	diffusion	Title
6.4.5a Factors	factors	Title
6.4.6b Implementation	innovation AND "implementation"	Title
6.4.7b Innovation	innovation	Title
6.4.8a Sustainability	sustainability OR "sustainable" OR "sustain"	Title
6.5b General Theory	theory OR "theoretical" OR "theories"	Title

Query name	Secondary Search Term	In the Title or Any field
6.6.1a Analysis	economic AND ("analysis" OR "analytical" OR "evaluation")	Title
6.6.2a Benefits	economic AND ("benefit" OR "impact")	Title
6.6.3a Costs	economic AND "cost"	Title
6.6.4a Funding	economic AND ("fund" OR "afford" OR "benefit")	Title
6.7.1a Change	organization AND "change"	Title
6.7.2b Factors	change AND ("factors" OR "issues")	Title
6.7.3a Implementation	change AND ("implementation" OR "managing")	Title
6.7.4b Licensing, credentials	Licensing OR "credentialing"	Title
6.7.5a Standards, Guidelines	Standards OR "Guidelines" OR "Codes"	Title
6.7.5b Policy	policy OR "policies"	Title
6.7.6a Processes	Process	Title
6.7.7a Structure	structur*	Title
6.7.8b Work	work	Title
6.8.1b Capital	social capital	In Any
6.8.2b Construction	constructivist	In Any
6.8.3b Economic	socioeconomic OR "socio-economic"	
6.8.4b Technical	sociotechnical OR "socio-technical"	In Any
6.8.5b Scientific	science OR "scientific"	Title
6.9.1a Evidence based	evidence base	Title
6.9.2b Normalization	Normalization OR "Normalisation"	In Any
6.9.3b Structuration	Structuration	Title
6.9.4a Systems	complex system	Title
8.4b Realist	realist	In Any
8.6b Systematic	systematic	In Any

Note. ‘*’ is a wildcard character, representing any other character.

APPENDIX C. PRELIMINARY SET OF LITERATURE THEMES

Name	Sources	References	Name	Sources	References
Appropriation	30	57	Frames Quality	3	7
Attitudes Acceptance	24	53	Frames Socio-cultural	3	6
Attitudes Users	3	8	Frames Sociotechnical	5	7
Context	29	37	Frames Space and Time	4	11
Distributed Knowledge	1	4	Frames Technical	4	7
Contexts Complex	3	4	Guidelines	62	111
Contexts Multiple	2	3	Implicit Codes	3	4
Contexts Organisational	3	4	Normalisation	37	51
Contexts Primary Care	2	2	Normalisation Processes	11	16
Design	4	5	Normalisation Sustainability	9	13
Design Multi-stability of technologies	2	6	Power	24	53
Design Technology driven	3	3	Power Conflict	7	10
Design Technology fit	11	11	Power Control	13	19
Diffusion of Innovations	23	34	Power Groups	16	25
Economic	7	16	Power Interests	19	39
Ethical Principles	1	7	Relationships	28	48
Frame	7	19	Relationships Changes	5	7
Frames and Place	7	10	Relationships Interoperability	2	2
Frames Changing	12	19	Relationships Media	2	8
Frames Contradictions	12	46	Relationships Mediated	6	16
Frames Cultural	3	7	Research questions	1	1
Frames Different	15	29	Roles	7	15
Frames Evaluation	5	12	Roles Workload	3	3
Frames Fit	70	142	The telephone	1	1
Frames in Time	8	10	Trust	16	23
Frames Medical	9	19	Trust Risk	12	18
Frames Multiple	7	9	Trust Safety	2	2
Frames Organisational	3	6	Views of Telehealth	3	5
Frames Professional	6	9	Vision	19	32

APPENDIX D. REALIST INFORMATION GATHERING GUIDE

SUSTAINABLE TELEHEALTH SERVICES
DESCRIPTION

This research will examine the sustainability of telehealth services, the conditions for innovation in telehealth services and how telehealth services develop in different settings, by seeking to understand the influence of the wider social and technical environment on telehealth services.

The research will be conducted according to relevant legislation and Flinders University policies including:

- The Australian Code for the Responsible Conduct of Research. It is a condition of the University's funding from the Australian Research Council (ARC) and the National Health and Medical Research Council that all researchers (staff and students) comply with the Code.
- Flinders University Research Policies available at http://www.flinders.edu.au/ppmanual/research/research_home.cfm.
- Flinders University Research Integrity Policies at http://www.flinders.edu.au/research/researcher-support/ebi/integrity-misconduct/integrity-misconduct_home.cfm. Research Integrity relates to the responsible conduct and reporting of research. It involves applying principles such as honesty, accuracy, accountability, quality and good stewardship of resources to the design and practice of research. How you store, manage and publish data is very important and is guided by codes and principles.
- Flinders University Research Higher Degree Regulations at http://www.flinders.edu.au/ppmanual/student/research-higher-degrees.cfm#Ethics
- Current best practice in ethics including abiding by the *National Statement* on Ethical Conduct in Human Research and all other relevant National Health and Medical Research Council standards;
- Relevant State and Commonwealth Acts and legislations.

STUDY INVESTIGATOR(S)

Name	Phone	Email	Institution	Study Role
Alan Taylor			Flinders University	**Principal Investigator**
Professor Paul Ward			Flinders University	Principal Supervisor

Realist Information Gathering Guide

Health/Social Science Research

South Australia / Queensland / Brazil (Optional)

Title	*Sustainable Telehealth Services*
Protocol Number	*EC00188*
Project Sponsor	*Flinders University, South Australia*
Principal Investigator	*Alan Taylor*
Supervisor	*Professor Paul Ward*
Location	*South Australia / Queensland / Brazil (Optional)*

INTRODUCTION

This research will examine the sustainability of telehealth services, the conditions for innovation in telehealth services and how telehealth services develop in different settings, by seeking to understand the influence of the wider social and technical environment on telehealth services. The inquiry method for this research will be based on a critical realist paradigm which views the world as existing independently of people's perceptions but recognises that perceptions influence the ways we perceive and experience the world. Contributions will be sought from several theories of how interventions based on technology (such as telehealth services) are influenced by context, technology and people.

TYPES OF REALIST INFORMATION GATHERING

The critical realist paradigm is agnostic about the type of information that should be collected. The emphasis is on obtaining information that may assist with explanation of underlying mechanisms that may be operative, so qualitative, quantitative, and mixed method instruments will be considered as needed.

Realist information gathering has three important characteristics:

- To be able to build explanations, an iterative process of data collection should be designed which includes the possibility to revisit respondents and repeat interviews (formally or informally) with the same participants (or sub-groups) at a later stage of the investigation. This longitudinal element is different from standard longitudinal qualitative research because, although it involves returning to interviewees, the objective is not to explore changes which occur over time in participants' lives but to explore and further develop researcher's theories.
- Practitioners have specific ideas on what is within the programme that works (mechanisms) because they are likely to have broad experience of successes and failures, and some awareness of people and places for whom and in which the programme works. The imperative is to work with a broad range of programme stakeholders who must be purposively selected based on researcher's hypotheses.
- Realist exploration are generally semi-structured, containing exploratory topics and questions based on the programme evaluated but acting as instruments to draw out the propositions of the general inquiry. It is also possible to begin with more structured questions as long as respondents are given space to explain their initial responses. Exploring differences in implementation might trigger hypotheses about different mechanisms and outcomes (Manzano, 2016).

The core tool in realist information gathering is the topic guide which will be discussed in a subsequent section..

Interviews

Interviews are an important tool in the collection of information. The specific interview technique to be used will be consistent with the critical realist paradigm, and will seek to elucidate interviewee's thoughts about the propositions being investigated (Maxwell, 2012, p. 104). The interview not only has to interpret of mechanisms operate to trigger outcomes, but also needs to analyse the contexts within which participants operate. The realist interview recognises the active role of the interviewer and the informant in drawing out insider understandings of social mechanisms but goes further by placing the researchers provisional theoretical models of context, mechanisms and outcomes at the centre of discussion between the teacher – the informant and the learner – the interviewer (Pawson & Tilley, 1997, p. 295, 2004). The interview commences with showing the interviewee "the particular programme theory under test" and then "the respondent, having learned the theory under test, is able to teach the researcher about those components of a programme in a particularly informed way" (Pawson & Tilley, 2004). Consequently the "the roles of teacher and learner are not static but become interchangeable between the interviewer and the interviewee during the process of thinking through the complexities of the programme" (Manzano, 2016).

Focus Groups

Similar principles to those of realist interviewing also drive the structuring of discussion points for the focus group. Focus groups may reduce the need for extensive numbers of interviews, but should not be relied on as the only method of collecting information from informants because individual interviews could elucidate deeper and possibly conflicting views on the operation of a programme.

Observations of professional activity

Similar principles to those of realist interviewing also drive the structuring of observation. The intent of possible observations of professional activity is to gain a greater understanding of what is working, for whom and how. Observations may confirm the views voiced in participant interviews and raise new questions for discussion with participants.

Instrument Design

There are three important principles implicit in realist methods that will be followed in designing all of these instruments.

Firstly subject to the need to obtain consistent information, some degree of customisation will be required. For instance it will may or may not make sense to ask a specialist clinician for their opinion on a specific information security protocol, or on the contrary discuss the role of a clinical protocol with an information technology specialist. Additionally different instances of a mechanism may be manifested differently in different contexts.

Secondly, some level of validation of each instrument will be needed. So instruments will be tested through, for example a test interview before be employed at scale. This may be slightly wasteful, but efforts will be made to employ colleagues to assist with this validation process.

Thirdly, after an initial tranche of interviews have been conducted or observations conducted, an analysis could reveal that there are misunderstandings, or lines of inquiry of little value. Hence the ability to evolve the efficacy of each instrument is important to retain, and the creation of absolutely fixed pre-approved, pre-validated, un-changeable instruments, prior to commencement of inquiry in each setting would not be advisable.

Useful tools

Realist information gathering is well placed to use and benefit from additional tools that can be presented in a diagrammatic or visual form.

Mental Models

Mental models are "an explanation of someone's thought process about how something works in the real world. It is a representation of the surrounding world, the relationships between its various parts and a person's intuitive perception about his or her own acts and their consequences" (Wikipedia, 2017)

Gap Analysis

A gap analysis can also be used to help participants analyse gaps between the outcomes of a programme and the desired outcomes. Gap analysis can be used to understand the differences in the contexts and implementation of programmes leading to possible identification of mechanisms and an understanding of what works where and when.

Stakeholder analysis

Stakeholder analysis is used conflict resolution, project management, and business administration. In realist information gathering, stakeholder analysis can be used to assess the attitudes of the stakeholders regarding the potential changes. Stakeholder analysis can track changes in stakeholder attitudes over time and the relative importance of each stakeholder.

ROLE OF RESEACHER

Objectives

The objective of realist information gathering is not to elicit participant narratives. For realists information exists within a programme or intervention context. The story of the programme and processes is captured from participants' stories. Tracing processes requires that the researcher takes an active role in directing the questioning and keeping the conversation on the specific topic under evaluation. Tracing implementation processes is important to realist evaluations because stakeholders' meanings and reasoning processes about programmes can help identify key mechanisms and contextual differences (Mark et al., 1999)...

Role of Researcher

In many other forms of qualitative data collection the researcher has often been described as that of the "amiable lacking knowledge, who has to be told things. Much of the methodological literature on interviewing cautions interviewers to be careful in how they ask questions and "a good interviewer is a listener rather than a speaker during an interview" (Creswell, 2013, p. 125).

While 'listening' is certainly a key skill in realist information gathering, the interviewee is not supposed to control the direction of the conversation, it is the interviewer who will aim to take control and to steer the session towards his/her topic of interest. Experienced researchers control the direction of conversation in most interviews but in realist evaluations they are not only asking about the programme but about the theories that the programme assumes (Mark et al., 1999)..

Realist information gathering recognises the active role of the researcher and the informant in drawing out insider understandings of social mechanisms but goes further by placing the researchers provisional theoretical models of context, mechanisms and outcomes at the centre of the discussion.

Logistical considerations

The demands of realist interviewing are considerable because large volumes of information may be collected. Not only is considerable time required to set up and undertake an interview but additional time is needed to analyse the interview. Therefore interviews will be digitally recorded, and analysed using software that enables the digital marking of sections of the interview of particular interest. Essentially this process constitutes open coding of audio information, rather than textual information and avoids the lengthy and expensive task of fully transcribing an entire interview into a textual form. The output of this process will be transcribed 'sections' of interest in each interview that are openly coded.

STAGES OF REALIST INFORMATION GATHERING

Within a realist information gathering (Manzano, 2016) proposes three phases; theory gleaning, refinement and consolidation.

These phases illustrate how the researcher adjusts and shapes the session, keeping theory as the common denominator. Sometimes these three phases will happen within the same data gathering session but, due to constraints, some sessions may have to stop at phase one or two. At other times researchers may already have formulated theories so they can start at phases two or three.

Theory gleaning

In theory gleaning sessions participants respondents are expected to help the researcher to articulate first order theories, which are those that identify how the contextual circumstances of some programmes may impact outcomes. and effectiveness.

In practice, questions should start ascertaining which of the hypothesized contexts, mechanisms and outcomes the stakeholder will be able to comment on. First because of their role in the process and then because of who they are; e.g. more experienced or well connected. That is, sessions should start with general questions about the programme followed by stories about specific experiences or issues with programme participants/constraints.

The questions asked will be mainly exploratory and the wording of those questions should try to ascertain how the programme works for whom and in what circumstances. Questions looking to explore context may ask for experiences of before/during/after the programme was implemented. For example: 'How was your work different before the programme was implemented?' (Manzano, 2016).

The objective is to draw the participant(s) into comparison of programme effectiveness within different contexts. . With those examples, events, stories and cases, the researcher eventually will be able to glean tentative explanations and, from there, to look for other potential participants, observations, comparisons and so on to build rigour from those relevant stories (Pawson, 2013).

Theory refinement

In theory refinement interviews second level theories are incorporated in the researchers thinking process. Now, the researcher is becoming more knowledgeable of programme nuances, and questions evolve to being less standardized and more tailor-made to refine specific outcome patterns. Meanings attributed by the researcher to previous answers or situations observed are discussed in the light of potential divergence and they are presented to the interviewee while spelling out the evidence (i.e. 'When this programme was implemented there was an issue … Have you experienced this?)

Tentative theories (ideas) about how a programme works are spelled out and exposed to participants, using their expertise as tools for hypotheses refinement. Then, as the number of cases cumulates, comparisons are made with all participants and with data generated by observations. In the realist evaluation approach, although stakeholders are not necessarily part of the research team, they always play an important role in the development of theories (Manzano, 2016)..

Theory consolidation

In this third phase, the theories more worthy of consideration are fine tuned. The consolidation process requires the investigation existing rules, protocols and unwritten norms about the programme. Theories at this level illustrate how new interventions or programmes modify routine roles and behaviours.

Theory consolidation aims to further refine how emerging theory is received by different stakeholders. Conversations with stakeholders should be guided with the help of the specificities of the individual cases and, from there, they can be directed into the general programme. In summary, this phase gives more detailed consideration to a smaller number of contexts, mechanisms and outcomes. The researcher may present nearly consolidated theory to the participant based on their own stories or nuggets of evidence (Pawson, 2006).

THE CONTEXTUAL MODEL

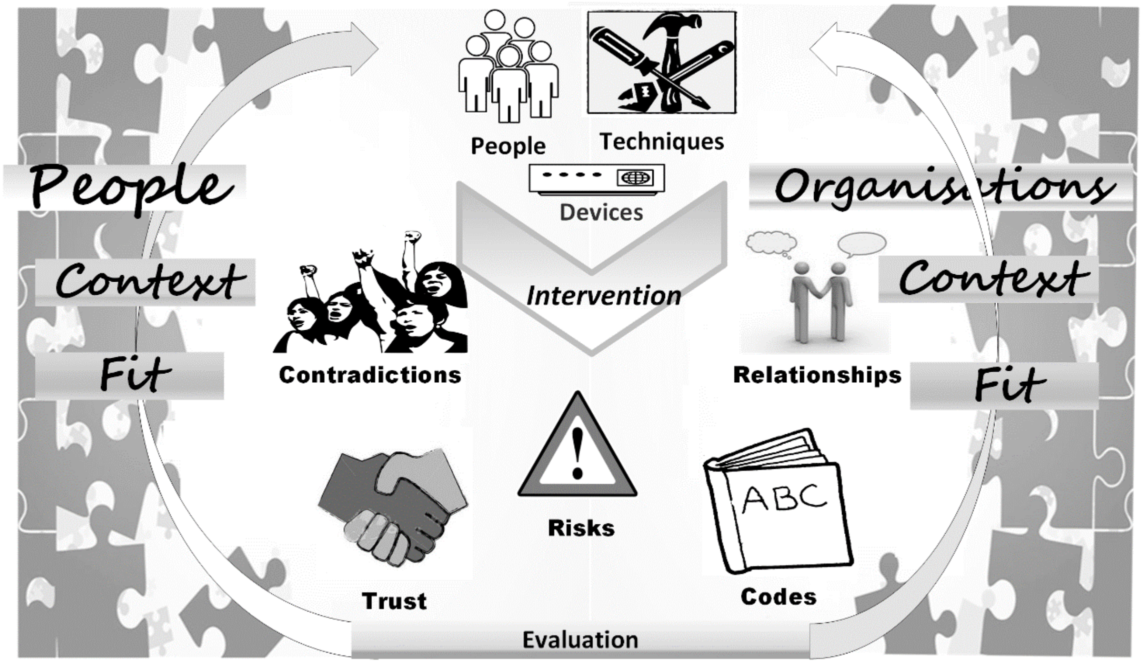
A contextual model of inquiry that has been developed that is intended to deepen the explanations and theoretical treatments discussed in the preceding synthesis of existing writing on telehealth. The model (Figure 1) proposes four mechanisms that may influence the developmental pathway of a telehealth intervention and if confirmed to exist, could assist in the explanation of changes to telehealth services.

1. Adjustment of interventions to maximise compatibility or fit between with the established sociotechnical context.
2. Exercise of power and control within relationships between people and organisations.
3. Management of risks and associated conflicts to the established context require a re-negotiation of trust mechanisms.

4. Adaptation of sociotechnical codes (explicit and implicit) to recognise new mechanisms of trust and changes to the established context.

(Sociotechnical codes are the economic, social and technical structures, interactions, and practices that form part of and simultaneously shape the way in which the technology is used)

Figure 1. Conceptual model of a telehealth intervention pathway.



INITIAL TOPIC GUIDES

Interviews and focus groups

Four research questions are proposed to investigate the development of telehealth services in the proposed research settings:

- How may personal, organisational and professional sociotechnical frames influence the developmental path of telehealth services?
- Can the developmental path of telehealth services be understood through the analysis of the relationships between people and organisations in the course of a telehealth intervention?
- Do risk acceptance and trust act as mechanisms for resolving conflicts (contradictions) over implicit or explicit personal, organisational and professional codes?
- Do design, implementation and evaluation codes provide social or technical mechanisms for resolving conflict (contradictions) and mitigating risks that arise during telehealth service interventions?

Based on these research questions an initial topic guide for realist information gathering (interviews, focus groups) is provided below. As investigation proceeds the guide will be refined and adapted.

Table A1.

Topic Guide for Realist Information Gathering – Interviews and Focus Groups

TOPIC	LOGIC	PHASE
14. Can you please tell me a little about your role in the organisation?	*Ice breaker*	*Introduction*
15. What responsibilities do you have or have had for telehealth service provision?	*Ice breaker*	*Introduction*
16. Which telehealth initiatives have you been associated with and how well have they worked?	*Checking for role and knowledge*	*Screening*
17. How do you think these initiatives have changed your work?	Fishing for ideas	Theory gleaning
18. How have the services delivered by telehealth technologies changed?	Is there a difference between non technology supported service and ordinary service	Theory gleaning
19. From where you sit, what are the organisational challenges of telehealth services?	Invited to channel the organisations context	Theory gleaning
20. What professional (medical, allied health, information technology) issues in implementation or operation of telehealth services have you experienced or witnessed?	Invited to channel the professional context	Theory gleaning
21. What difficulties (if any) do you see telehealth services interventions have fitting in with personal and organisational ways of doing health care?	Is the new intervention welcome?	Theory gleaning
22. What sorts of issues have you seen arise during a telehealth service implementation (or operation)? Why?	What gets in the way or is missing? Probe for mechanisms.	Theory gleaning
23. What sort of opinions have you heard about telehealth services?	Fishing for frames of reference	Theory gleaning
24. How have issues in telehealth service implementations been resolved?	Is there conflict? How is it overcome? (Mechanism)	Theory gleaning
25. Do you think telehealth technologies are useful in health service delivery?	Fishing to see what is really different.	Theory gleaning
26. My thinking at the moment is that key to telehealth interventions is: • *personal, organisational and professional thinking* • *relationships between people and organisations in the course of a telehealth intervention?* • *Do risk acceptance and trust act as mechanisms for resolving conflicts (contradictions)* • *Design, implementation and evaluation codes as mechanisms for resolving conflict (contradictions) and mitigating risks*	Introducing researchers theories. Flagging that the views of the participant(s) on my theories are important to me.	*Relationship building*
27. Do you think that telehealth services are going to expand and fit in with current service provision, and to what extent could they replace face to face services?	Are there potential power struggles?	Theory refinement
28. Where have you seen (within a service, or the health system, or support services) the most serious disagreements over telehealth occur	Checking for contradictions and which ones are important	Theory refinement

TOPIC	LOGIC	PHASE
29. In (specify) the telehealth service you are closest to what risks were envisaged and how were they managed? Elaborate.	Looking for resolution of contradictions and more information on these.	Theory refinement
30. When providing, managing or operating telehealth services who or what roles do you have to rely on most?	Where are the key tensions located?	Theory refinement
31. Are good communications and relationships important to running telehealth services? Can you provide examples?	How do people deal with new techniques and processes?	Theory refinement
32. Have codes, protocols or guidelines been adapted or created to protect, support or enhance telehealth services.	What are the manifestations of sociotechnical codes?	Theory refinement
33. Where have you found agreements, codes, protocols or guidelines of value to existing health services, telehealth or new services.	Have or do sociotechnical codes become stabilised?	Theory refinement
34. Looking at some of how a telehealth service evolves do you think this model is a reasonable representation? Discuss points of agreement or disagreement	Sharing of a more formal model or theory about telehealth interventions pathways	Relationship building
35. Looking at (a specific telehealth service) what action or resource could, would or would have made a difference to its operation?	Looking under the bonnet for hidden mechanisms	Theory consolidation
36. Do disagreements over telehealth service provision still exist / continue / changed / ceased / similar to non-telehealth services? Describe, elaborate.	Is telehealth all smiles? Trying to dig into possible contradictions, who is involved and how they are resolved.	Theory consolidation
37. Now telehealth services have been operating for some time are they seen as routine, or still perceived as risky? Why?	Have perceptions changed, and through what mechanisms	Theory consolidation
38. Have the levels of trust between different players in (the) telehealth service provision changed? In what way? Specify? Or not important?	Checking for a mechanism. Is the mechanism still active?	Theory consolidation
39. Who are the key stakeholders (in terms of roles) that need to come together to make telehealth services viable?	Looking for relationships	Theory consolidation
40. What sorts of agreements, understandings, protocols or guidelines have you found most valuable to getting telehealth services accepted? Between who (roles) do these exist?	Are certain relationships needed to to solidify certain codes?	Theory consolidation
41. Have any telehealth services (or the service) been formally (or informally) evaluated? What were / are the conclusions? Is evaluation useful?	Does anyone care? Who? Why? What happens next?	Theory consolidation
42. Is (the) telehealth service(s) still thought to be valuable to healthcare? Why?	Is a telehealth service any different to other forms of service?	Theory consolidation
43. Which telehealth services (or specific telehealth services) will possibly expand? Why?	Is there a key mechanism(s) at work?	Theory consolidation
44. Are future technologies likely to make telehealth any easier? Why?	Is the technique important or other contexts.	Big picture theory
45. How would you change the technology parts of telehealth services? Why? Or is the way telehealth is implemented more relevant?	Looking for the social in the technical?	Big picture theory

TOPIC	LOGIC	PHASE
46. Wrap up and sharing of conclusions if possible	Expression of thanks to participant	*Close*

Observation of professional activity

The same four research questions inform the observation of telehealth services in the proposed research settings: The intent of possible observations of professional activity is to gain a greater understanding of what is working, for whom and how. The aim of observations will be to:

- understand the personal, organisational and professional sociotechnical frames of the telehealth activity;
- gather evidence of how and if the relationships between people and organisations influence the telehealth activity;
- assess the importance or otherwise of risk acceptance and trust in supporting the telehealth activity; and
- look for evidence that design, implementation and evaluation codes play a role in telehealth activities.

Observation of direct interactions between clinical staff and patients is not required and information relating to a patient will not be gathered. Based on these aims an initial topic guide for observation of professional activity is provided below. Typical situations could be observations taken during a tour of facilities, informal conversations with technicians, team meetings or seminars. As investigation proceeds the guide will be refined and adapted.

Table A2.

Topic Guide for Realist Information Gathering – Observation of Professional Activity

TOPIC	LOGIC	PHASE
1. Record context, place, situation, general activity? E.g. Education session, second opinion etc.	Establish context of observation	*Introduction*
2. Who is involved in telehealth activity - patients, family, nurses, primary care doctor, specialists?	*Professional context*	*Introduction*
3. What organisations are involved in the activity? E.g. hospital, clinic.	*Organisational context*	*Introduction*
4. How long has this activity or service been running?	*Organisational context*	*Introduction*
5. What type of technology is being used - asynchronous / synchronous, messaging-information systems/video	*Technology context*	*Introduction*
6. What do people say about how a telehealth technology has changed their work practice? E.g. Checking medications is easier.	*Practice context*	Theory gleaning
7. Why are these organisations involved in the activity? E.g. Need greater efficiency, improve access.	*Organisational context*	Theory gleaning
8. What are the scheduling processes used? E.g Booking times, equipment, people	Understanding what works - Process	Theory gleaning
9. What are the payment related processes used? E.g. who pays for specialist time?	Understanding what works - Process	Theory gleaning
10. What sorts of issues arise with any processes that is observed?	Understanding what works - Process	Theory gleaning

TOPIC	LOGIC	PHASE
11. What are the most important roles in the activity? Why? E.g. does the specialist drive the activity, or the nurse organise everything	Understanding relationships	Theory refinement
12. Is there evidence that people worry about some unresolved problems with others? Describe.	Understanding relationships	Theory refinement
13. Is there evidence of disagreements? E.g. Are there different ways of running an activity depending on who is involved?	Understanding conflict	Theory refinement
14. Who resolves differences? E.g. Are attempts made to standardise procedures, applications etc?	Understanding conflict	Theory refinement
15. What issues are observed with the quality of the technology	Understanding risks	Theory refinement
16. Who feels comfortable with the technology? Why? E.g. Do doctors like the activity?	Understanding risks	Theory refinement
17. Is the observed telehealth activity rated as being as effective an alternative face to face activity? E.g Is the tea room conversation positive?	Looking for fit with prevalent practice	Theory consolidation
18. How easy do participants in the observation feel telehealth technology is to use compared with an alternative face to face activity? E.g. Are many patients subsequently seen face to face, why?	Looking for fit with prevalent practice	Theory consolidation
19. Has technology made a difference to clinical practice? E.g. What is said about how we used to do it?	Looking for changes to context	Theory consolidation
- Found problem that would have gone unrecognised		Theory consolidation
- Resolved a problem faster E.g. appointment made with specialist.		Theory consolidation
- Provided advice or reassurance to others - who? - E.g. Training provided to remote nurse.		Theory consolidation
20. What procedures, codes, guidelines are applied during the observed activity? E.g. look for posters, reference to procedure books etc.	Understanding role of codes	Theory consolidation

REFERENCES

Creswell, J. (2013). Qualitative inquiry & research design: choosing among five approaches (3rd ed.). Thousand Oaks, California: Sage Publications, Inc.

Manzano, A. (2016). The craft of interviewing in realist evaluation. Evaluation, 1356389016638615. https://doi.org/10.1177/1356389016638615

Mark, M.M., Henry, G.T. and Julnes, G. (1999). Toward an integrative framework for evaluation practice.
American Journal of Evaluation 20: 177–98.

Maxwell, J. (2012). A Realist Approach for Qualitative Research. Retrieved March 17, 2017, from https://d1pbog36rugm0t.cloudfront.net/-/media/ualberta/faculties-and-programs/centres-institutes/international-institute-of-qualitative-methods/webinars/master-class/2017/joseph-a-maxwell-realism-in-qualitative-inquiry.mp4

Pawson, R. (2006). Evidence-based policy: a realist perspective. London ; Thousand Oaks: SAGE Publications.

Pawson, R. (2013). The science of evaluation: a realist manifesto. London: SAGE.

Pawson, R., & Tilley, N. (1997). Realistic evaluation. London ; Thousand Oaks, Calif.: Sage.

Pawson, R., & Tilley, N. (2004). Realist Evaluation. Retrieved from http://www.communitymatters.com.au/RE_chapter.pdf

Wikipedia. (2017, April 24). Mental model. In Wikipedia. Retrieved from https://en.wikipedia.org/w/index.php?title=Mental_model&oldid=777015218

APPENDIX E. INTERVIEW GUIDE IN BRAZIL

Sustentabilidade dos Serviços de Telessaúde - Guia de Entrevista - versão 1,4

1. Entrevista Notas

Os participantes serão lembrados de que o objetivo da entrevista é o de reunir dados e opiniões sobre:

- Como pessoas, profissionais e organizações influenciam no contexto do desenvolvimento de serviços de telessaúde?
- A importância dos relacionamentos entre as pessoas e as organizações no decurso de uma intervenção telessaúde?
- Risco de não aceitação e confiança atuam como mecanismos de resolução de conflitos durante o desenvolvimento de serviços?
- Qual a importância das regras, implementações, avaliações.?

Os participantes serão perguntados se aceitam e desejam continuar com a entrevista e lembrados que eles podem se retirar a qualquer momento.

Aos participantes será assegurada a confidencialidade das informações fornecidas.

Os participantes serão convidados a assinar um Termo de Consentimento Livre e Esclarecido.

Os participantes serão questionados se gostariam de ter algum feedback

Os participantes serão questionados se eles têm quaisquer documentos relevantes que podem fornecer ao pesquisador

2. Guia de tópicos

2.1 Perguntas iniciais

a) Você pode, por favor, me contar um pouco sobre o seu papel e responsabilidades na organização?

b) O que a telessaúde significa para você?

c) Que tipo de iniciativa em Telessaúde você desenvolve ou está associado?

2.2 Inquérito

a) Quais problemas (profissionais, clínicos, tecnológicos, outros) você já encontrou em seu trabalho com a Telessaúde?

b) (Especificar) Nos serviços de telessaúde que você foi envolvido, que riscos foram previstos, como foram administrados e por quem?

c) Que tipo de códigos, protocolos, diretrizes, regras informais ou gestão de riscos têm sido úteis no desenvolvimento de serviços de telessaúde? *Por quê?*

2.3 Mecanismos

a) Olhando (um determinado serviço de telessaúde) qual a ação ou recurso poderia, ou pode fazer a diferença para o seu funcionamento?

b) Agora, os serviços de telessaúde têm sido praticados por algum tempo, eles são vistos como rotina, ou percebido como arriscado? *Por quê?*

c) Quão importante foi a cooperação entre diferentes papéis, pessoas ou organizações em apoiar a prestação de serviços de saúde usando tecnologias de telessaúde? *De que forma? Entre quem?*

d) Quando a telessaúde é desenvolvida, práticas profissionais, funções e interações mudam?

e) Que tipos de contratos, acordos, protocolos ou diretrizes você percebeu como valioso na criação de serviços de telemedicina / telessaúde? *Quem esteve envolvido na criação deles?*

(Usada mais na assistência).

a) Quais são as diferenças entre os cuidados de saúde que utiliza os serviços de telemedicina/telessaúde e de outras formas de cuidados de saúde? *Os serviços de telessaúde são diferentes por que?*

2.4 Conclusão

Você tem algum outro comentário? Você estaria disposto a ser contatado novamente? *Muito obrigado!*

APPENDIX F. PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

School of Health Sciences, Public Health

Flinders University

GPO Box 2100

Adelaide SA 5001

(Interviews)

Health/Social Science Research - *Adult providing own consent*

Title	*Sustainable Telehealth Services*
Protocol Number	*113.17*
Project Sponsor	*Flinders University, South Australia*
Principal Investigator	*Alan Taylor BSC, MSC, CEng, MIET, RPEng (IT&T). Research Higher Degree Student.*
Supervisor	*Professor Paul Ward*
Location	*South Australia / Queensland / Brazil ~~(option)~~*

Part 1 What does my participation involve?

Introduction

You are invited to take part in this research project, which is called Sustainable Telehealth Services because you are or have been:

- Employed by a health service, government or professional body associated with the delivery of telehealth services.
- Working in managerial, specialist, medical, nursing, allied health, logistical and information technology roles associated with the delivery of telehealth services.
- In a professional role it is assumed that you have a certain level of understanding of how a telehealth service is promoted, managed or delivered.

The Researcher obtained your contact details through a recommendation or your publically available research and professional profiles. This Participant Information Statement/Consent Form tells you about the research project. It explains the processes involved with taking part. Knowing what is involved will help you decide if you want to take part in the research.

Please read this information carefully. Ask questions about anything that you don't understand or want to know more about. Participation in this research is voluntary. If you don't wish to take part, you don't have to.

If you decide you want to take part in the research project, you will be asked to sign the consent section. By signing it you are telling us that you:

- Understand what you have read
- Consent to take part in the research project
- Consent to be involved in the research described
- Consent to the use of your personal and health information as described.

You will be given a copy of this Participant Information and Consent Form to keep.

2 What is the purpose of this research?

This study is part of the study entitled '*Sustainable Telehealth Services'.* This study will investigate how telehealth services develop in different organisations.

This research in several settings is part of a larger study that proposes to examine the sustainability of telehealth services and how telehealth services develop in different organisations. This research recognises that social and ~~the~~ technical matters that influence telehealth services are related. Because personal and organisational contexts influence the social and technical nature of telehealth interventions this research will be examine and compare different telehealth services operating in different jurisdictions.

This research seeks to learn from participants in this research what they think *'works for whom in what circumstances'* for telehealth services based on their experiences and knowledge.

The researcher will specifically discuss some ideas about how telehealth services work in different situations, and seek to understand what disagreements occur, what risks are considered and how these may get resolved. Telehealth is a complex puzzle. The researcher would like to understand which parts of the puzzle you think are important.

In particular there may be explicit and implicit practices, ideas and assumptions, built into current means of healthcare delivery and the telehealth technologies themselves that may influence how telehealth services are or are not adopted over time.

The results of this research will be used by the researcher; Alan Taylor to obtain a PhD in Public Health degree and has been initiated by the researcher, Alan Taylor. This research is supported by Flinders University School of Health Sciences, Public Health and is not in receipt of any other support or funds.

3 What does participation in this research involve?

The researcher will confirm that you are able to participate in this study. You will then be invited to attend a one-on-one interview in or close to your place of work or private business, or by telephone or video conference at a date and time that is convenient to you and your employer.

If you request to participate in this research in a personal capacity, you should agree a time and date for the interview that is both is convenient to you and does not impact any other commitments such as employment.

Following your consent to participate, the researcher who will discuss with you what you think 'works for whom in what circumstances' for telehealth service provision based on your experiences and knowledge. The researcher will also suggest some topics for discussion with you and ask for your views on the researchers ideas.

The researcher will also seek your assistance to provide any documents that will be helpful to the discussion, particularly guides, codes of practice, regulations, protocols or instructions. These documents will be treated as in confidence unless otherwise agreed with you.

The interview will take between 30 and 60 minutes. The interview will be recorded using a digital audio recorder to help with analysing your experiences and suggestions. Once recorded, the interview will be transcribed (typed-up) and stored as a secured computer file. At a later stage clarifications may be sought via email or a short second interview of up to 30 minutes

This research project has been designed to make sure the researchers interpret the results in a fair and appropriate way.

There are no costs associated with participating in this research project, nor will you be paid.

4 Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage.

If you do decide to take part, you will be given this Information Statement and Consent Form to sign and you will be given a copy to keep. Please return the signed consent form by email to Content removed for privacy reasons.

If there is any existing or foreseeable future professional relationship between a participant and the researcher this relationship with the researcher or Flinders University will not be influenced by choosing to participate or not participate.

5 What are the possible benefits of taking part?

We cannot guarantee or promise that you will receive any benefits from this research, however the sharing of your experiences will assist in the improvement of the planning and delivery of telehealth programs.

This research may make a contribution to how telehealth interventions are viewed and implemented within the health sector by explaining why some telehealth services are failing to develop into larger scale deployments.

Understanding how telehealth interventions do or do not become sustainable, or indeed whether the concept of sustainability is a useful one in this context is important for healthcare organisations and those who work in telehealth service provision.

This research hopes to contribute a broader perspective on these issues which may lead to the adoption of improved strategies for the implementation of telehealth services.

6 What are the possible risks and disadvantages of taking part?

The researcher anticipates few risks from your involvement in this study. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher or the researcher’s supervisor whose contact details are listed above.

The time required for an interview will be between 30 mins to 60 mins to minimise disruption to your work. Subsequently clarifications may be sought via email or a short second interview of up to 30 minutes.

If you feel that some of the questions asked are stressful or upsetting or if you do not wish to answer a question, you may skip it and go to the next question, or you may stop immediately.

7 What if I withdraw from this research project?

If you do consent to participate, you may withdraw at any time. If you decide to withdraw from the project, please notify the researcher before you withdraw. If you do withdraw, you will be asked to complete and sign a ‘Withdrawal of Consent’ form. The researcher will provide this form to you.

If you decide to leave the research project, the researchers will not collect additional personal information from you, although personal information already collected will be retained to ensure that the results of the research project can be measured properly and to comply with law.

You should be aware that data collected up to the time you withdraw will form part of the research project results. If you do not want your data to be included, you must tell the researchers when you withdraw from the research project.

8 Could this research project be stopped unexpectedly?

This research project may be stopped unexpectedly for a variety of reasons. These may include illness or other unforeseen circumstances.

9 What happens when the research project ends?

On completion of the research, outcomes of the study will be provided to all participants via email. Completion of the research is expected in 2019.

Part 2 How is the research project being conducted?

10 What will happen to information about me?

No personal information about you will be collected apart from your name and profession. No identifying information will be attached to the audio recording file. All information will be stored in password protected computer and data storage that only the researcher will have access to.

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such a way that you cannot be identified.

In accordance with relevant Australian privacy and other relevant laws, you have the right to request access to the information about you that is collected and stored by the research team. You also have the right to request that any information with which you disagree be corrected. Please inform the research team member named at the end of this document if you would like to access your information.

11 Complaints and compensation

If you suffer any injuries or complications as a result of this research project, you should contact the study team as soon as possible and you will be assisted with arranging appropriate medical treatment. If you are eligible for Medicare, you can receive any medical treatment required to treat the injury or complication, free of charge, as a public patient in any Australian public hospital.

12 Who is organising and funding the research?

This research project is being conducted by Alan Taylor, a Research Higher Degree student from Flinders University, South Australia which is supporting this research. You will not benefit financially from your involvement in this research. The researcher will not receive a personal financial benefit from your involvement in this research project (other than their ordinary wages).

13 Who has reviewed the research project?

All research in Australia involving humans is reviewed by an independent group of people called a Human Research Ethics Committee (HREC). The ethical aspects of this research project have been approved by the Southern Adelaide Clinical Research Ethics Committee (EC00188).

This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007). This statement has been developed to protect the interests of people.

14 Further information and who to contact

The person you may need to contact will depend on the nature of your query. If you want any further information concerning this project or if you have any problems which may be related to your involvement in the project, you can contact the researcher on +61412032576 or any of the following people:

Researcher

Name	Alan Taylor
Position	Research Higher Degree Student and Associate Lecturer, Flinders University
Telephone	Content removed for privacy reasons
Email	Content removed for privacy reasons

Research Supervisor

Name	Professor Paul Ward
Position	Head of Public Health, School of Health Sciences, Flinders University
Telephone	Content removed for privacy reasons
Email	Content removed for privacy reasons

For matters relating to research at the site at which you are participating, the details of the local site complaints person are:

Complaints contact person

Name	Villis Marshall
Position	Director, Office for Research
Telephone	Content removed for privacy reasons
Email	Content removed for privacy reasons

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Reviewing HREC approving this research and HREC Executive Officer details

Reviewing HREC name	Southern Adelaide Clinical
Position	Executive Officer
Telephone	Content removed for privacy reasons
Email	Content removed for privacy reasons

Consent Form for Interviews - *Adult providing own consent*

Title	*Sustainable Telehealth Services*
Protocol Number	*113.17*
Project Sponsor	*Flinders University, South Australia*
Principal Investigator	*Alan Taylor*
Supervisor	*Professor Paul Ward*
Location (please complete)	~~…………………………….~~
Medium used	~~*Face to face / Telephone / Video conference*~~

Declaration by Participant

1. I have read the information provided for participants in the Letter / Email of Introduction and Information Statement in a language that I understand.
2. I have had an opportunity to ask questions and I am satisfied with the answers I have received.
3. I understand the purposes and procedures to be used in the research project.
4. I agree to audio recording of my information and participation.
4. I am aware that I should retain a copy of the Information Sheet and Consent Form for future reference.
5. I understand that:

    - I may not directly benefit from taking part in this research project as described.
    - I am free to withdraw from the project at any time and am free to decline to answer particular questions.
    - While the information gained in this study will be published as explained, I will not be identified, and individual information will remain confidential.
    - I may ask that the interview be stopped at any time, and that I may withdraw at any time from an interview or the research without disadvantage.

7. I understand that either the researcher or I may request clarification of the information I provided at any time following the interview.

6. The following documents (if any) that I have provided to the researcher are listed on the reverse of this consent form.

Name of Participant (please print) ______________________________

Signature ______________________ Date ______________________

Declaration by Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Researcher† (please print) ______________________	
Signature ______________________	Date ______________________

Note: All parties signing the consent section must date their own signature. *NB: Two signed copies should be obtained.*

<u>Documents provided to the researcher by the participant</u>

Brief document name	**Conditions of confidentiality**
	May be referred to without quoting / For information only, may not be directly referred to.
	May be referred to without quoting / For information only, may not be directly referred to.
	May be referred to without quoting / For information only, may not be directly referred to.
	May be referred to without quoting / For information only, may not be directly referred to.
	May be referred to without quoting / For information only, may not be directly referred to.
	May be referred to without quoting / For information only, may not be directly referred to.
	May be referred to without quoting / For information only, may not be directly referred to.

Form for Withdrawal of Participation - *Adult providing own consent*

Title	*Sustainable Telehealth Services*
Protocol Number	*113.17*
Project Sponsor	*Flinders University, South Australia*
Principal Investigator	*Alan Taylor*
Supervisor	*Professor Paul Ward*
Location (please complete)	………………………………….

You should be aware that data collected up to the time you withdraw will form part of the research study results. If you do not want your data to be included, you must tell the researchers when you withdraw from the research study.

Declaration by Participant

I wish to withdraw from participation in the above research project and understand that such withdrawal will not affect my routine care, or my relationships with the researchers or Flinders University.

Name of Participant (please print) ______________________________

Signature ______________________ Date ______________________

In the event that the participant's decision to withdraw is communicated verbally, the Researcher must provide a description of the circumstances below.

Declaration by Researcher†

I have given a verbal explanation of the implications of withdrawal from the research project and I believe that the participant has understood that explanation.

Name of Researcher (please print) ______________________________

Signature ______________________ Date ______________________

Note: All parties signing the consent section must date their own signature.

APPENDIX G. PARTICIPANT CONSENT IN BRAZIL

UNIVERSIDADE FEDERAL DE SANTA CATARINA

CENTRO DE CIÊNCIAS DA SAÚDE

DEPARTAMENTO DE PATOLOGIA

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Prezado(a) Senhor(a)

Você está sendo convidado(a) a participar de uma pesquisa que tem por objetivo avaliar se o portal para registro de dados, avaliação de exames (clínico e/ou radiológico e/ou histopatológico) e segunda opinião de diagnóstico de lesões bucais está construído de forma fácil e compreensível para você, usuário, na realização de tarefas específicas. O estudo faz parte do projeto *"Implementação e avaliação de ferramentas de telessuporte ao estabelecimento de uma rede de atenção ao paciente portador de lesões bucais",* coordenado pela Profa. Maria Inês Meurer, do Departamento de Patologia. A sua participação envolve responder a um questionário sobre a qualidade do sistema.

Você não será diretamente beneficiado(a) por esta pesquisa. Acreditamos, no entanto, que pode haver benefício à organização do sistema de saúde estadual se os resultados demonstrarem que este novo sistema online tem potencial para qualificar as informações dos documentos de referência à atenção secundária especializada em Estomatologia. Caso haja alguma despesa ou dano relacionados à sua participação na pesquisa (ou seja, relacionados ao preenchimento da ficha *Escala de Usabilidade do Sistema*), ou dela decorrentes, você será ressarcido(a)/indenizado(a) nos termos da legislação vigente.

A sua participação poderá lhe expor a riscos como desconforto pelo tempo gasto na coleta dos dados e estresse pelas dúvidas que você pode ter em relação aos conhecimentos solicitados. É importante que fique claro que não serão colhidas informações que permitam a sua identificação. Os dados utilizados nesta pesquisa serão guardados sob os cuidados da Profa. Dra. Maria Inês Meurer, com sigilo quanto à sua identidade; entretanto, sempre existe a remota possibilidade de quebra de sigilo, ainda que involuntária e não intencional, cujas consequências serão tratadas nos termos da lei.

Você poderá entrar em contato com a Profa. Dra. Maria Inês Meurer na sala 13 do Centro de Ciências da Saúde da Universidade Federal de Santa Catarina (UFSC), através do telefone (48) 3721-9492 ou pelo e-mail: (...............), caso tenha alguma dúvida sobre assuntos relacionados à pesquisa. Você também poderá entrar em contato com o Comitê de Ética em Pesquisa com Seres Humanos da UFSC pelo telefone (   ), pelo e-mail (__________) ou presencialmente na rua Desembargador Vitor Lima, nº 222, Prédio Reitoria II, 4º andar, sala 401, Trindade, Florianópolis. Você terá a liberdade de desistir da participação nessa pesquisa e retirar seu consentimento a qualquer momento, sem ter que apresentar justificativas e sem qualquer prejuízo, apenas manifestando sua vontade.

Se concordar em participar, de forma livre e espontânea, você deverá assinar a autorização abaixo.

Eu, ____ li este documento (ou tive este documento lido para mim por uma pessoa de confiança), concordo e autorizo a minha participação na pesquisa *"Implementação e avaliação de ferramentas de telessuporte ao estabelecimento de uma rede de atenção ao paciente portador de lesões bucais",* coordenada pela Profa. Maria Inês Meurer, desde que seja mantido o sigilo de minha identificação, conforme normas do Comitê de Ética em Pesquisa com Seres Humanos da Universidade Federal de Santa Catarina. Autorizo, ainda, a utilização dos dados obtidos a partir da pesquisa, sem a minha identificação, para utilização como material didático para aulas, apresentação em eventos científicos ou para publicação de trabalhos em revistas e eventos científicos da área da saúde, nacionais e/ou internacionais.

____________________, ____ de ______________________ de 201___.

(município) *(dia)* *(mês)* *(ano)*

____ __________________________

Assinatura do(a) participante *Documento de Identidade*

____

Profa. Maria Inês Meurer - RG 881.805

Duas vias deste documento estão sendo rubricadas e assinadas por você e pela pesquisadora. Guarde cuidadosamente sua via, pois este é um documento que registra importantes informações de contato e garante seus direitos como participante da pesquisa. A pesquisadora, que também assina este documento, compromete-se a conduzir a pesquisa de acordo com o que preconiza a Resolução 466/12, que trata dos preceitos éticos e de proteção aos participantes em pesquisas.

APPENDIX H. LETTER OR EMAIL OF INTRODUCTION

Content removed for privacy reasons

APPENDIX I. LETTER OR EMAIL OF INTRODUCTION IN BRAZIL

UNIVERSIDADE FEDERAL DE SANTA CATARINA

CENTRO DE CIÊNCIAS DA SAÚDE

DEPARTAMENTO DE PATOLOGIA

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Prezado(a) Senhor(a)

Você está sendo convidado(a) a participar de uma pesquisa que tem por objetivo avaliar se o portal para registro de dados, avaliação de exames (clínico e/ou radiológico e/ou histopatológico) e segunda opinião de diagnóstico de lesões bucais está construído de forma fácil e compreensível para você, usuário, na realização de tarefas específicas. O estudo faz parte do projeto *"Implementação e avaliação de ferramentas de telessuporte ao estabelecimento de uma rede de atenção ao paciente portador de lesões bucais",* coordenado pela Profa. Maria Inês Meurer, do Departamento de Patologia. A sua participação envolve responder a um questionário sobre a qualidade do sistema.

Você não será diretamente beneficiado(a) por esta pesquisa. Acreditamos, no entanto, que pode haver benefício à organização do sistema de saúde estadual se os resultados demonstrarem que este novo sistema online tem potencial para qualificar as informações dos documentos de referência à atenção secundária especializada em Estomatologia. Caso haja alguma despesa ou dano relacionados à sua participação na pesquisa (ou seja, relacionados ao preenchimento da ficha *Escala de Usabilidade do Sistema*), ou dela decorrentes, você será ressarcido(a)/indenizado(a) nos termos da legislação vigente.

A sua participação poderá lhe expor a riscos como desconforto pelo tempo gasto na coleta dos dados e estresse pelas dúvidas que você pode ter em relação aos conhecimentos solicitados. É importante que fique claro que não serão colhidas informações que permitam a sua identificação. Os dados utilizados nesta pesquisa serão guardados sob os cuidados da Profa. Dra. Maria Inês Meurer, com sigilo quanto à sua identidade; entretanto, sempre existe a remota possibilidade de quebra de sigilo, ainda que involuntária e não intencional, cujas consequências serão tratadas nos termos da lei.

Você poderá entrar em contato com a Profa. Dra. Maria Inês Meurer na sala 13 do Centro de Ciências da Saúde da Universidade Federal de Santa Catarina (UFSC), através do telefone (   ) ou pelo e-mail: (   ), caso tenha alguma dúvida sobre assuntos relacionados à pesquisa. Você também poderá entrar em contato com o Comitê de Ética em Pesquisa com Seres Humanos da UFSC pelo telefone (   ), pelo e-mail (   )ou presencialmente na rua Desembargador Vitor Lima, nº 222, Prédio Reitoria II, 4º andar, sala 401, Trindade, Florianópolis. Você terá a liberdade de desistir da participação nessa pesquisa e retirar seu consentimento a qualquer momento, sem ter que apresentar justificativas e sem qualquer prejuízo, apenas manifestando sua vontade.

Se concordar em participar, de forma livre e espontânea, você deverá assinar a autorização abaixo.

Eu, ____ li este documento (ou tive este documento lido para mim por uma pessoa de confiança), concordo e autorizo a minha participação na pesquisa *"Implementação e avaliação de ferramentas de telessuporte ao estabelecimento de uma rede de atenção ao paciente portador de lesões bucais",* coordenada pela Profa. Maria Inês Meurer, desde que seja mantido o sigilo de minha identificação, conforme normas do Comitê de Ética em Pesquisa com Seres Humanos da Universidade Federal de Santa Catarina. Autorizo, ainda, a utilização dos dados obtidos a partir da pesquisa, sem a minha identificação, para utilização como material didático para aulas, apresentação em eventos científicos ou para publicação de trabalhos em revistas e eventos científicos da área da saúde, nacionais e/ou internacionais.

____________________, ____ de ______________________ de 201___.

(município) *(dia)* *(mês)* *(ano)*

____ ___________________________

Assinatura do(a) participante *Documento de Identidade*

____

Profa. Maria Inês Meurer - RG 881.805

Duas vias deste documento estão sendo rubricadas e assinadas por você e pela pesquisadora. Guarde cuidadosamente sua via, pois este é um documento que registra importantes informações de contato e garante seus direitos como participante da pesquisa. A pesquisadora, que também assina este documento, compromete-se a conduzir a pesquisa de acordo com o que preconiza a Resolução 466/12, que trata dos preceitos éticos e de proteção aos participantes em pesquisas.

APPENDIX J. ETHICS APPROVAL, SOUTHERN ADELAIDE LOCAL HOSPITAL NETWORK

Office for Research
Flinders Medical Centre
Ward 6C, Room 6A219
Flinders Drive, Bedford Park SA 5042
Tel: (08) 8204 6453
E: Health.SALHNOfficeforResearch@sa.gov.au

Government of South Australia
SA Health
Southern Adelaide Local Health Network

Amendment: Ethics Approval

27 December 2017

Alan Taylor
alan.taylor@flinders.edu.au

Dear Alan Taylor

OFR Number:	113.17
HREC reference number:	HREC/17/SAC/196
Project title:	Sustainable Telehealth Services
Chief Investigator:	Alan Taylor

Ethics and Governance Approval Period: 11 July 2017 to 11 July 2020

The Southern Adelaide Clinical Human Research Ethics Committee (SAC HREC EC00188) has reviewed and provided ethics approval for this amendment which appears to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007).*

This amendment approval does not alter the current SAC HREC approval period.

Public health sites approved under this Ethics amendment application:

- Southern Adelaide Local Health Network
- Northern Adelaide Local Health Network
- Central Adelaide Local Health Network
- Country Health SA Local Health Network
- Plus South Australia Health management and infrastructure provision functions if not included in the above LHN's

Interstate public health sites:

- Central Queensland Hospital and Health Service
- Children's Health Queensland Hospital and Health Service
- Darling Downs Hospital and Health Service
- Mackay Hospital and Health Service
- Metro North Hospital and Health Service
- Metro South Hospital and Health Service
- North West Hospital and Health Service
- Townsville Hospital and Health Service
- Wide Bay Hospital and Health Service
- Retrieval Services Queensland
- Plus Queensland Health management and infrastructure provision functions if not included in the above Hospital and Health Services

The below documents have been reviewed and approved by the SAC HREC:

- Participant Information Statement and Consent Form v4 06/11/2017
- Project Amendment Form dated 06/11/2017
- Qualitative Research Application Form v4 06/11/2017

TERMS AND CONDITIONS OF ETHICS APPROVAL
As part of the Institution's responsibilities in monitoring research and complying with audit requirements, it is essential that researchers adhere to the conditions below and with the *National Statement Chapter 5.5.*

Final ethics approval is granted subject to the researcher agreeing to meet the following terms and conditions:

1. The approval covers the ethics component of the application. Please submit a copy of the approved amendment to the local RGO for acknowledgement
2. If University personnel are involved in this project, the Principal Investigator should notify the University before commencing their research to ensure compliance with University requirements including any insurance and indemnification requirements.
3. Compliance with the *National Statement on Ethical Conduct in Human Research* (2007) & the *Australian Code for the Responsible Conduct of Research* (2007).
4. To immediately report to SAC HREC anything that may change the ethics or scientific integrity of the project.
5. Report Significant Adverse events (SAE's) as per SAE requirements available at our website.
6. Submit an annual report on each anniversary of the date of final approval and in the correct template from the SAC HREC website.
7. Confidentiality of research participants MUST be maintained at all times.
8. A copy of the signed consent form must be given to the participant unless the project is an audit.
9. Any reports or publications derived from the research should be submitted to the Committee at the completion of the project.
10. All requests for access to medical records at any SALHN site must be accompanied by this approval email.
11. To regularly review the SAC HREC website and comply with all submission requirements, as they change from time to time.
12. Once your research project has concluded, any new product/procedure/intervention cannot be conducted in the SALHN as standard practice without the approval of the SALHN New Medical Products and Standardisation Committee or the SALHN New Health Technology and Clinical Practice Innovation Committee (as applicable) Please refer to the relevant committee link on the SALHN intranet for further information.
13. Researchers are reminded that all advertisements/flyers need to be approved by the committee, and that no promotion of a study can commence until final ethics and executive approval has been obtained. In addition, all media contact should be coordinated through the FMC media unit.

For any queries about this matter, please contact the Office for Research on (08) 8204 7433 or via email to Health.SALHNOfficeforResearch@sa.gov.au.

Yours sincerely

A/Professor Bernadette Richards
Chair, SAC HREC

APPENDIX K. ETHICS APPROVAL, BOLTON CLARKE

Bolton Clarke Human Research Ethics Committee

Human Ethics Approval Certificate

NHMRC Registered Committee Number EC00349

Date of issue: 01 March 2018 (supersedes all previously issued certificates)

Dear Alan

A Human Research Ethics Committee (HREC) should clearly communicate its decisions about a research proposal to the researcher and the final decision to approve or reject a proposal should be communicated to the researcher in writing. This Approval Certificate serves as your written notice that the proposal has met the requirements of the *National Statement on Ethical Conduct in Human Research* and has been approved on that basis. You are therefore authorised to commence activities as outlined in your proposal application, subject to any specific and standard conditions detailed in this document.

Within this Approval Certificate are:

- Project details
- Participant details
- Conditions of Approval (specific and standard)

Researchers should report to the Bolton Clarke HREC, via the Bolton Clarke HREC Chair, events that might affect continued ethical acceptability of the project, including, but not limited to:

- serious or unexpected adverse effects on participants,
- proposed significant changes in the conduct, the participant profile or the risks of the proposed research, and
- unforeseen events that might affect continued ethical acceptability of the project.

Further information regarding your ongoing obligations regarding human based research can be found via the Bolton Clarke website http://www.boltonclarke.com.au/research/research-ethics or by contacting the HREC Secretariat on 03 9536 5236 or ethics@boltonclarke.com.au

If any details within this Approval Certificate are incorrect please advise the HREC Secretariat within 10 days of receipt of this certificate.

PROJECT DETAILS

Approved From:	01/03/2018	**Approved Until:**	01/03/2019 (subject to 6 monthly reports to Bolton Clarke HREC)
Approval Number:	170010		
Project Title:	Sustainable Telehealth Services		
Project No:	192		
Project Summary:	Health workers associated with telehealth services will be interviewed about the sustainability of telehealth services. The intention of the research is to understand the conditions for innovation of telehealth services and how telehealth services develop in different settings by understanding the influence of the wider social and technical environment on telehealth services		

INVESTIGATOR DETAILS

Chief Investigator: Alan Taylor, Research Higher Degree Student and Associate Lecturer, Flinders University

Other Researchers:

Name	**Affiliation**	**Role**
Professor Paul Ward	Flinders University	Supervisor
Professor Anthony Maeder	Flinders University	Supervisor
Professor Colin Carati	Flinders University	Supervisor
Dr Liz Cyarto	Bolton Clarke	Adviser

PARTICIPANT DETAILS

Participants:
Bolton Clarke staff/managers.

CONDITIONS OF APPROVAL

Specific Conditions of Approval:
Nil

Standard Conditions of Approval:
The standard conditions of approval require the research team to:

1. Conduct the project in accordance with the Bolton Clarke Guidelines for Researchers Seeking Ethics Approval for Research Projects and the provisions of any relevant State/Territory or Commonwealth regulations or legislation.
2. Include in participant information a Withdraw without prejudice clause.
3. Respond to the requests and instructions of the Bolton Clarke Human Research Ethics Committee (HREC).
4. Advise the Bolton Clarke HREC Chair immediately if any complaints are made or expressions of concern are raised in relation to the project.
5. Suspend or modify the project if the risks to participants are found to be disproportionate to the benefits and immediately advise the Bolton Clarke Bolton Clarke Chair of this action.
6. Stop any involvement of any participant if continuation of the research may be harmful to that person and immediately advise the Bolton Clarke HREC Chair of this action.
7. Advise the Bolton Clarke HREC Chair of any unforeseen development or events that might affect the continued ethical acceptability of the project.
8. Notify the Bolton Clarke HREC if a decision is taken to end the study prior to the expected date of completion or failure to commence the study within 12 months of the HREC approval date.
9. Provide a report on the progress of the approved project every 12 months, from the date of approval for the duration of the project, or at intervals determined by the Committee. Template available on Bolton Clarke website at http://www.boltonclarke.com.au/research/research-ethics/
10. Upon completion of the project, provide a final report. Template available on Bolton Clarke website at http://www.boltonclarke.com.au/research/research-ethics/
11. (Where the research is publicly or privately funded) publish the results of the project in such a way to permit scrutiny and contribute to public knowledge.
12. Ensure that the results of the research are made available to participants.

Modifying your Ethical Clearance:
Requests for variations must be made in writing to the Bolton Clarke HREC Chair. Major changes, depending upon the nature of your request, may require submission of a new application.

APPENDIX L. ETHICS APPROVAL, PLATAFORMA BRASIL

Saúde
Ministério da Saúde

principal sair

Público | Pesquisador | Alterar Meus Dados

Alan Taylor - Pesquisador | V3.2

Cadastros

DETALHAR PROJETO DE PESQUISA

DADOS DA VERSÃO DO PROJETO DE PESQUISA

Título da Pesquisa: Sustentabilidade de serviços de telessaúde
Pesquisador Responsável: Alan Taylor
Área Temática:
Versão: 1
CAAE: 80481717.6.1001.0121
Submetido em: 28/11/2017
Instituição Proponente:
Situação da Versão do Projeto: Aprovado
Localização atual da Versão do Projeto: Pesquisador Responsável
Patrocinador Principal: Financiamento Próprio

COORDENADOR

Comprovante de Recepção: PB_COMPROVANTE_RECEPCAO_982011

DOCUMENTOS DO PROJETO DE PESQUISA

- Versão Atual Aprovada (PO) - Versão 1
  - Pendência Documental (PO) - Versão 1
    - Documentos do Projeto
      - Comprovante de Recepção - Submissã
      - Declaração do Patrocinador - Submissã
      - Folha de Rosto - Submissão 2
      - Informações Básicas do Projeto - Subm
      - Orçamento - Submissão 2
      - Outros - Submissão 2
      - Projeto Detalhado / Brochura Investigad
      - TCLE / Termos de Assentimento / Justi
    - Apreciação 2 - Universidade Federal de Sa
- Projeto Completo

Tipo de Documento	Situação	Arquivo	Postagem	Ações

LISTA DE APRECIAÇÕES DO PROJETO

Apreciação	Pesquisador Responsável	Versão	Submissão	Modificação	Situação	Exclusiva do Centro Coord.	Ações
PO	Alan Taylor	1	28/11/2017	26/02/2018	Aprovado	Não	

HISTÓRICO DE TRÂMITES

Apreciação	Data/Hora	Tipo Trâmite	Versão	Perfil	Origem	Destino	Informações
PO	26/02/2018 16:20:09	Parecer liberado	1	Coordenador	Universidade Federal de Santa Catarina - UFSC	PESQUISADOR	
PO	26/02/2018 16:19:43	Parecer do colegiado emitido	1	Coordenador	Universidade Federal de Santa Catarina - UFSC	Universidade Federal de Santa Catarina - UFSC	
PO	25/02/2018 19:12:06	Parecer do relator emitido	1	Membro do CEP	Universidade Federal de Santa Catarina - UFSC	Universidade Federal de Santa Catarina - UFSC	
PO	23/02/2018 17:56:23	Aceitação de Elaboração de Relatoria	1	Membro do CEP	Universidade Federal de Santa Catarina - UFSC	Universidade Federal de Santa Catarina - UFSC	
PO	22/02/2018 23:52:42	Confirmação de Indicação de Relatoria	1	Coordenador	Universidade Federal de Santa Catarina - UFSC	Universidade Federal de Santa Catarina - UFSC	

APPENDIX M. PARTICIPANT ROLES AND COUNTRY

ID	Role, Country	ID	Role, Country	ID	Role, Country	ID	Role, Country
0001-Au	Allied Health, Australia	0037-Au	Support, Australia	0085-Au	Coordinator, Australia	0120-Br	Technologist, Brazil
0002-Au	Physician, Australia	0038-Au	Physician, Australia	0086-Au	Physician, Australia	0121-Br	Researcher, Brazil
0003-Au	Manager, Australia	0039-Au	Physician, Australia	0087-Au	Nurse, Australia	0123-Br	Manager, Brazil
0005-Au	Physician, Australia	0041-Au	Support, Australia	0088-Au	Coordinator, Australia	0124-Br	Coordinator, Brazil
0006-Au	Manager, Australia	0049-Au	Physician, Australia	0089-Au	Coordinator, Australia	0125-Br	Coordinator, Brazil
0007-Au	Physician, Australia	0051-Br	Manager, Brazil	0090-Au	Support, Australia	0126-Br	Coordinator, Brazil
0008-Au	Physician, Australia	0052-Br	Manager, Brazil	0091-Au	Manager, Australia	0127-Br	Manager, Brazil
0009-Au	Physician, Australia	0053-Br	Manager, Brazil	0092-Au	Nurse, Australia	0128-Br	Technologist, Brazil
0010-Au	Physician, Australia	0054-Br	Manager, Brazil	0093-Au	Coordinator, Australia	0129-Br	Physician, Brazil
0011-Au	Physician, Australia	0055-Au	Physician, Australia	0094-Au	Nurse, Australia	0131-Br	Physician, Brazil
0012-Au	Physician, Australia	0056-Au	Physician, Australia	0095-Au	Nurse, Australia	0132-Br	Coordinator, Brazil
0013-Au	Support, Australia	0060-Au	Coordinator, Australia	0096-Au	Nurse, Australia	0133-Br	Coordinator, Brazil
0014-Au	Physician, Australia	0061-Au	Physician, Australia	0097-Au	Physician, Australia	0134-Br	Researcher, Brazil
0015-Au	Nurse, Australia	0062-Au	Physician, Australia	0098-Au	Physician, Australia	0135-Br	Coordinator, Brazil
0016-Au	Physician, Australia	0063-Au	Manager, Australia	0099-Au	Physician, Australia	0136-Br	Manager, Brazil
0017-Au	Physician, Australia	0064-Au	Coordinator, Australia	0100-Au	Physician, Australia	0137-Br	Manager, Brazil
0018-Au	Support, Australia	0065-Au	Researcher, Australia	0101-Au	Manager, Australia	0138-Br	Manager, Brazil
0019-Au	Manager, Australia	0066-Au	Technologist, Australia	0102-Au	Physician, Australia	0139-Br	Other, Brazil
0020-Au	Support, Australia	0068-Au	Physician, Australia	0103-Au	Physician, Australia	0140-Br	Physician, Brazil
0021-Au	Allied Health, Australia	0069-Au	Physician, Australia	0105-Au	Physician, Australia	0141-Br	Physician, Brazil
0022-Au	Specialist, Australia	0070-Au	Coordinator, Australia	0106-Au	Technologist, Australia	0142-Br	Coordinator, Brazil
0023-Au	Specialist, Australia	0071-Au	Allied Health, Australia	0107-Br	Specialist, Brazil	0143-Br	Coordinator, Brazil
0024-Au	Allied Health, Australia	0073-Au	Technologist, Australia	0108-Br	Researcher, Brazil	0144-Br	Manager, Brazil
0025-Au	Strategist, Australia	0074-Au	Physician, Australia	0109-Br	Physician, Brazil	0145-Br	Coordinator, Brazil
0026-Au	Physician, Australia	0075-Au	Technologist, Australia	0110-Br	Support, Brazil	0146-Br	Manager, Brazil
0027-Au	Physician, Australia	0076-Au	Physician, Australia	0111-Br	Physician, Brazil	0147-Br	Manager, Brazil
0028-Au	Researcher, Australia	0077-Au	Physician, Australia	0112-Br	Support, Brazil	0148-Br	Specialist, Brazil
0029-Au	Manager, Australia	0078-Au	Manager, Australia	0113-Br	Manager, Brazil	0151-Br	Coordinator, Brazil
0030-Au	Manager, Australia	0079-Au	Coordinator, Australia	0114-Br	Manager, Brazil	0152-Br	Manager, Brazil
0031-Au	Support, Australia	0080-Au	Technologist, Australia	0115-Br	Researcher, Brazil	0153-Br	Manager, Brazil
0032-Au	Coordinator, Australia	0082-Au	Physician, Australia	0116-Br	Researcher, Brazil	0154-Br	Manager, Brazil
0034-Au	Manager, Australia	0083-Au	Physician, Australia	0117-Br	Coordinator, Brazil	0155-Br	Physician, Brazil
0035-Au	Physician, Australia	0084-Au	Physician, Australia	0118-Br	Manager, Brazil	0156-Br	Physician, Brazil
0036-Au	Nurse, Australia			0119-Br	Manager, Brazil	0158-Br	Physician, Brazil

APPENDIX N. PRIORITISATION OF THEMES

Theme or sub-theme in NVivo software	A : Participant Code: Country = Australia	B : Participant Code: Country = Brazil	Total Participants commenting[27]	Prioritised themes
A. Professional Contexts	**52**	**22**	**74**	**A. Professional Contexts**
A1. Personal cultures	0	5	5	
A1.1 National characteristics	0	3	3	
A1.2 Personal Motivations	0	2	2	
A2. Medical culture	47	18	65	A2. Medical culture
A2.1 Habits	5	4	9	A2.1 Habits
A2.3 Conservatism	2	3	5	
A2.4 Technology competence	9	6	15	A2.4 Technology competence
A2.5 Distal support	13	6	19	A2.5 Distal support
H6. Technology mediated relationships	35	4	39	H6. Technology mediated relationships
A3. Patient culture	9	2	11	A3. Patient culture
A3.1 Patient experience	1	1	2	
A3.2 Technical competence	3	0	3	
A3.3 Cultural difference	5	1	6	
B. Organisational Context	**39**	**26**	65	**B. Organisational Context**
B1. Organisational culture	26	6	32	B1. Organisational culture
B1.1 Patient centred care	11	3	14	B1.1 Patient centred care
B1.2 Team culture	8	1	9	B1.2 Team culture
B1.3 Hospital centricity	3	0	3	
B1.4 Changing attitudes	6	2	8	
B2. Organisational strategy	9	16	25	B2. Organisational strategy
B2.2 Plans and vision	8	8	16	B2.2 Plans and vision

[27] The number participants commenting on sub-themes will not total to the numbers commenting on major themes. NVivo software aggregates sub-themes when totalled into major themes.

Theme or sub-theme in NVivo software	A : Participant Code: Country = Australia	B : Participant Code: Country = Brazil	Total Participants commenting[27]	Prioritised themes
B2.3 Political influence	0	6	6	
B2.4 Role of Education	0	2	2	
B2.5 Primary Health	1	1	2	
C. Mechanism RQ3a - Adaptation of Organisational Contexts	**64**	**34**	**98**	**C. Mechanism RQ3a - Adaptation of Organisational Contexts**
C1. Technology boundaries	30	11	41	C1. Technology boundaries
C1.1 Software Development	2	2	4	
C1.2 Use of Devices	5	0	5	
C1.3 Independent Networks	4	3	7	
C1.4 Multiple Video Applications	11	0	11	C1.4 Multiple Video Applications
C1.5 Independent EMRs	9	4	13	C1.5 Independant EMRs
C1.6 Availability of Support	2	1	3	
C1.7 Paper versus digital	1	0	1	
C1.8 Patient Identity	0	1	1	
C1.9 Interoperability	1	2	3	
C2. Organisational identity	9	5	14	C2. Organisational identity
C2.1 Adaptation to local needs	4	1	5	
C2.2 Ownership	3	1	4	
C2.3 Territory	1	1	2	
C2.4 Organisational Interests	2	2	4	
C3. Organisational scope	15	15	30	C3. Organisational scope
C3.1 Extending Services	2	1	3	
C3.2 Geographical Boundaries	8	2	10	C3.2 Geographical Boundaries
C3.3 Funding scope	8	6	14	C3.3 Funding scope
C3.4 Client base	0	1	1	
C3.5 Tertiary to Primary Care	5	0	5	
C3.6 Education v Health care	0	7	7	
C4. Decentralisation	21	12	33	C4. Decentralisation

Theme or sub-theme in NVivo software	A : Participant Code: Country = Australia	B : Participant Code: Country = Brazil	Total Participants commenting[27]	Prioritised themes
C4.1 Capacity of small entities	5	5	10	C4.1 Capacity of small entities
C4.2 Independence of large entities	0	1	1	
C4.3 Technical diversity	2	1	3	
C4.4 Collaborative structures	4	2	6	
G7. Capacity	14	6	20	G7. Capacity
C5. Organisational silos	27	9	36	C5. Organisational silos
C5.1 Specialisms	5	3	8	
C5.2 Indigenous Health Services	3	0	3	
C5.3 eHealth	2	0	2	
H3. Sharing information	18	7	25	H3. Sharing information
C6. Legal boundaries	6	5	11	C6. Legal boundaries
C6.1 Contracts	1	2	3	
C6.2 Structures	2	2	4	
C6.3 Financial boundaries	3	4	7	
D. Mechanism RQ3b - Adaptation of Professional Contexts	**69**	**41**	**110**	**D. Mechanism RQ3b - Adaptation of Professional Contexts**
D1. Conflict	19	11	30	D1. Conflict
D1.1 Information Technology	6	0	6	
D1.2 Clinical	9	6	15	D1.2 Clinical
D1.3 Persistence	8	5	13	D1.3 Persistence
D2. Interests	40	32	72	D2. Interests
D2.1 Information Technology	9	2	11	D2.1 Information Technology
D2.2 Clinical	23	9	32	D2.2 Clinical
D2.3 Managerial	12	2	14	D2.3 Managerial
D2.4 Private sector	3	7	10	D2.4 Private sector
D2.5 Political	11	26	37	D2.5 Political
D2.6 Corruption	2	4	6	
D3. Control	29	16	45	D3. Control

Theme or sub-theme in NVivo software	A : Participant Code: Country = Australia	B : Participant Code: Country = Brazil	Total Participants commenting[27]	Prioritised themes
D3.1 Information Technology	14	1	15	D3.1 Information Technology
D3.2 Clinical	10	3	13	D3.2 Clinical
D3.3 Managerial	6	7	13	D3.3 Managerial
D3.4 Community	1	8	9	D3.4 Community
D3.6 Government	2	5	7	
D4. Resistance	33	16	49	D4. Resistance
D4.1 Information Technology	6	1	7	
D4.2 Clinical	19	12	31	D4.2 Clinical
D4.3 Managerial	17	8	25	D4.3 Managerial
E. Mechanism RQ3c - Changing Behaviour	**73**	**36**	**109**	**E. Mechanism RQ3c - Changing Behaviour**
E1. Acceptance	27	21	48	E1. Acceptance
E1.1 Clinicians	17	20	37	E1.1 Clinicians
E1.2 Patients	14	4	18	E1.2 Patients
E2. Usability	15	7	22	E2. Usability
E2.1 Clinical	10	7	17	E2.1 Clinical
E2.2 Patients	8	0	8	
E3. Risks	58	18	76	E3. Risks
E3.1 Clinical	49	11	60	E3.1 Clinical
E3.2 Privacy	8	4	12	E3.2 Privacy
E3.3 Triaging	25	9	34	E3.3 Triaging
E3.4 Technical	2	0	2	
E4. Trust	20	16	36	E4. Trust
E4.1 Clinicians	16	13	29	E4.1 Clinicians
E4.2 Nurses	2	1	3	
E4.3 Privacy	5	3	8	
E5. Support for staff	16	3	19	E5. Support for staff
F. Mechanism RQ3d - Codes	**74**	**42**	**116**	**F. Mechanism RQ3d - Codes**
F1. Training	21	14	35	F1. Training

Theme or sub-theme in NVivo software	A : Participant Code: Country = Australia	B : Participant Code: Country = Brazil	Total Participants commenting[27]	Prioritised themes
F2. Guidelines	56	29	85	F2. Guidelines
F2.1 Legal	5	7	12	F2.1 Legal
F2.3 Implicit	17	1	18	F2.3 Implicit
F2.4 Guides	21	11	32	F2.4 Guides
F2.5 Clinical Procedures	19	13	32	F2.5 Clinical Procedures
F2.6 Technical	5	2	7	
F2.7 Customisation	7	0	7	
F2.9 Templates and Forms	5	0	5	
F3. Pathways	7	10	17	F3. Pathways
F4. Referrals	14	15	29	F4. Referrals
F7. Practice	22	12	34	F7. Practice
F8. Processes	13	9	22	F8. Processes
F9. Scheduling	27	2	29	F9. Scheduling
G. Underpinning Mechanism - Resources	**75**	**45**	**120**	**G. Underpinning Mechanism - Resources**
G1. Availability of technology	41	22	63	G1. Availability of technology
G2. Human Resources	45	19	64	G2. Human Resources
G2.1 Changing roles	29	5	34	G2.1 Changing roles
G2.2 Coordinator Roles	13	1	14	G2.2 Coordinator Roles
G2.3 Staffing	20	2	22	G2.3 Staffing
G2.6 Turnover	7	11	18	G2.6 Turnover
G3. Technolgy Design	9	8	17	G3. Technolgy Design
G4. Technology Processes	3	2	5	
G5. Funding and Payments	26	27	53	G5. Funding and Payments
G6. Demand	50	28	78	G6. Demand
G6.1 Travel	25	8	33	G6.1 Travel
G6.3 Access	26	12	38	G6.3 Access
G6.4 Out of Hospital care	11	0	11	G6.4 Out of Hospital care
G6.6 Medical Education	12	16	28	G6.6 Medical Education

Theme or sub-theme in NVivo software	A : Participant Code: Country = Australia	B : Participant Code: Country = Brazil	Total Participants commenting[27]	Prioritised themes
G8. Physical environment	19	5	24	G8. Physical environment
H. Underpinning Mechanism - Relationships	**62**	**27**	**89**	**H. Underpinning Mechanism - Relationships**
H1. Cooperation	31	22	53	H1. Cooperation
H1.1 Teamwork	15	3	18	H1.1 Teamwork
H1.2 Cross Facility	10	1	11	H1.2 Cross Facility
H1.4 Workfow	2	1	3	
H1.5 Partnerships	1	11	12	H1.5 Partnerships
H1.6 State Support	0	7	7	
H1.7 Networks between organisations	2	4	6	
H1.8 Communities of Practice	6	4	10	H1.8 Communities of Practice
H1.9 University Support	0	3	3	
H2. Leadership	32	10	42	H2. Leadership
H2.1 Champions	27	6	33	H2.1 Champions
H2.2 Credibility	2	2	4	
H2.3 Boundary Spanning	8	2	10	H2.3 Boundary Spanning
H4. Networks within organisations	17	2	19	H4. Networks within organisations
H5. Networks personal	23	12	35	H5. Networks personal
I. Outcome RQ3 - Changing the Normal	**72**	**48**	**120**	**I. Outcome RQ3 - Changing the Normal**
F5. Reform	21	10	31	F5. Reform
F6. Evaluation	11	14	25	F6. Evaluation
G6.2 Quality of care	14	15	29	G6.2 Quality of care
I2. Embedding	30	17	47	I2. Embedding
I3. Normalisation	20	14	34	I3. Normalisation
I4. Routinisation	50	25	75	I4. Routinisation
I5. Appropriation	8	10	18	I5. Appropriation
I6. Diffusion	12	6	18	I6. Diffusion
I7. Utilisation	5	10	15	I7. Utilisation
I8. Costs and benefits	13	10	23	I8. Costs and benefits

APPENDIX O. THEMES – INFLUENCE OF ORGANISATIONAL CONTEXTS

Sub-theme[28]	Sub-theme definition	*n*[29] (AU)[30]	*n* (BR)	Indicative Quotes
C3. Organisational scope	What an organisation is funded to do for who and where	15	12	"there are challenges that are represented through the establishment of the HHS's that has to do with catchments and referral flows, what patients belong where and around cross HHS funding arrangements … the money doesn't follow the patient (p0063-Au) "doing any of this effectively requires involvement of primary care and general practice and we have suddenly crossed state federal divide … and suddenly the patient misses out again" (p0073-Au)
C2. Organisational identity	Activity supporting organisational independence	11	5	"each state or centre takes the protocol and adapts it to its own reality. We are doing this with oral health" (p0117-Br)
C5. Organisational silos	Identification of people with their profession or speciality	12	6	"they think that only a doctor can work with a doctor or a nurse with a nurse or a dentist with a dentist" (p0115-Br)
C4. Decentralisation	Issues arising from decentralisation of health service organisations	6	11	"but due to the decentralized nature of Queensland Health now. I've got 17 CIOs (Chief Information Officers) each with their own roadmaps, their own agendas, their own policies and it's very hard to please all of them" (p0080-Au)
C6. Legal entities	Rules defining how an organisation may work	2	5	"because (hospitals) are funded to have provided a recipient end telehealth, they forget about the GP and they send everybody to the local hospital … these people could have been better managed … with their GP … It's just one of the constant barriers that you see between GPs and hospitals" (p0103-Au)

[28] Original NVivo alpha-numerical code is retained for traceability purposes.
[29] There were 84 Australian and 51 Brazilian participants
[30] *n* is the number of NVivo sources coded against a sub-theme, which represents the number of participants commenting on a sub-theme. Participants may make several comments on the same sub-theme.

Sub-theme[28]	Sub-theme definition	*n*[29] (AU)[30]	*n* (BR)	Indicative Quotes
B2.5 Political influence	Influence of the political process	11	26	“more important for me was the quality of the State Health Secretary that came in. As well as the previous Secretary who pushed the possibilities of telemedicine, also the Secretary who came later” (p0153-Br)
C1. Technology boundaries	Technology configurations that limit service	31	10	“once you go outside of the digital telehealth they're going to try and bridge into those other networks over the open Internet it is just hopeless. It was. It drove me crazy of trying to do it. Connection problems” (p0012-Au)
G6.3. Access	Efforts to improve access to healthcare	26	12	“We're very much driving an agenda that says we're tele health is the best modality for quality care it should be provided across the state” (p0006-Au)
G6.1 Travel	The need to reduce travel required by patients or by physicians	25	8	“Up until then I was going to Mildura for one day ten times a year. And to be honest it was wrecking me. And I also saw my colleague in the next room who was going to Broken Hill about every three weeks. I saw him burn out” (p0007-Au)

APPENDIX P. THEMES – INFLUENCE OF PROFESSIONAL CONTEXTS

Sub-theme	Sub-theme definition	*n* (AU)	*n* (BR)	Indicative Quotes
G6.2 Quality of care	Safe, evidence based care	14	15	“you are giving professionals the ability to improve the quality of health care immediately” (p0115-Br)
D1.2, 2.2 ,3.2, 4.2 Clinicians interests	Conflict over the interests of clinicians	61	30	“So I guess there was a lot of resistance saying you can't do it in the sense of you clinically can't do it, it's not going to get your results it's going to be a waste of time” (p0071-Au) “there was huge resistance .... principally from the Federal Medical Council” (p0145-Br)
D2.3, 3.3,4.3 Managers interests	Conflict over the interests of managers	35	17	“(Management) like the outcomes for patient centred care … They put it in their report as a patient engagement, patient centred thing for accreditation. Yeah they do. I gets lots of support” (p0094-Au)
D1.1,2.1, 3.1,4.1 Information technology	Conflict over the interests of information technology professionals	35	4	“But as far as I'm concerned the IT tail wags the health dog all the time. I mean basically especially in state health” (p0002-Au) “the IT person should say yes, this is the software and this is the cable and this is how we do it. Rather than saying it can't be done or hasn’t been done before” (p0005-Au)

APPENDIX Q. THEMES – LEGITIMISING PRACTICES

Sub-theme	Sub-theme definition	*n* (AU)	*n* (BR)	Indicative Quotes
F2. Guidelines	Implicit and explicit guides, procedures, clinical protocols, technology standards, regulations and laws	56	29	“it basically steps out the very beginning of a telehealth consult all the way through to the end. The requirements of the nurses and requirements of the patients. It's also included in our consent form that when patients come on to our service” (p0060-Au) “the guidelines, the clinical protocols, the process for the calls that are specified in documents, the telehealth staff use a lot. For the work process and management issues, they use the guidelines for basic care” (p0126-Br)
B2. Reform	Changes in organisational strategies, culture, or services.	9	16	“if Transforming Health didn't come about … if telerehab had hadn't been implemented … we wouldn't be where we are today. I think it was just the perfect mix” (p0003-Au)
F2.5 Processes	Technical, clinical and administrative methods	19	13	“We have had organizational issues. Telehealth takes an enormous amount of organisation. If there's not the organization there, I can tell you it doesn't work” (p0074-Au)
F3. Pathways	Models of care for the management of patients	7	10	“that's the key coronary syndrome chess pain pathway. Which actually took us two years to develop ... from 2001 to 2003” (p0012-Au)
F4. Referrals	Transfer of patients between health care providers	14	15	“Initials are done face to face. Reviews can be done by telephone telehealth or face to face so they'll pick a face to face if or dependant on the clinician” (p0071-Au)
F5. Practice	Routines and habits adopted by health care providers	22	12	“there's no mandate as such you can't make clinicians practice in a certain way. And so we are still very much hinged on personal preference. Doctors if there's one thing I've learned doctors don't like being told what to do” (p0032-Au)

APPENDIX R. THEMES – CHANGING BEHAVIOURS

Sub-theme	Sub-theme definition	*n* (AU)	*n* (BR)	Indicative Quotes
E1. Acceptance by clinicians	Extent to which technology and associated services are used by clinicians	27	21	"Doctors have more resistance and delay starting, but once a level of confidence is established they start to use the service" (p0116-Br)
I5. Appropriation of technology	Use of available technology	8	10	"We do renal dialysis in the home absolutely. But now we're adding the telehealth with a video conferencing component on top of that" (p0003-Au)
I6. Diffusion of technology	Transfer of skills	12	6	"Then all of a sudden RN Y will use it and all of a sudden it will be RN X and RN Y" (p0090-Au)
E2. Usability - clinical and patient	Perceived ease of technology use	15	7	"Skype is pretty much a no-brainer, it's really, really easy to do a teleconference on Skype, but there's other solutions where … you have to jump onto a website, wack in a pin code and a passcode" (p0031-Au)
F1. Training	Formal education in technologies and procedures	21	14	"Oh, train them, train them [laughs] - yes. I think because I've been doing it for a while now I know each doctor, how they function and work, and work with them with their different personalities" (p0036-Au)
E3.1, 3.2, 3.4 Risk management	Measures taken to avoid adverse events	59	15	"So maybe it could be generational in relation to risks with telehealth but I think now it's been around a long enough time that people know it's safe" (p0060-Au) "One mechanism in terms of managing that risk, that we insist on is having a clinician at the other end during all sessions" (p0027-Au)
E3.3 Triaging patients	Selection of patients for treatment according to criteria	25	9	"Primary health has the concept of triaging, the type of situations that can be treated locally and those where the patient needs referral" (p0140-Br)
E4. Trust	Establishing relationships and confidence in people, systems and technology	20	16	"the rural clinician gets that Big Brother fear of someone is watching me, they don't trust me. Sometimes you will get that" (p0090-Au)
E5. Support for staff	Help provided by technical and administrative staff	16	3	"we were actually initially set up by AV telemed services and they were amazing … and they are perhaps the most helpful people I've ever come across" (p0074-Au)

APPENDIX S. THEMES – BUILDING RELATIONSHIPS

Sub-theme	Sub-theme definition	*n* (AU)	*n* (BR)	Indicative Quotes
H1. Cooperation	Collective activity including teamwork, communities of practice and partnerships to promote telehealth initiatives, and share experiences.	31	22	It's vitally important … and we can't do things by ourselves and especially in healthcare we need to work together as a team (p0100-Au) So definitely there's cooperation. Definitely there has to be cooperation between the providing facility and where the patients is going to go. (0032-Au) the telehealth community of practice is actually working really well … to drive consistency in both practice and a little bit of technology and building collaboration (p0088-Au)
H2. Leadership	The role of individuals in creating and sustaining telehealth initiatives across organisational boundaries	32	10	People always talk about clinical champions. Champions are good if the system the system already taken it as an agenda ... But if champions have to do the driving it is not going to go too far it is going to go too far because their sphere of influence is small.(p0069-Au) He's someone that just wants to make things happen and is very good at knocking down barriers…. and he would just get on the phone and make it happen.(p0017-Au)
H4. Organisational networks	Relationships formed within organisations to develop telehealth services	17	2	I think 90 percent of this job is around building relationships and building people's trust in that they will feel supported with bringing on telehealth clinics.(p0070-Au)
H5. Personal networks	Personal bonds supporting cooperation for telehealth interventions	23	12	It was a group of people from medical societies. I picked up the telephone said ‘shall we participate. I know that you have a room (for video conferencing) in your hospital. Let’s do it. I talked with others until we met as a group (p0111-Br)

APPENDIX T. THEMES – RESOURCING SERVICES

Sub-theme	Sub-theme definition	*n* (AU)	*n* (BR)	Indicative Quotes
G1. Availability of technology	Availability of technology that transmits information between health facilities or providers	41	22	“I don't worry at all that the technology. It's reliable ... There's stuff that we'd like to do of course but even the clinicians involved don't worry too much about the technology” (p0063-Au) “our computers we use in outpatients they don’t work in telehealth for video not for any video because they are all thin clients. So there is this huge barrier for us” (p0085-Au)
G8. Physical environment	The physical environment(s) necessary to host equipment, services and health provides that provide telehealth services	19	5	“I think if you're going to be using telehealth as frequently as we do up here, that it should be in a dedicated room rather than just shoved into any consulting room” (p0092-Au)
G2. Human resources	The people that provide clinical, managerial and technical support for telehealth services	45	19	“what we actually need to have is seeing if there should be a nurse who is helping to coordinate those appointments because they have a bit more clinical understanding about who might be and might not be a suitable candidate for Telehealth” (p0034-Au) “the biggest impediment to the roll out is the resourcing of the peripheral centre in terms of having an administration officer and a person to sit in on the consultation to take notes. So that actually involves resources and to an extent you don't really need it” (p0061-Au)
G6.6 Medical Education	Perceived need to improve the medical knowledge of the workforce, especially staff in regional areas or working in primary care.	12	16	“Therefore we need continuous education and the means to continue education of newly arrived professionals that are not adequately prepared for what we need” (p136-Br)
G5. Funding and Payments	Mechanisms used to provide financial support to health organisations or providers to operate telehealth services	26	27	“Our unit is extremely poor. We're block funded and we're not funded - we're not sitting under a Division of Surgery, a Division of Medicine …. So we've got a little bit of money to do a trial for telehealth and get it up and running” (p0036-Au)

APPENDIX U. THEMES – NEW CONTEXTS FOR HEALTHCARE

Sub-theme	Sub-theme definition	*n* (AU)	*n* (BR)	Indicative Quotes
I8. Costs and benefits	Financial expenses and benefits	13	10	"we've seen a dramatic reduction in the number of patients who are transferred down … from either Wide Bay or Central Queensland hospitals to the Royal Brisbane It costs us significantly less" (p0083-Au)
I7. Utilisation	Numerical usage measures	5	10	"When we opened in 2012 … we saw about 400 occasions of service … at the PA. Now we've got 18 services and counting and we're looking to probably top the 4500 mark this year" (p0029-Au)
I4. Routine	Regular use of telehealth services	50	25	"So is this thing as a routine service now. It is just part of our service Not risky. No it's just part of the service" (p0035-Au }
I2. Embedded	Application of processes	30	17	"It is routine. It's not as embedded as it should be. Two issues; one is the consciousness of the doctors in making sure that where a telehealth service exists that they consider utilising it" (p0103-Au)
I3. Normalised	Readily available ordinary care	20	14	"To me it's very simple it's very easy and it's really not an issue. You know it's pretty much just normal practice. You know. The telehealth at 6 o'clock and off we go" (p0062-Au)

APPENDIX V. COREQ CHECKLIST

Adapted COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research based on (Tong, Sainsbury, & Craig, 2007).

Topic	Item No.	Guide Questions/Description	Reported in Section No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	4.9.2
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	BSc, MSc, CEng
Occupation	3	What was their occupation at the time of the study?	Health technology consultant
Gender	4	Was the researcher male or female?	NA
Experience and training	5	What experience or training did the researcher have?	Acknowledgements
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	4.7.4
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Appendix F
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	9.4
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	4.3, 4.4, 4.5, 4.6
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	4.7.4
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	4.7.4
Sample size	12	How many participants were in the study?	4.7.3
Non-participation	13	How many people refused to participate or dropped out? Reasons?	4.7.5
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	Appendices F and G
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	No. See 4.7.4

Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	4.7.3
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested	Appendices D and E. . See 4.9.1
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	None
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	Appendices F and G
Field notes	20	Were field notes made during and/or after the interview or focus group?	4.8.2
Duration	21	What was the duration of the inter views or focus group?	Appendices F and G
Data saturation	22	Was data saturation discussed?	4.7.3
Transcripts returned	23	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	One. See 4.9.3
Description of the coding tree	25	Did authors provide a description of the coding tree?	Appendices O to U
Derivation of themes	26	Were themes identified in advance or derived from the data?	4.9
Software	27	What software, if applicable, was used to manage the data?	4.9.3
Participant checking	28	Did participants provide feedback on the findings?	NA
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Yes. See Chapter 6
Data and findings consistent	30	Was there consistency between the data presented and the findings?	Yes. See Chapter 7
Clarity of major themes	31	Were major themes clearly presented in the findings?	Yes. See Chapter 6
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	Yes. See Chapters 6 and 7