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**DESIGNING VALUE CREATING
AND SUSTAINABLE BUSINESS
MODELS: AN INVESTIGATION OF
TELEHEALTHCARE SERVICE
ECOSYSTEM IN NORTH EAST
ENGLAND**

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PhD

2019

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AND SUSTAINABLE BUSINESS
MODELS: AN INVESTIGATION OF
TELEHEALTHCARE SERVICE
ECOSYSTEM IN NORTH EAST
ENGLAND**

SUMAN BHATTACHARYA

A thesis submitted in partial fulfilment
of the requirements of the University
of Northumbria at Newcastle for the
degree of Doctor of Philosophy

Research undertaken in the Faculty
of Business and Law

December 2019

Declaration

I declare that I have not submitted the work contained in this thesis for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

The research presented in this thesis has received internal ethical clearance. The *Faculty of Business and Law Ethics Committee* granted ethical approval on 29th February 2016.

I declare that the word count of this thesis is 84,600.

Suman Bhattacharya

Abstract

A rising elderly population in England, together with the prevalence of long-term chronic health conditions and higher demands for social care, is creating significant challenges for both the English National Health Service (NHS), and for Local Authorities. These challenges relate to the effective planning, commissioning and provisioning of services for people with complex social and health care needs, amidst a predominantly public-funded health and care system. Digital technology innovations, such as telecare and telehealth (telehealthcare) can facilitate assisted living through technology-mediated preventions, early detections of risks, timely interventions, and self-directed care. Policymakers acknowledge the potential of these technologies to drive greater operational efficiency and cost savings by supporting the policy agenda of 'ageing in place', as opposed to an increasing reliance on commissioning expensive institutional provisions such as care homes. In order to realise the opportunities of technology-enabled care, policymakers have started advocating faster adoption, provisioning and implementation of telehealthcare services on an increased population scale.

A review of the relevant health technology and systems literature indicates that prior and current research does not sufficiently address the business model and service perspectives, which are considered critical to the practical justification and adoption of complex health service innovations such as telehealthcare. This research study and thesis brings together two interdisciplinary and complementary theoretical frames, synthesised from the extant literature on business models and service innovation. A new theoretical framework is developed in order to examine, interrogate and explain the phenomena of value creation and value realisation within a telehealthcare service ecosystem. Conventional business model-based thinking focuses on value propositions and the financial realisation of value. In contrast, service-dominant logic offers more relational and systemic insights on value co-creation (emphasising social as well as economic factors) through stakeholders' resource integration within the entire service ecosystem.

Using the principles of Critical Realism (CR) to inform a case study approach, this qualitative study employs a multiple case-based research design, resulting in five case studies of telehealthcare services (including one pilot) in the North East of England. The analysis of empirical data collected from the case studies, including a representative sample comprising forty key-informant stakeholder interviews, combined with documentary and observational evidence, reveals four main themes. In the next stage of analysis, following a critical realist perspective, *abduction* and *retroduction* based reasoning are applied, leading to a theoretical explanation concerning the underlying structures and their causal *powers* (*mechanisms*). Three most significant causal mechanisms, namely *Organisational Inertia*, *Fragmented Ecosystem*, and *Quasi-market Characteristics*, have been identified to explain the stratified reality within a telehealthcare service ecosystem.

This research analysis results in both theoretical, and practitioner related contributions concerning the development of a typology for telehealthcare service business models with illustrations of three archetype business models and their related elements. These archetype models signify the dynamic possibilities or potential variations of business models and new service designs contingent upon the operational contexts in which the business models are to be situated.

Dedicated to my wife Soma

I could not have reached this far without your inspiration and support.

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First, I would like to take this opportunity to convey my sincere gratitude and appreciation to all my supervisors, especially Professor Jason Whalley and Professor David Wainwright, who had always encouraged, guided, and supported me throughout this PhD journey. I am also thankful to Professor Teresa Waring for her valuable advice during the early days of this doctoral project and to Dr Nadja Damij for her encouragement and support. I am obliged to the Faculty of Business and Law at the University of Northumbria for funding this PhD.

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‘According to the Great Equation, Medical Care equals Health. But the Great Equation is wrong. More available medical care does not equal better health. The best estimates are that the medical system (doctors, drugs, hospitals) affects about 10 percent of the usual indexes for measuring health: whether you live at all (infant mortality), how well you live (days lost due to sickness), how long you live (adult mortality). The remaining 90 percent are determined by factors over which doctors have little or no control, from individual life-style (smoking, exercise, worry), to social conditions (income, eating habits, physiological inheritance), to the physical environment (air and water quality). Most of the bad things that happen to people’s health are at present beyond the reach of medicine.’

(Wildavsky, 1979, p. 284)

Chapter 1: Introduction

Demographic trends such as an ageing population, often affected with long-term physical and cognitive conditions (Department of Health, 2006), together with a decline in the number of informal caregivers due to changing socio-economic settings (Cook et al., 2013) and the rising cost for delivering services for people with complex social care and health care needs (Prince et al., 2015) result in increased health and social care challenges. These challenges involve the National Health Service (NHS) at all levels, nationally, regionally and locally, and just as importantly in terms of increasing demands for social care, Local Authorities who are responsible for adult social care provisioning.

Population census data for the period 2015 to 2017 reveals that while life expectancy in England is rising; healthy (or disability-free) life expectancy which indicates the number of years lived in 'good health' is on a decline¹ (ONS, 2018, p. 12). Government and policymakers acknowledge that such demographic shifts pose a big challenge in terms of sustaining a predominantly public-funded health and care system in the United Kingdom (UK) amidst a constrained funding landscape due to economic austerity (Murray et al., 2011; OXFAM, 2013; National Audit Office, 2018b).

“Vastly improved life expectancy, one of the great triumphs of the last century, looks set to be one of great challenges of this one. Between 2015 and 2020, over a period when the general population is expected to rise 3%, the numbers aged over 65 are expected to increase by 12% (1.1 million); the numbers aged over 85 by 18% (300,000); and the number of centenarians by 40% (7,000).”

(Parliament UK, 2015)

¹ Health state life expectancy data at birth for males and females in England suggest years lived with disability are about 16.5 years (for males) and 21.0 years (for females).

The NHS England budget deficit is expected to reach £6 billion by 2020-21 (Gainsbury, 2016). Over two-thirds of NHS activity and an estimated eighty per cent of costs are related to one-third of the population - predominantly older people with long-term conditions and/or disabilities – in delivering expensive secondary care services in hospitals or care homes (DOH, 2006). These challenges necessitate finding innovative strategies for provisioning and delivery of care services. It is anticipated that this can be achieved through leveraging the 'preventative' role of digital health technologies and by taking advantage of the rapid development of technology innovations (TSA, 2017a). Such technology-enabled services allow preventions and early actions, potentially reducing the cost of care by shifting the focus of care delivery from institutional settings to more community-based and self-directed alternatives (Benson, 2006), and supporting people to remain independent and live in their own homes (DOH, 2005; Bardsley et al., 2011).

During the last two decades, increasing shifts in the UK Government's policies related to health and social care services (Audit Commission, 2004; DOH, 2005) emphasise the importance of a person-centred approach anchoring on principles of greater personalisation, maximisation of choice and control for the patients/users (Ferguson, 2007; DOH, 2007). The potential of digital technology-based assisted living services such as telehealthcare², to address self-directed and complex care needs associated with long term conditions, for example, dementia is acknowledged in both academic and policy literature (Roulstone et al., 2013; Health Committee, 2014; Knapp et al., 2016).

Contemporary policy directions and initiatives highlight the focus on integrated health and social care pathways. For instance, the 'Better Care Fund' (BCF) was

² A working definition of the term 'telehealthcare' is presented in Chapter 2

created in 2015 with a £3.8 billion single pooled budget for use by local authorities and NHS clinical commissioning groups (NHS England, 2013; Bennett and Humphries, 2014). In its published '*Five Year Forward View*' document (NHS England, 2014b), the aspirations to develop and adopt new care delivery models for services including '*Technology Enabled Care Services*' (TECS) have been clearly articulated.

1.1. Aims of the Research

Within the context of the rising demographics related to the elderly population and the associated increasing demand for coping with complex healthcare needs, current research provides a growing evidence base which indicates that despite the strategic visions and policy guidance conveyed in published UK government documents, the full potential of telehealthcare systems in transforming healthcare services are yet to be realised on a large scale in the UK (Barrett et al., 2015; Goodwin, 2010; May et al., 2011; Lennon et. al, 2017). The evaluation of benefits and outcome-related effectiveness has often been cited as key factors affecting the wide-spread diffusion and adoption of telehealthcare technologies (Barlow and Hendy, 2009; Beale et al., 2010). *Health Technology Assessment* (HTA) using quantitative techniques such as *Randomised Control Trials* (RCT), an established model for the production of evidence within a Clinical medicine dominated English healthcare culture, is considered to be inappropriate for the assessment/justification of benefits and business cases for complex and multi-stakeholder service delivery interventions such as telehealthcare (Williams et al., 2003; Barlow and Hendy, 2009). An integrated approach that investigates the sociotechnical and organisational issues that may result in creating barriers to collaborative working and partnerships can facilitate a better understanding of the

potential challenges for integrating health and social care information systems (Waring and Wainwright, 2015).

Underpinned by the national policy discourses of user choice, control, and empowerment (Ferguson, 2007; Daly, 2012), adult social care services in England are evolving with a 'mixed economy' of supply (Rodrigues and Glendinning, 2015, p. 649) and are getting increasingly market-orientated (Bartlett and Le Grand, 1993; Barron and West, 2017). A preliminary review of the extant literature on telehealthcare services suggests that contemporary research has focused its attention primarily on issues concerning strategy, policy, evaluation of technology implementations (Goodwin, 2010; Rogers et al., 2011; Hirani et al., 2014) and technology adoption amongst patients/users and healthcare professionals (Gramstad, Storli, and Hamran, 2014; Peek et al., 2015; Saborowski and Kollak, 2015). Prior and current research does not sufficiently address the business perspectives (Oderanti and Li, 2016), that must be understood and incorporated in order to adopt such 'complex innovations' and unique 'user systems' such as telehealthcare (Sugarhood et al., 2014, p. 79), in which success entails effective collaboration across a diverse range of stakeholders, with sharing of risks and alignments of interests and incentives (Arrow, 1963; Christensen and Remler, 2009).

Therefore, to address this gap in knowledge, this study aims to develop better theoretical insights by adapting and adopting business concepts from other disciplines, which could potentially inform and enrich the future designs of telehealthcare service models within the context of the English health and social care systems.

1.2. Research Questions and Objectives

At the outset and early stages of this study, the PhD research thesis started by asking the following research question:

How can telehealthcare technologies act as drivers for new models of care in the context of North East England?

After conducting a review and synthesis of the literature examined in Chapter 3, it became necessary to refine this broad and multi-faceted research question, using insights derived through the thematic analysis of literature. The purpose of reframing was to redefine both the problem focus and the scope of inquiry. A refined over-arching research question was accordingly proposed.

How can new telehealthcare service models be designed and delivered in the context of North East England?

The above research question was then further refined and reframed into a set of three separate research questions in Chapter 4, based on the insights gained through a further review focusing on the literature related to business models and service logic. Therefore, the final three research questions that this thesis aims to answer are defined as follows:

Research Question 1:

How can new service business models, with better value propositions for the users and other stakeholders, be designed?

Research Question 2:

What are the opportunities for value co-creation within such designs of new telehealthcare service business models?

Research Question 3:

How can telehealthcare services achieve sustainability through sufficient realisation of value within these business models?

To answer these three research questions, this thesis has charted the following research objectives:

- i. To gain an in-depth and enriched understanding of the English Health and Social Care systems – focusing upon the relevant organisations, government policies, funding and provisioning arrangements related to telehealthcare services
- ii. To identify useful concepts and constructs, from the relevant literature, to further refine and reframe the research question, and to develop a theoretical framework in guiding the empirical investigation
- iii. To develop an appropriate research approach and research design, with relevant methods for data collection and analysis
- iv. To conduct a pilot field study in order to gain a better understanding of organisational practices and associated challenges in a telehealthcare service
- v. To gain access and identify key informants in conducting the main primary research field study of four case studies
- vi. To analyse underlying structural issues within a telehealthcare service ecosystem based on insights from both the literature and the empirical evidence to provide theoretical explanations for the observed outcomes
- vii. To develop and propose designs for new telehealthcare service models for the future

1.3. Research Approach and Methodology

This research has been conducted employing a multiple case study research design informed by critical realism (Bhaskar, 1998; Lawson, 1997). A telehealthcare service ecosystem is embedded within its social, organisational, and technological contexts (Greenhalgh et al., 2016). Critical realism offers a lens

to examine the underlying structures exhibiting causal powers or tendencies (mechanisms) within a telehealthcare service ecosystem together with the sociotechnical contexts in which these mechanisms work. Unlike an interpretivist (or constructionist) approach that purely focuses upon the actors' subjective experience and indicates epistemic relativity when judging among competing interpretations, a Critical Realist (CR) approach allows a more realist ontology to be adopted that can be used to uncover deeper, more static and fixed underlying issues in an open and complex sociotechnical 'user system' characteristic of a telehealthcare service ecosystem (Sugarhood et al., 2014, p. 79). Application of CR analysis, which uses *abduction* and *retroduction* based reasoning, this research offers the opportunity to provide a broader range of plausible causal explanations for the phenomena studied. In Chapter 5, following a discussion on ontological, epistemological, and methodological principles of a critical realist inquiry, the rationales for adopting a critical realist approach to address the research aim and research questions of this study are explained.

Following an initial observational pilot study, a multiple case study research design has employed four additional case studies involving large telehealthcare services that are located and are currently operating in the North East of England. Empirical investigations have been conducted at the pilot telehealthcare site and also at these four telehealthcare service provider organisations. The collection of empirical data, both qualitative and quantitative, primarily comprises thirty-two³ key-informant stakeholder interviews, documentary evidence, and observational field notes. The participants for this study have been drawn from a wide range of organisations within the telehealthcare service ecosystem, including the service providers, the NHS Clinical Commissioning Group (CCG), North East Ambulance

³ This figure excludes the eight participants for the pilot case study described in Chapter 6

Services (NEAS), the Telecare Service Association (TSA), Academic Health Sciences Network (AHSN) North East & North Cumbria, and two leading technology manufacturers/solution providers in the UK. A framework for the analysis of data is developed in Chapter 5, following the key methodological principles of a critical realist case study approach. This framework was used to guide the analysis of empirical findings combining them with the theoretical perspectives synthesised from the literature. A process of generating inferences based on *abduction* and *retroduction* (Danermark et al., 2002) – leading to theoretical explanations concerning the underlying structures and their causal powers (mechanisms), was used.

1.4. Originality and Contributions

Contemporary research in healthcare information systems focuses mostly on issues around strategy, policy, localised implementations or user acceptance amongst clinical and non-clinical healthcare professionals and patients / users. There is a paucity of research concerning telehealthcare service aspects that concern value propositions (both financial and non-financial), value co-creation through sectoral collaborations and partnerships, and value realisation reaped by provider organisations for sustainability and growth. Adopting a theoretical lens informed through the disciplines of Business Strategy, and Service Innovation, this PhD research thesis addresses and helps to inform this gap in the healthcare literature.

The research contributes knowledge to three domains: theory, methodology, and practice. First, the thesis brings together two interdisciplinary and complementary theoretical frames, from the literature on business models and service innovation, to develop a theoretical framework in order to interrogate the phenomena of value creation and value realisation that may be used to better understand and enable

the diffusion, adoption and, sustainability of telehealthcare services at scale. The framework offers a systemic perspective of value co-creation that underscores the vital role of collaborations and partnerships in a complex and diverse service ecosystem such as telehealthcare. It also emphasises the accommodation of relational, experiential and ethical aspects within a service business model – through providing better opportunities for co-designing and co-learning with predominantly older and vulnerable users - leading to more sociotechnically informed and ‘user-centric’ service designs. The thesis further proposes a typology for telehealthcare service business models with illustrations of three archetypes of potential business models and their related business model elements. These signify the dynamic possibilities or potential variations of business model designs that may be developed and adopted, contingent upon the operational contexts for which the business models are designed.

Secondly, the research contributes to the literature on research methodology, through the application of an innovative research design guided by the ontological principles of critical realism. Prior research in healthcare has traditionally followed either positivist notions of ‘evidence-based practice’ within closed systems, or interpretivist approaches that focus on the micro-level sociotechnical phenomenon and individual agencies. A critical realist perspective, adopted in this thesis, offers an alternative way of examining issues around adoption of telehealthcare technologies within the English health and social care system through the exploration of underlying structural issues and causal mechanisms within a telehealthcare service ecosystem. This can be undertaken at both *meso* and *macro* levels and result in richer and contextually more relevant theoretical explanations. Additionally, this research contributes to the limited volume of

literature on critical realist methodology concerning its application for multiple case study designs.

Thirdly, the findings from this research identify and inform both the strategic and operational implications for the policies and practices related to large scale and sustainable telehealthcare adoption at regional levels. The insights derived from the study and presented as recommendations in Chapter 9, are expected to inform a range of stakeholders - the policy-makers, industry bodies and technology suppliers/solution developers at a macro (national) level; and commissioning authorities, and health and social care provider organisations at the *meso* (regional) level.

Finally, this research offers a range of potential choices or alternatives for future designs of telehealthcare service models in the English healthcare context, which lays the foundation for further empirical investigations, leading to the advancement of evidence-based business cases for the design, development and adoption of digital technology-enabled health and care services.

1.5. Outline of the Thesis

In this section, the outline of the thesis is described, followed by an illustration of how the chapters map onto the research objectives stated earlier in Section 1.2. The remainder of the thesis is organised as follows.

Chapter 2 situates the study within the national-context of digital technology enabled care services (TECS) in the UK. The chapter highlights issues around overlapping and often inconsistent use of terminology in the TECS domain and accordingly, provides a working definition of 'telehealthcare' services that is adopted throughout this thesis. This chapter further describes macro level settings surrounding the telehealthcare services, including an overview of the English

Health and Social Care systems, national policies on telehealthcare, technology and market landscapes, and also, a history of telehealthcare services in relation to social care services and in relation to NHS England. A conceptual view of a telehealthcare service ecosystem is presented with a depiction of key stakeholders within the ecosystem and their relationships.

Chapter 3 provides an in-depth review of the existing literature that is concerned with the policies, implementation, and practices of telehealthcare services, in relation to the initial research question. The purpose of this literature review is to understand key issues raised in contemporary research concerning TECS and to ascertain how far the extant literature addresses the original research question proposed in the study. Following a systematic search strategy for locating existing literature in terms of the review focus, potential sources, and their relevance; a narrative synthesis approach (Popay et al., 2006) is adopted for the literature review. A thematic analysis of literature identifies four key themes related to the initial research question and elicits essential gaps in knowledge. Finally, the insights gained through the literature review are employed to sharpen the research focus by reframing the initial research question.

The insights gained from a review of telehealthcare literature highlight the need to investigate opportunities for new service designs using perspectives from the business literature. Accordingly, Chapter 4 undertakes an examination of the literature based on service innovation and business models, focused around conceptualisations on value-driven aspects in services such as value co-creation and value capture. The focus of this review is to gain a deeper understanding of the value construct through the theoretical lens of business models and service-dominant logic (SDL). The review helps to develop new theoretical underpinnings for a conceptual framework, which serves as an *a priori* investigative and guiding

framework to develop the next stages of the empirical study based on four telehealthcare service providers.

Chapter 5 present the philosophical assumptions, methodology, study design and methods employed for the empirical investigation. Through the adoption of a critical realism ontology-driven position, this chapter justifies the use of case study as the chosen methodology for this study. A multiple case study based research design is presented with a discussion of approaches and methods for data collection. Informed by a critical realist research agenda, a strategy for data analysis through the processes of *abduction* and *retroduction* is outlined. The chapter concludes with a discussion on the ethical considerations in conducting this study.

Chapter 6 describes an early collaboration opportunity that was taken to conduct a pilot case study at a local organisation (a large social housing provider organisation offering telecare services) site. This chapter outlines the background, key objectives of the engagement, and the mode of interactions agreed upon with the organisational actors. A strategy for data collection through interviews, participant observations and document analysis is also discussed. Key findings from the case study are analysed concerning the research question refined in Chapter 3. Experience and knowledge gathered through this pilot study, especially as a participant-observer feed this research in two areas. First, the insights gained from the practice domain guided the research in exploring a suitable theoretical lens, to further investigate opportunities of new 'value-creating' service designs anchored around the providers. Secondly, the pilot study exposed the need for a deeper examination of the underlying structures and their relationships in a telecare service ecosystem, leading to a Critical Realism informed multiple case design for further empirical investigation and analysis.

In the next chapter (Chapter 7), the four case studies of telehealthcare services in the North East of England are discussed in detail. The socio-economic and organisational contexts surrounding the services, the service characteristics, and key processes are then described with a focus on comparisons among the services in terms of similarities and contrasts. A comparative analysis of service business models across the four case studies is subsequently made, focusing on the identification of common themes emerging out of empirical data. The objective of this analysis is to uncover the *meso* and *macro* level structural issues within a telehealthcare service ecosystem.

The empirical findings from the analysis undertaken in the preceding chapter lead to a discussion in Chapter 8. The first part of the chapter examines the empirical findings through critical realism informed inferences based on *abduction* and *retroduction*, in order to uncover the true nature of reality within a service ecosystem; and to provide a theoretical explanation for the outcomes observed at the empirical level. Three causal mechanisms are identified alongside the necessary contextual conditions that make the existence and/or activation of these mechanisms possible. The latter part of the chapter identifies potential choices/alternatives for designing more effective value-creating and sustainable business models.

The thesis concludes (Chapter 9) by summarising the key findings from this research, highlighting the contributions to knowledge, theory and practice that the study has made and also by acknowledging the originality, limitations, and subsequent recommendations for further research.

Chapter 2: Setting the Context

2.1. Introduction

The previous chapter provided a brief overview of the study, which highlights the research aims and objectives to investigate Information and Communications Technology (ICT) enabled assisted living services – referred to in this study as telehealthcare services. This research is set in the policy and practice context of the English health and social care systems, with a geographical focus placed on the North East of England. This chapter aims to situate the study concerning the healthcare policy, strategy and Information Systems (IS) research domain and to lay the foundation in a later chapter for a more detailed review of the literature. A study of complex IS phenomenon like telehealthcare necessitates an exploration of the sociotechnical, political and organisational contexts within which the services are designed and delivered (Greenhalgh et al., 2016; Hamblin et al., 2017). Accordingly, it becomes vital to explore these *macro* level settings surrounding provisioning and delivery of telehealthcare services.

This chapter presents a brief overview of how health and social care services are provisioned in England, key stakeholder organisations, and their responsibilities for provisioning and delivery of telehealthcare services. The policy environment, including the visions, strategies, key programmes and initiatives undertaken at the national level to stimulate uptake of telehealthcare, is subsequently described. A discussion on the technology landscape explaining the evolution of telehealthcare technologies, trends, and future opportunities follows next. The Market and Industry environment for telehealthcare are then explored briefly. In the following

section, by borrowing a metaphor of a business ecosystem from the literature (Iansiti and Levien, 2004), a conceptualisation of a telehealthcare service ecosystem is presented. Key stakeholders within the service ecosystem, their roles, and interactions are also identified and illustrated.

However, the domain of telehealthcare technologies is characterised by confusing and often loosely applied terminology that lacks proper definitions of terms and their differentiations in terms of scope and objectives. **Terms such as ‘telecare’, ‘telehealthcare’, ‘telemonitoring’, and ‘telemedicine’ are used interchangeably, in both the academic and practice literatures, even within the same document meaning different things to different people** (Barlow, Bayer, and Curry, 2006, p. 397; Gibson et al., 2016, p. 682). Such an absence of agreement on terminology is suggestive of the fact that these technology solutions are evolving rapidly, offering an alternative approach to care that could still be considered relatively new (Barrett, Thorpe, and Goodwin, 2015). The lack of an agreed taxonomy often leads to difficulties in linking benefits to interventions (Barrett et al., 2015), and therefore, it becomes vital to provide a clear understanding of the terms used in the first place. Accordingly, the following section provides a clarification of the key terminology used in the literature on a range of technology solutions addressing assisted living needs and proposes a working definition of telehealthcare services that is adopted throughout this study. Such a definition should serve to designate the aim and scope of telehealthcare services that this thesis is concerned with.

2.2. Explanation of the Terminology

The World Health Organization (WHO) defined the term ‘assistive technology’ as ‘an umbrella term for any device or system that allows individuals to perform tasks they would otherwise be unable to do or increases the ease and safety with which

the tasks can be performed' (WHO, 2004, p. 14). Assistive technologies can be broadly characterised into two categories - electromechanical systems providing functional assistance aids and equipment, and ICT enabled digital systems (Doughty et al., 2007; Cook et al., 2013). Telecare, telehealth, telemedicine, mHealth among others belong to the latter category.

Telecare is defined as 'the continuous, automatic and remote monitoring of real time emergencies and lifestyle changes over time in order to manage the risks associated with independent living' (TTA, 2005). Telecare systems use communications technology to provide health and social care directly to the user (patient), but this excludes the exchange of information solely between professionals, generally for diagnosis or referral' (Barlow et al., 2007, p. 172). The Department of Health (2011, p. 4) defines telecare as:

"Personal and environmental sensors in the home that enable people to remain safe and independent in their own home for longer. 24 hour monitoring systems ensure that should an event occur the information is acted upon immediately and the most appropriate action put in train."

Greenhalgh et al. (2016) define telehealth as remote monitoring of biological markers such as weight, blood pressure or oxygen levels. Home-based telehealth typically involves the collection and transmission of data between home (patient) and healthcare provider (clinical staff). Telehealth equipment is used as a tool in the management of long-term conditions in the community to proactively monitor 'vital signs' of the patients and respond promptly when pre-set parameters are breached (Stowe and Harding, 2010, p. 195). In a similar vein, telehealth is described by the Department of Health (2011, p. 4) as:

"Electronic sensors or equipment that monitors vital health signs remotely, e.g. in your own home or while on the move. These readings are automatically transmitted to an appropriately trained person who can monitor the health vital signs and make decisions about potential interventions in real time, without the patient needing to attend a clinic."

The above definitions convey essential aspects that differentiate telecare from telehealth. In terms of aim, telehealth technology is primarily concerned with helping people to manage their health at home, in particular for long-term conditions such as diabetes, COPD, and so forth whereas telecare aims to manage risks of independent and safe living at home (Bower et al., 2011, p. 2). In terms of design and scope, telehealth technology necessarily involves the remote exchange of data between a patient and health care professionals to allow clinicians making appropriate diagnoses and interventions. On the other hand, in case of telecare, the smart sensors trigger automated alarms which are communicated to either a designated family member, a friend or to a call centre.

Outside the United Kingdom (UK), telehealth has been used as an umbrella term, which includes telecare, among others. The Telehealth Services Code of Practice for Europe (TeleSCope) project uses the following definition of both telecare and telehealth.

“The means by which technologies and related services at a distance are accessed by or provided for people and/or their carers at home or in the wider community, in order to facilitate empowerment or the provision of care and/or support in relation to needs associated with their health and well-being.”

(Rudel et al., 2011, p. 39)

The World Health Organisation (WHO, 2010, p. 9) takes a broader view in its following definition of telemedicine.

“The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and education, and for the continuing education of health care providers, all in the interest of advancing the health of individuals and their communities.”

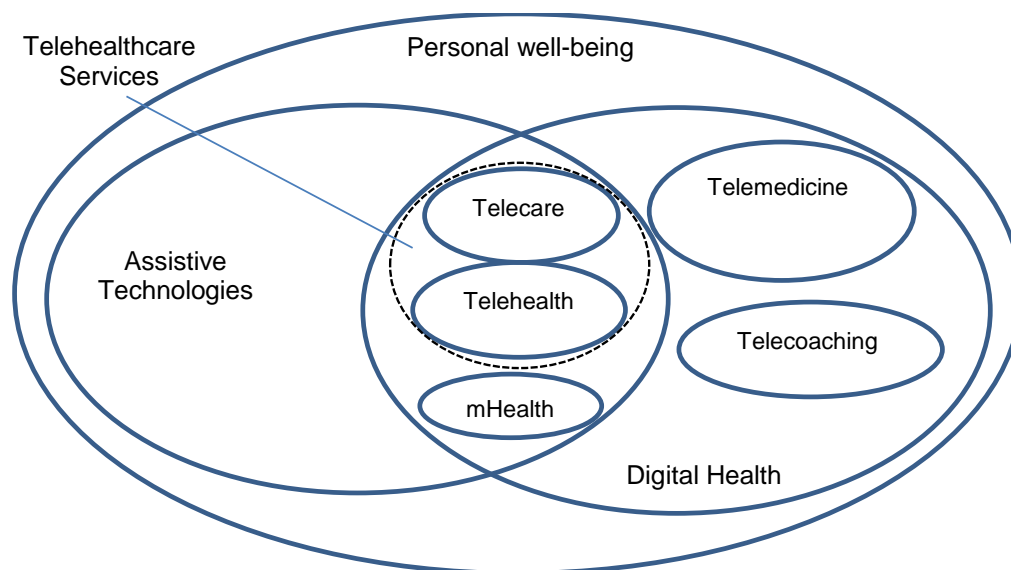
In the United States of America, ‘telemedicine’ and ‘telehealth’ are typically treated as synonymous, and the terms are used interchangeably (American Telemedicine Association, 2012). Both solutions refer to the use of remote health care technology to deliver clinical services. In both telemedicine and telehealth, all

applications share two common elements, namely the geographic separation between two or more actors in health care and the use of telecommunication and related technology to enable, facilitate, and possibly enhance clinical care and gathering, storage, and dissemination of health-related information (Bashshur et al., 2000, p. 614).

In the academic and practice literature alike, some emerging terms such as mHealth and eHealth are widely employed as part of ICT based applications in the health and care domain (Rudel et al., 2011). mHealth refers to the use of mobile communication and network-based technologies in providing increased access to health information, services, and skills; and in promoting positive health behaviours (WHO, 2016, p. 1), typically through mobile applications (or 'apps'). eHealth is an all-inclusive term that covers all aspects of health and ICT, and in addition to telecare and telehealth, it encompasses telemedicine, telecoaching, and mHealth (POST, 2014). Lately, a new and overarching term 'Digital Health' that defines 'use of information and communication technologies to improve human health, healthcare services, and wellness for individuals and across populations' (Kostkova, 2015, p. 1) has gained prominence in both academic and practice literature, in place of eHealth. Thus, Digital Health can be considered as another domain alongside 'assistive technologies', which comprises digital as well as mechanical devices to support independent living at home for elderly and vulnerable people. Figure 2.1 below illustrates how the definitions overlap, positioning telecare and telehealth at the intersection of two domains.

Figure 2.1 Scope of telehealthcare services within Digital Health Domain

(Source: own illustration)



Telehealth and telehealth services in the English health and social care context entail different objectives, separate funding mechanisms, and discrete sets of organisational stakeholders. Telecare services are funded and provisioned as part of adult social care services by local authorities, whereas telehealth services are funded and delivered by NHS England, primarily led by clinicians and health professionals. Current policy narrative promotes an integrated and holistic care agenda that aims to blur the boundaries between social and health care, emphasising the need for ‘independent living technologies together with life-enhancing technologies’ (Turner and McGee-Lennon, 2013, p. 22). Following Doughty et al. (2007), **this PhD research adopts the umbrella term ‘telehealthcare’ instead of using telecare and telehealth as two distinct technologies with different aims.** Such definition of telehealthcare services is mostly consistent with the aims and scope of ‘Technology Enabled Care Services’ (TECS) – a term used by NHS England in referring to the use of services in providing care for patients with long term conditions that is convenient, accessible and cost-effective (NHS England, 2014). In the practice literature, TECS is the

most commonly used term to denote telehealthcare services in the UK. It is fair to mention here that while a conflation of two distinct categories – telecare and telehealth is employed by using the term ‘telehealthcare’ (see Figure 2.1), **the focus of this study primarily rests on telecare services**. Such narrowing of attention is fundamentally due to the reasons that telehealth initiatives in the UK are still emerging and not widely adopted, and also, such services are restricted within clinical settings of NHS England. Therefore, the references and descriptions concerning telehealthcare, in this thesis, are mostly restricted to telecare services.

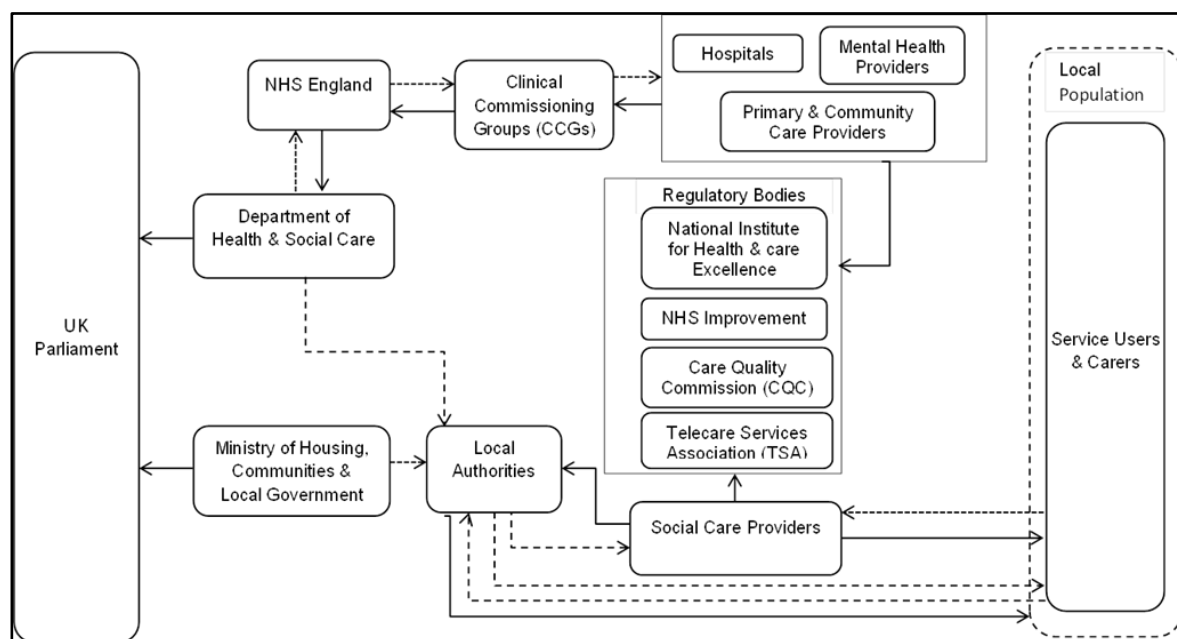
2.3. An Overview of Health and Social Care Systems in England

This section provides a brief overview of the English health and social care system, including key organisations and their structures, in order to understand the various connections shaping the formations and functioning of telehealthcare service ecosystems that this study intends to investigate.

2.4. Organisations and Settings

While the Department of Health and Social Care is responsible for health and adult social care policy in England, the Ministry of Housing, Communities, and Local Government has responsibility for local government finance and the accountability system. The National Health Service (NHS) England is overall responsible for supporting local and/or direct commissioning of health services. In the case of social care, local authorities (or Councils) are responsible for the commissioning of care services. Unlike NHS England, local authorities do not have direct accountability to the government as they are accountable to the local population (NAO, 2018b). Figure 2.2 below illustrates the primary organisations involved in the broader health and social care system in England with a simplified view of how the accountability and funding flow happens across the system.

Figure 2.2 Accountability & Funding Flow in English Health & Social Care Services
(Source: adapted from NAO, 2018b)



Legend:

→ Accountability - - - -> Fund flow

2.3.1.1. The National Health Service (NHS)

The National Health Service (NHS) was established in 1948 out of a twentieth-century post-war vision and social policy that upheld core principles of universal, equitable and free health services for all citizens in the UK (The King's Fund, n.d.). The NHS is mainly funded through general taxation and the National Insurance contributions, and it provides health services that are largely free at the point of use for all UK citizens. As the world's fifth-largest employer, UK NHS currently employs over 1.7 million people (Nuffield Trust, 2017) and provides health services under various settings such as primary care, secondary care, mental health, and community care, among others. As a public service, NHS is held with high value by the vast majority of UK citizens (The King's Fund, n.d.). Each country within the UK chose to structure its own NHS in different ways. For example, NHS is supported by the Department of Health and Social Care in

England. For 2016/17, the overall NHS budget was around £107 billion, with an increase in 2017/18 to £125 billion (House of Commons, 2018).

Since its inception, the NHS has been operated within highly political and dynamic environments of successive governments and organisation structures of the NHS have been in a continuous state of change. In a major shift in policy directions that came out with the Health and Social Care Act 2012, NHS England went through substantial structural reforms, in terms of organisation structure, financial and operational accountability, and leadership. As per the new structure of NHS England (NHS, 2014), it supports Clinical Commissioning Groups (CCGs) that are responsible for about 60% of the NHS budget and commission secondary/acute care, community care, mental health, and rehabilitative care services. NHS Foundation Trusts provide the services that the CCGs commission, including hospitals, ambulance and mental health services. NHS England directly commissions primary care services⁴, for example, General Practitioner (GP) s, Dentists and Opticians and also, some ‘specialised’ services that include military and veteran health services and health services for people in prisons.

2.3.1.2. Local Authorities

The accountability for publicly funded social care spending and service provision lies with the respective local authorities (or Councils) in England. Adult social care is the largest area of spend for local authorities, which accounted for 43% of councils’ overall spending on local services in 2016–17 (National Audit Office, 2018a). Local authorities rely on a combination of council tax, business rates revenues, income from NHS, and government grants for funding of adult social care services. In 2016-17, local authorities commissioned care services of about £20.4 billion value (NAO, 2018). Unlike the NHS, which generally remains free at

⁴ In some cases, CCGs also play a part in the commissioning of GP services

the point of use, state-funded adult social care is not free for everyone. Eligibility for local authority funded social care is subject to both a financial means test and care needs assessment. Local authorities commission adult social care services that cover both short-term support and long-term care and support needs, from a range of service providers (National Audit Office, 2014). The majority of local authority expenditure goes into providing long-term support services, which comprises providing care and support in a residential setting such as care homes, nursing homes and supported accommodations; and also, supporting elderly, frail and vulnerable people (such as younger adults with learning disabilities) to live independently in their own homes. The latter category of care and support needs involve personal and domiciliary care, home adaptations, and assisted living technology-enabled care (telecare). Thus, local authorities are the 'key agents' within telecare policy who have the most significant role in the delivery and funding of telecare services in England (Lloyd, 2012, p. 9).

2.5. The Policy Context

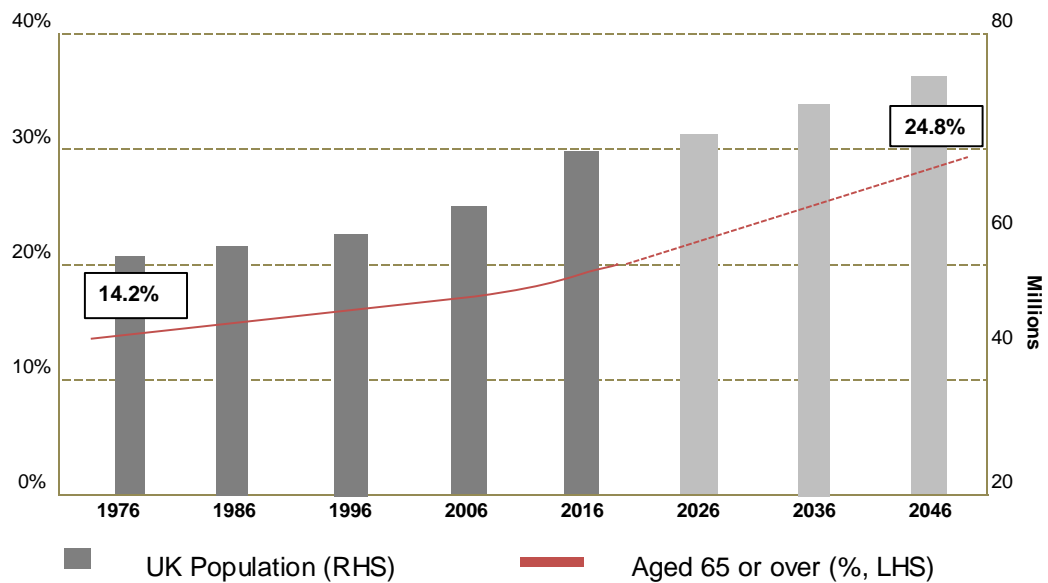
2.5.1. The Challenge of Ageing Population

The ageing of the population has become a global phenomenon - for the first time in history, people aged 65 years and older in the world are set to outnumber children under five years old within the next five years (Suzman et al., 2015). Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%, and all countries over the world face significant challenges in addressing the health and care demands arising out of this demographic shift (World Health Organization, 2018). UK Population Estimates suggest that by 2046, nearly 1 in 4 people in the UK (24.8%) will be aged 65 or over (see Figure 2.3). The highest increase has been seen among the 'oldest old' age group (those aged 85 or above), which is projected to make up 5%

of the total population (AKTIVE, 2013, p. 3). At the same time, there has been a decline in the number of potential caregivers due to changing family structures, geographical dispersion of family members and also, due to women's increased participation in paid employment (AKTIVE, 2013, Cook et al., 2013).

Figure 2.3 UK Population and Proportion of Population aged 65 & over

(Source: ONS, 2017)



ONS annual population survey data for 2015-2017 suggests that while life expectancy in England is rising, healthy (or disability-free) life expectancy, which indicates the number of years lived in 'good health', is on a decline⁵ (ONS, 2018, p. 12).

Demographic projections in 2019 (see Table 2.1) show that the percentage of the older population (aged 65 and over) with limiting long-term conditions in North East of England is higher (by about 2%) compared to the same for England. **Such projections suggest that the demand for care services is anticipated to be**

⁵ Health state life expectancy data at birth for males and females in England suggest years lived with disability are about 16.5 years (for males) and 21.0 years (for females).

relatively higher than that at the national level. Furthermore, as Table 2.2 shows, there are considerable regional differences in terms of household wealth amongst 65+ year old population, and a higher share of older people in the North East of England live in less wealthy households. In a contemporary study examining the health inequalities in the North of England, Addison et al. (2018, p. 1) observe that ‘whilst the North represents 30% of the population of England it includes 50% of the poorest neighbourhoods, and tends to have worse health than places with similar levels of poverty in the rest of England’. Data from the English deprivation report also supports relatively high levels of health deprivation and inequalities in North East districts (DCLG, 2015 p. 14) compared to England average.

Table 2.1 Comparison of Demographic Projections between NE England & England

(Source: <https://www.poppi.org.uk> and <https://www.pansi.org.uk>)

Metric	North East of England	England
Population aged 65 and over (percentage of total population)	530,000 (20%)	10,366,000 (18.39%)
Population aged 85 and over (percentage of total population)	65,500 (2.5%)	1,390,400 (2.47%)
Total population aged 65 and over with a limiting long term illness whose day-to-day activities are limited a lot	152,092	2,456,207
% of population aged 65 and over with a limiting long term illness whose day-to-day activities are limited a lot	5.7%	4.3%

Table 2.2 Share of 65+ year population with household wealth < £50,000 by region (Source: ONS, 2013, p.17)

Region	% of 65+ old people with total household wealth < £50,000
North East	24%
North West	16%
East Midlands	12%
West Midlands	13%
East of England	10%
London	21%
South East	10%
South West	9%
Total UK	14%

2.5.2. Economic Constraints in provisioning Health and Care Services

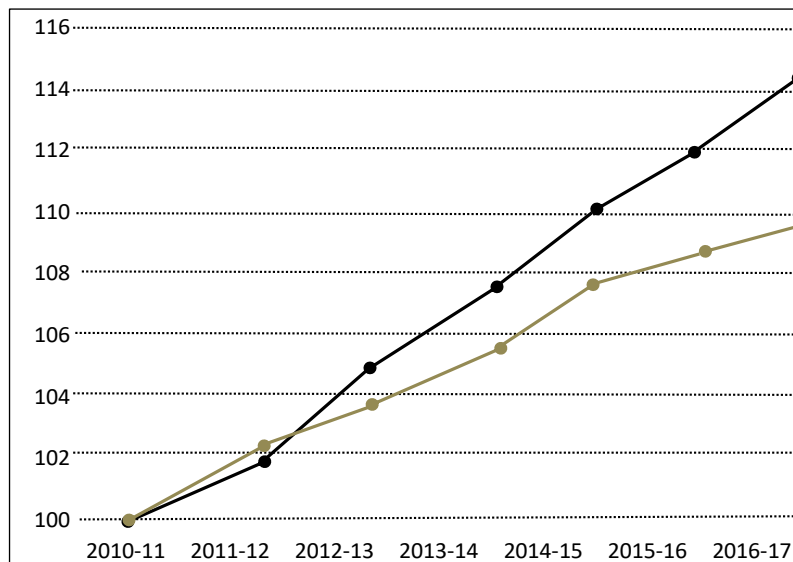
Effective management of 'long-term conditions' associated with the rising elderly demographic and reduced disability-free life expectancy is recognised as one of the major challenges facing the 21st-century National Health Service in England (Department of Health, 2012c). The number of people with long-term conditions in England is projected to increase to around 18 million by 2025, accounting for about 70% of total expenditure on health and care (Health Committee, 2014, p. 3). The ageing population and increasing prevalence of long-term conditions will have a significant impact on health and social care budget and are likely to add £5 billion additional expenditure by 2018 (Age UK, 2018, p. 7). More than two-fifths of NHS budget is estimated to be spent on people over 65 as patients with long term conditions are high users of health services, accounting for 55% of all GP, 68% of all outpatient and Accident and Emergency (A&E) appointments and 77% of inpatient bed days in England (Health Committee, 2014). An upward trend in the number of hospital admissions and readmissions has put increased pressure on acute/secondary care capacity and added to the rising cost of healthcare delivery - with NHS budget deficit expected to reach about £6 billion by 2020-21 (Gainsbury, 2016).

Figure 2.4 highlights the increasing demand for social care services, especially for the segment of people aged 65 and over, which has grown by over 14% between 2010-11 and 2016-17 (National Audit Office, 2018b). With aims to reduce the fiscal deficit and to deliver growth to the economy, since 2010, successive English governments have followed austerity measures through cuts in spending on public services, including adult social care (Ofcam, 2013). Due to such economic austerity measures, over the period 2010-11 to 2017-18, local authorities experienced a real-terms reduction in spending power of 28.6% (National Audit

Office, 2018b). However, a recent report published by the *Institute of Fiscal Studies* has reported that such cuts in social care spending are not uniformly spread across all English local authorities (Philipps and Simpson, 2017). The report mentioned that the local authorities in the North East that initially (before austerity) had higher levels of assessed social care spending need and higher levels of deprivation had experienced 18% cut in adult social care spending per adult between 2009–10 and 2015–16 which is larger than the England average (11% cut) (Philips and Simpson, 2017, p. 29).

Figure 2.4 Growth in Demand for Social Care Services, 2010-11 to 2016-17

(Source: National Audit Office, 2018b)



- Estimated population in need of care aged 18-64
- Estimated population in need of care aged 65 and over

Y axis displays the change in demand with respect to 2010-11 (indexed: 2010-11=100)

The cuts in adult social care budgets in the backdrop of increasing demand for care services have prompted the local authorities to set challenging saving targets in provisioning such services. In its budget survey of 144 local authorities in England with social care responsibility, Association of Directors of Adults Social

Services (ADASS)⁶ reports that adult social care planned savings for 2017-18 is £824 million, which is approximately 5% of adult social care budget (ADASS, 2017). Unlike health services many social care services including telecare are not statutory by nature. Therefore, in addressing their budget deficits, local authorities need to carefully balance prioritising between prioritising their statutory duties towards those with the greatest needs, as per 'Fair Access to Care Services' (FACS) criteria (SCIE, 2012) and investing in preventive services such as telehealthcare (ADASS, 2017, p. 19).

2.5.3. Policy shifts towards Personalisation, Choice and Empowerment

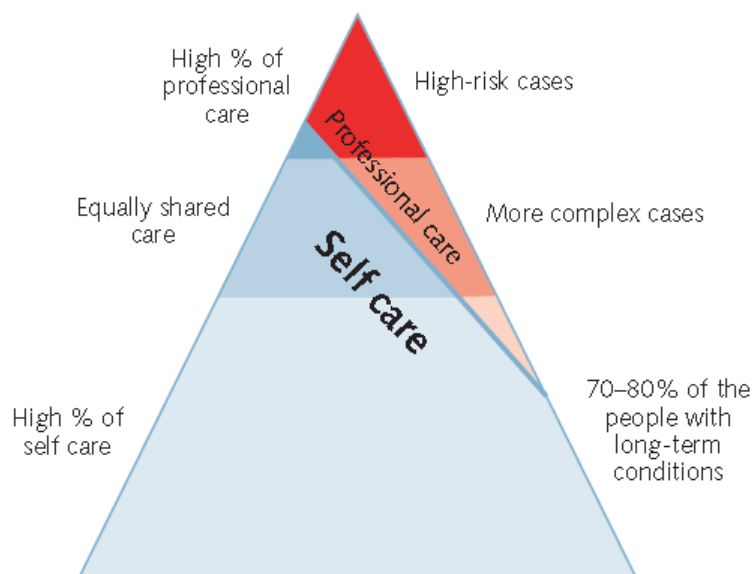
The demographic challenge of the ageing population under a constrained public funding landscape, called for shifts in the prevalent health and care policies to focus more on prevention, self-direction, and personalisation (Audit Commission, 2004a). A series of policy publications such as *Assistive Technology Independence and Well-being* (Audit Commission, 2004b) and *Building Telecare in England* (Department of Health, 2005) recognised the 'preventative' role of assistive technologies, such as telecare and telehealth, to promote the well-being and independence of older, disabled or vulnerable people. Department of Health's policy document *Putting People First* (Department of Health, 2007) highlighted the importance of a person-centred approach that anchors on principles of greater personalisation, maximisation of choice and control for the patients/users.

In a white paper published in 2006, *Our Health, Our Care, Our Say: A New Direction for Community Services* (DOH, 2006, p. 109), the Department of Health highlighted a strategic challenge for the health and care systems by presenting that over two-thirds of NHS activity, and an estimated eighty percent of costs are related to one-third of the population - predominantly older people with long-term

⁶ More information on The Association of Directors of Adult Social Services (ADASS) can be found at <https://www.adass.org.uk/>

conditions and/or disabilities. As shown in Figure 1.5, the policy document emphasised the importance of putting a greater focus on prevention, early intervention, and self-directed care through ‘low-level support services’, such as assistive technologies - providing more empowerment and choice for patients /users. Subsequent policy documents, notably a green paper *Shaping the Future of Care Together* (DOH, 2009a); a white paper *Building the National Care Service* (DOH, 2010) and a vision document *Vision for Adult Social Care: Capable Communities and Active Citizens* (DOH, 2010) suggested a central role of telecare within the future social care policy. **The potential of telehealthcare interventions to address more specific care needs, such as for people living with dementia, is also emphasised** in the national dementia strategy document *Living Well with Dementia* (DOH, 2009b). More recently, Prime Minister’s challenge on dementia 2020 (DOH, 2015) document has further envisioned a greater role of telehealthcare technologies with a national programme to deliver sustained improvements in health and care, create dementia-friendly communities, and boost dementia research by 2020.

Figure 2.5 Policy agenda for Empowering and enabling individuals to take control
(Source: Department of Health, 2006, p. 111)



So far, the discussion has been focused on health and care policies and agendas related to telehealthcare. However, it is necessary to mention the key strategies and guidance around the application of digital health information technologies within the broader context of English health and social care systems. Telehealthcare systems are described as ‘information infrastructure’ (Collinge and Liu, 2009, p.161), and it is reasonable to assume that digital strategies and roadmaps developed at a national level, could have important implications for future designs of telehealthcare services. While there have been several publications on this area, a few documents call for particular attention, with regard to the digitisation agenda within NHS England and also, concerning data /information strategy and governance with the health and social care systems. Department of Health put forward its future strategy for a digitally enabled and technologically ambitious health and care system through a cultural change to embrace the potential of digital technology (DOH, 2012). Consistent with the NHS Five Year Forward View (NHS England, 2014) vision, digitisation of health and social systems have been deemed as one of the highest priorities for NHS England. A report prepared by the National Advisory Group, *‘Making IT Work: Harnessing the Power of Health Information Technology to Improve Care in England’* (Wachter, 2016), discussed various challenges for implementing digitisation programme in NHS England. The report made several practical recommendations, which comprise, among others, building capacities in health and care organisations, maintaining an appropriate balance between local/regional control and engagement versus centralisation, and promoting wide-spread interoperability and electronic data sharing. Two documents feed into the above digitisation agenda, addressing the issues of *Data and Information Strategy* (NHS Digital, 2016) and the *Local Digital Roadmaps* (NHS England, 2017) with

overarching aims of supporting integration and governance of data/information across the disparate health and care systems.

2.5.4. Locating Telehealthcare in the Policy

The introduction of the *Preventative Technology Grant* by the Department of Health in 2006 led to the increased policy focus on telehealthcare (Doughty et al., 2007). With an investment of £80 million over two years from April 2006, Preventative technology grant aimed to promote the use of telecare technology and to support 160,000 vulnerable people to live independently at home, thereby reducing the need for avoidable admissions to hospital and residential care (Wanless et al., 2006).

While considerable interest and commitment to supporting widespread adoption of telehealthcare services had been expressed in the policy literature, as mentioned earlier, lack of rigorous evidence of the actual impact was missing (Bower et al., 2011). Only limited evidence was available on the effectiveness of telecare, primarily from a few pilot studies (Wanless, 2006), and the policymakers felt that a more reliable and robust evidence base is a prerequisite to mainstreaming these technologies (Roulstone et al., 2013).

Therefore, the Whole System Demonstrator (WSD) programme, believed to be the world's largest randomised control trial of telehealth and telecare, was introduced by the DOH in 2008, to evaluate the effectiveness of telehealthcare technology at a far larger scale than pilot studies had used previously. WSD trials, aimed to provide 'gold standard' evidence for the effectiveness of both telehealth and telecare, recruited over 6000 participants and involved 238 GP practices in three pilot sites across England. Telehealth trials focused on long-term diseases such as diabetes, Chronic Heart Failure (CHF), and Chronic Obstructive Pulmonary Disease (COPD). Headline findings from WSD established the

potential of telehealth trials in reducing mortality rates and emergency hospital admissions to a considerable extent (DOH, 2011; Steventon et al., 2012). Several studies reported mixed results on the cost-effectiveness and outcomes of the telehealth and telecare treatments (Cartwright et al., 2013; Hendy et al., 2012; Hirani et al., 2014; Steventon et al., 2013).

Inspired by the preliminary findings from WSD pilot trials and also informed by the success of telehealth programmes such as *Veterans Health Administration* in the United States (Darkins et al., 2008), in 2012, the Department of Health announced another major initiative, *3millionlives*, in collaboration with telehealthcare industry (DOH, 2012a). The purpose of this campaign was to promote the adoption of telehealthcare services at scale, with a target to reach three million users by 2017. The initiative started with a commitment of NHS to work with industry and initially led by an industry group. However, owing to criticisms around commercial interests involved in the industry-led project, just over a year after the launch, NHS England took over and repositioned the campaign (POST, 2014). A redefined vision for the programme articulated the critical need for collaboration across a broader range of stakeholder groups – commissioners, providers, the Third sector, Local Government, and housing, to achieve ‘Integrated Care for 3millionlives’ (Cashman, 2013).

It is worth mentioning three further important initiatives that aimed to promote uptake of telehealthcare technologies and to explore the underlying challenges. First, the ‘*Assisted Living Innovation Platform*’ (ALIP) realised out of a vision to transform long term care provisions for older people by providing alternatives to institutional care and allowing a larger population of the elderly and people with care needs to live more independently (Housing LIN, 2013). The programme was

run by the UK's innovation agency, Innovate UK (formerly Technology Strategy Board).

The second was an ambitious national programme named '*Delivering Assisted Living At Scale*' (DALLAS), which got conceived in 2012 with £37 million investment from Innovate UK, the National Institute of Health Research (NIHR) and the Scottish Government (Lennon et al., 2017). The programme aimed to explore how new technologies and services could improve and support peoples' needs for independent living and long term care. Accordingly, four consortia were tasked with running the programme to benefit about 170,000 users across the UK by 2015 (Harper, 2016). While findings from the DALLAS programme suggested higher receptiveness to the uptake of telehealthcare services, they also highlight some significant barriers to mainstreaming of such services (Lennon et al., 2017, p. 7).

Finally, '*Assistive Technology and Telecare to maintain Independent Living At Home for People with Dementia*' (ATTILA) was a multi-site randomised control trial programme that got funded by the Health Technology Assessment (HTA) Programme (Leroi et al., 2013). The primary objective of this trial was to ascertain the effectiveness of telehealthcare interventions, in supporting people with dementia to live independently at their homes.

In the last five years, there have been three important policy updates related to health and care services, which could have implications for telehealthcare services. 'The Care Act 2014' released by the UK government in 2015 (Government of the UK, 2014) set out guidelines for local authorities in relation to the assessment of people's care needs and on ascertaining their eligibility for publicly funded care and support. The eligibility framework related to social care and support provides a classification of needs such as 'substantial' or 'critical',

depending on the severity of the risk involved. Such policy guidance allows the local authorities to follow 'Fair Access to Care Services' (FACS) criteria (SCIE, 2012) in prioritising adult social care demands, in a way that referrals to telehealthcare interventions could be prioritised only for severe needs and as substitutes for expensive residential care packages.

Another critical policy initiative, Better Care Fund (BCF) was created with a £3.8 billion single pooled budget between both the NHS England and the Local Government (NHS England, 2013). The BCF has aimed to enable health and social care services to work more closely and to improve the lives of some of the most vulnerable people in the society, through provisioning of more integrated health and social care services. Self-care management utilising telecare and telehealth services could potentially make good use of the BCF (Bennett and Humphries, 2014). Since 2015-16, local authorities and NHS CCGs have been pooling budgets in a way that supports more people to live at their homes when they get discharged from the hospital (National Audit Office, 2018b, p.16).

In their published *Five Year Forward View* vision (NHS England, 2014b), NHS England leaders recognised the critical need to adopt new care delivery models enabled by latest technology advancements and higher engagement of empowered local communities, focusing on the preventive and self-care services. Such vision acknowledges the potential of *Technology Enabled Care Services* (TECS) in transforming the way services are designed and delivered, leading to a sustainable NHS for the future. In order to maximise the value delivered by TECS, practical recommendations and tools are provided as guidance to TECS commissioners (NHS, 2015). Following the plan laid out in the NHS Five Year Forward View, "vanguards" for new care models programme have started working

on integrated care systems to end the prevailing ‘fractured’ care system’ (NHS England, 2017a).

While the policy literature talks about health and social care in the same breadth, it can be argued that policy focus remains primarily restricted to the health/clinical area. Despite a commitment made by the Conservative Government in March 2017 for the publication of a Green Paper on adult social care, in order to allow a public consultation, the new social care policy has been delayed several times (HCL, 2019). According to media reports, the most recent delays are attributed to the Government concentrating on Brexit and also a lack of clarity and detail about the proposals to be included in the Green Paper.

2.6. Technology Landscape for Telehealthcare

This section explores the technology landscape for telehealthcare services, with particular focus on how these technologies have evolved over a period of time in the English health and care context and the strategic visions and future opportunities around Digital Health and Care solutions. For reasons already explained earlier (see section 2.2), discussion in this section is restricted primarily to telecare services.

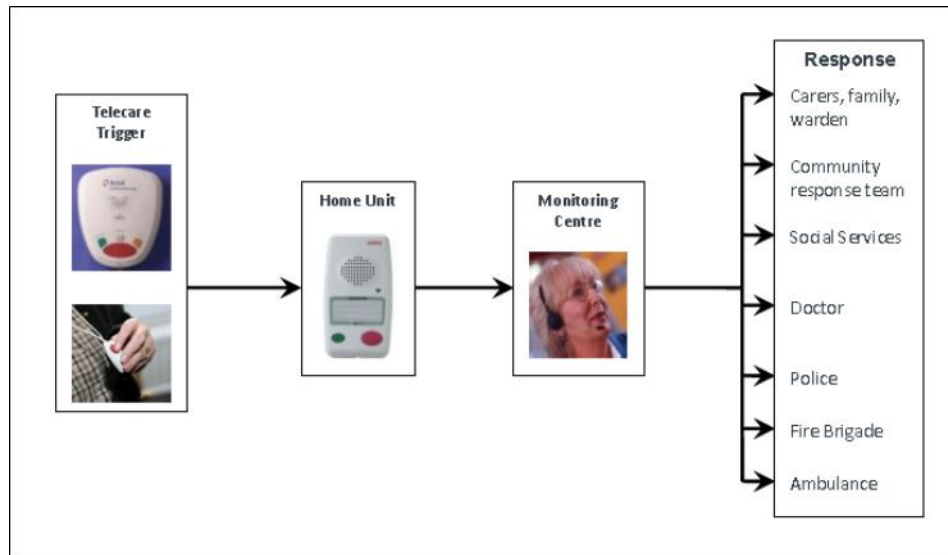
2.6.1. How a telecare system works

A typical telecare system (see Figure 2.6 below) uses a range of electronic devices (with sensors) and a base unit installed at a user’s home (or worn by the user), which are connected to a remote monitoring centre through ICT network. These sensors monitor vital health status (such as falls) for elderly users and also, monitor the environment at their home (such as detection of flooding, gas leaks, smoke, or fire). In case of emergencies, these sensors trigger alarms (automatically or through manual action by the user) and send alerts to a remote telecare monitoring centre. The telecare call centre, in turn, acknowledges the

alarm and responds appropriately following an established protocol as part of the service agreement.

Figure 2.6 A Basic Telecare System

(Source: adapted from Brownsell and Bradley, 2003, p. 8)



2.6.2. Evolution of telehealthcare technologies in the UK

In the UK, Telecare has been in practice since last five decades (Fisk, 2003, p. 57), commonly referred in terms of ‘community alarms’ or ‘social alarms’ as the systems were originally designed for elderly people and low-income groups (Miskelly, 2001, p. 455). Since then, advances in telecare technologies have offered incremental benefits related to assisted living health and care needs. The different stages of development of telecare technology have been conceived as three distinct yet overlapping generations of systems (Doughty et al., 1996; Brownsell and Bradley, 2003). Table 2.3 illustrates the key characteristics of each of these three generations of telecare systems with relevant examples.

Table 2.3 Three Generations of Telecare Systems (Source: own illustration)

Generation and timeline	Focus	Key characteristics	Example (s)
First (introduced in the 1960s; still in use, although minimally)	Reactive, either through 'ex post' emergency response to risk events, or through mitigating escalation or harm	Simple and reactive monitoring with no embedded intelligence (Brownsell et al, 2008, p. 8). Require manual alarm activation by the user.	Typically used in monitoring of elderly users in sheltered houses where users need to trigger alarm calls by using button on a portable device such as a pendant, or by reaching a pull cord in their places
Second (introduced in the 1990s, majority of current telecare systems in England)	Reactive but with capabilities of reducing risk through early detection and activation of response action	Continuous monitoring through automatic detection and activation of alarms that does not require user's action. Also employs a broader range of sensors.	Fall detectors, fire and smoke detectors, flood detectors, Door / property exit sensors, bed/chair occupancy sensors, motion detectors etcetera
Third (Introduced in the early 2000s, adoption of this generation of technologies has been slow so far)	Preventative through prediction of risk events	Builds on the second generation and brings more advanced and complex capabilities through measurement, collection and analysis of "lifestyle monitoring" data in the user's home (Stowe and Harding, 2010, p. 194). Utilises broadband, wireless, and audio-visual technology to create a concept of 'virtual neighbourhood' (Brownsell and Bradley, 2003).	Telecare solutions that focus around activity monitoring by families or carers (e.g. 3rings) or lifestyle enhancement (e.g. safer walking) through GPS location tracking based solutions, such as 'Buddi' systems.

As Table 2.3 illustrates, telecare systems across the three generations have evolved from a simple and 'user-activated' design using analogue telephone system (in first-generation 'social alarms') to an automated and sophisticated infrastructure with a range of 'intelligent' sensors utilising broadband, wireless, and audio-visual technology. Social alarms with 'user-activated' were perceived unsuitable for users with cognitive impairment (such as dementia) (Woolham et al., 2006). The second generation of telecare sensors is capable of identifying abnormal or unusual patterns in the everyday lives of users. For example, fall

detectors enable automated triggering and communicating an alarm to the telecare control centre in case sudden movements or changes in positions of the user are detected by the sensor technology. Finally, the third generation of telecare could potentially be useful from prevention perspective given their capabilities of predicting problems through analysis of patterns of data from monitored events. Data collected automatically from various sensors could be made accessible to the carers (formal or informal) and relatives, for continuous monitoring and reassurance of the user's well-being. Additionally, this generation of telecare systems could potentially address a broader range of assisted living needs related to activities for daily living, social communication and participation (Sixsmith and Sixsmith, 2008, p. 232) - for example, contact with family via social networking websites or video telephony, perform grocery shopping over the Internet, and so forth (Stowe and Harding, 2010, p. 194).

2.6.3. Technology visions and opportunities for Digital Health and Care

A recent policy paper (Government of the UK, 2018, p. 4) sets out the government's vision for the use of digital technology and data in transforming the health and social care system. It acknowledges that within the current fragmented state of health and care systems in the UK:

'Technology systems used daily across hospitals, GP surgeries, care homes, pharmacies and community care facilities don't talk to each other fail frequently and do not follow modern cyber security practices. As a result, some people are getting suboptimal care, staff are frustrated and money could be saved and released for the front line.'

The policy paper advocates a radical new approach to use of cutting-edge digital technologies such as *Artificial Intelligence (AI)* to help diagnose diseases or conditions, *Robotics* and voice assistants to support people and their carers in rehabilitation, dementia support or medication management (Government of the UK, 2018, p. 4). Likewise, the Industrial Strategy white paper (UK Government,

2017) reiterates the UK Government's support for the care sector to adapt for the future – through innovation, development of new business models, and better use of emerging technologies. In its published report, Government Office for Science (2014) emphasised the potential of the *Internet of Things* (IoT) based new 'SMART' technologies for remote monitoring and care services (Manyika et al., 2013).

Britain will see a closure of the traditional analogue public switched telephone network (PSTN) and a switch to fibre network-enabled digital Internet Protocol (IP)-based voice telephony services by 2025 (Hall, 2018). This changeover will impact current telehealthcare solutions that rely heavily on analogue PSTN network to a fully digital communication regime. Ofcom, BT, and TSA are now working jointly with the providers and other relevant stakeholders of the telehealthcare service ecosystems in consulting and planning this transition (TSA, 2017a).

2.7. Market Environment for Telehealthcare

In this section, an overview of the current market environment is presented concerning the TECS industry and the broader Digital Health sector in the UK. While adoption of telecare in the UK, with about 1.7 million users as of 2010, has been perceived as decent (Gibson et al., 2016; Goodwin, 2010), only a modest number of 5,000 telehealth users have been reported, mostly receiving the service out of the Department of Health's WSD pilot programme (Goodwin, 2010). Such a lower adoption of telehealth has been attributed to several challenges, including the lack of a robust evidence base around cost-effectiveness, funding mechanisms, and clinical buy-in (Monitor Deloitte, 2015).

Estimation of current and future market size for telehealthcare services in the UK, both in terms of number of users and spending, has been described as a

challenging task (Barlow et al., 2012) owing to the overlapping terminology used across telehealthcare interventions, uncertainty on the number of actual users, and also, changing capabilities of technology. Technology review reports from TECS industry sources and big consultant firms project optimistic growth numbers (and market value) in terms of demand for telehealthcare, and Digital Health technologies in general (Deloitte Centre for Health Solutions, 2014; Plum Consulting, 2010; Philips, 2018). However, existing academic literature on telehealthcare has not paid much attention to the issue of present and future market volume.

Only a limited volume of academic studies have addressed the telehealthcare market issues, primarily with reference to the market for telecare services specific to dementia (Knapp et al., 2016) and concerning aspects of 'market readiness' for these services from a macro perspective (Lennon et al., 2017). One of the fundamental aspirations of the policy initiatives like *3millionlives* and DALLAS has been to collaborate with the private industry sector and encourage developing a retail market for telehealthcare services (DOH, 2012; Lennon et al., 2017). However, factors such as 'low levels of consumer awareness together with a confusing mix of assistive technology terminology' (AKTIVE, 2014, p. 8); lack of a clear boundary between health and social care services; and a diverse range of heterogeneous and autonomous organisations with distinct work culture result in a complex and challenging UK telehealthcare market for private retail sector (May et al., 2011; Lennon et al., 2017). Issues related to technology infrastructures such as lack of standardization, adaptability, and interoperability further hinder large-scale adoption within the TECS industry (Greenhalgh et al., 2016).

Attempts by the service providers to reach out to retail customers directly, as was the case with 'Help at Hand' telehealthcare service from O2 Health, failed in the

past (Lowe, 2013). A 'quasi-consumer model' in which telehealthcare services used to be traditionally funded and provisioned by the local authorities, has been cited as a limiting factor for the growth of a private market ((Barrett et al., 2015, p. 6). The growing policy shift from primarily statutory, to more self-funded provision for telehealthcare services, through use of direct payments and personal budgets (Glasby, 2009; House of Commons, 2016) is anticipated to move towards more private customer-led service models in the English telecare market (AKTIVE, 2014).

While large global companies such as Philips (Home Healthcare Division) are becoming increasingly interested in the TECS business in the UK, the industry remains relatively small-scale and fragmented (Barlow et al., 2012). Tunstall Healthcare (<https://uk.tunstall.com/>) and Legrand Electric Limited (www.legrand.co.uk) are currently the two leading manufacturers of telehealth and telecare devices in the UK. In addition to manufacturing a wide range of assistive technology sensors and devices, these companies also supply telecare technology management platforms (Tunstall PLC and Jontek Answerlink) – a vital component of a telecare service delivery infrastructure. Among other relatively smaller yet established companies, Buddi (<https://www.buddi.co.uk/>), 3Rings (<https://news.3rings.co.uk/>), 'Just Check In' (<https://justchecking.co.uk/>) and Oysta (<https://oystatechnology.co.uk/>) offer a range of specialty services focused on activity monitoring and location tracking for their customers.

The Telecare Service Association (TSA) is the representative industry body for TECS in the UK, working on behalf of the industry and also, advising a range of organisations including service providers, manufacturers/suppliers, housing associations, and health and social care commissioners (<https://www.tsa-voice.org.uk/about-tsa>). In early 2018, TSA has been reorganised into two

separate organisations. After restructuring, one organisation that retained the name TSA is set up as a community interest company and focuses on membership of partner organisations, and strategic areas such as lobbying to central and devolved governments around the policies and strategies concerning TECS. The other organisation, 'Technology Enabled Care Quality' (TEC Quality) is an arm organisation of TSA with an independent Board and auditing function, which is responsible for assessing and certifying service quality for about 150 member service provider organisations across England against the TSA Code of Practice⁷.

2.8. Conceptualising a Telehealthcare Service Ecosystem

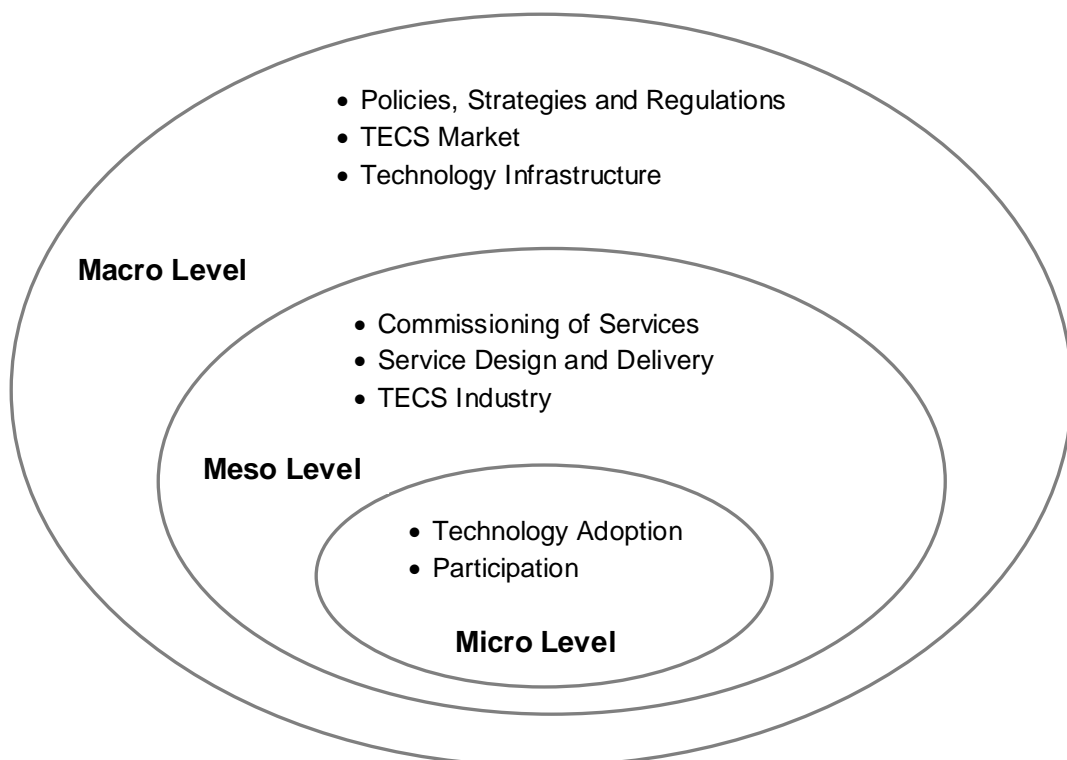
The metaphor of a 'business ecosystem' has been widely used in the business literature to represent a loosely bound community of interacting entities (or actors) with varying roles and capabilities, and their relationships which determine the overall effectiveness at an aggregated level (Iansiti and Levien, 2004; Moore, 1993). Such a metaphor provides a useful lens to adopt a systemic view, in exploring issues related to participation, partnerships, and collaboration within a broader business environment (Adner, 2017). Telehealthcare has been described by Sugarhood et al. (2014) as a complex and diverse "user system" in which aligning interests across a wide range of stakeholders remains critical yet challenging. Discussions made so far suggest that an investigation into telehealthcare services necessitate 'Systems Thinking' approach (Chughtai and Blanchet, 2017), to adequately capture the complexity of relationships and interactions, and diversity of the loose coupled communities of associated actors - defined by their networks and affiliations, rather than being part of a rigid, hierarchical structure (Adner, 2017, p. 40).

⁷ TSA Code of Practice is currently being replaced by a Quality Standard Framework

Accordingly, a conceptualisation of a telehealthcare service ecosystem is presented in Figure 2.7. Three distinct levels of a service ecosystem are defined as *micro*, *meso*, and *macro* and key themes ascribed to each level are mentioned (see Figure 2.7). At the **micro** level, adoption of technologies and related aspects of acceptance and participation take centre stage defined by the interactions and 'lived experiences' with the services by the users and their support system (carers, families, and friends). The central themes for the **meso** level revolve around commissioning, design, and delivery of the telehealthcare services occurring within specific geographical contexts.

Figure 2.7 Three levels of a Telehealthcare Service Ecosystem

(Source: own illustration)



In addition to the telehealthcare service provider, this level of the service ecosystem potentially involves a wide range of stakeholder organisations, as listed below:

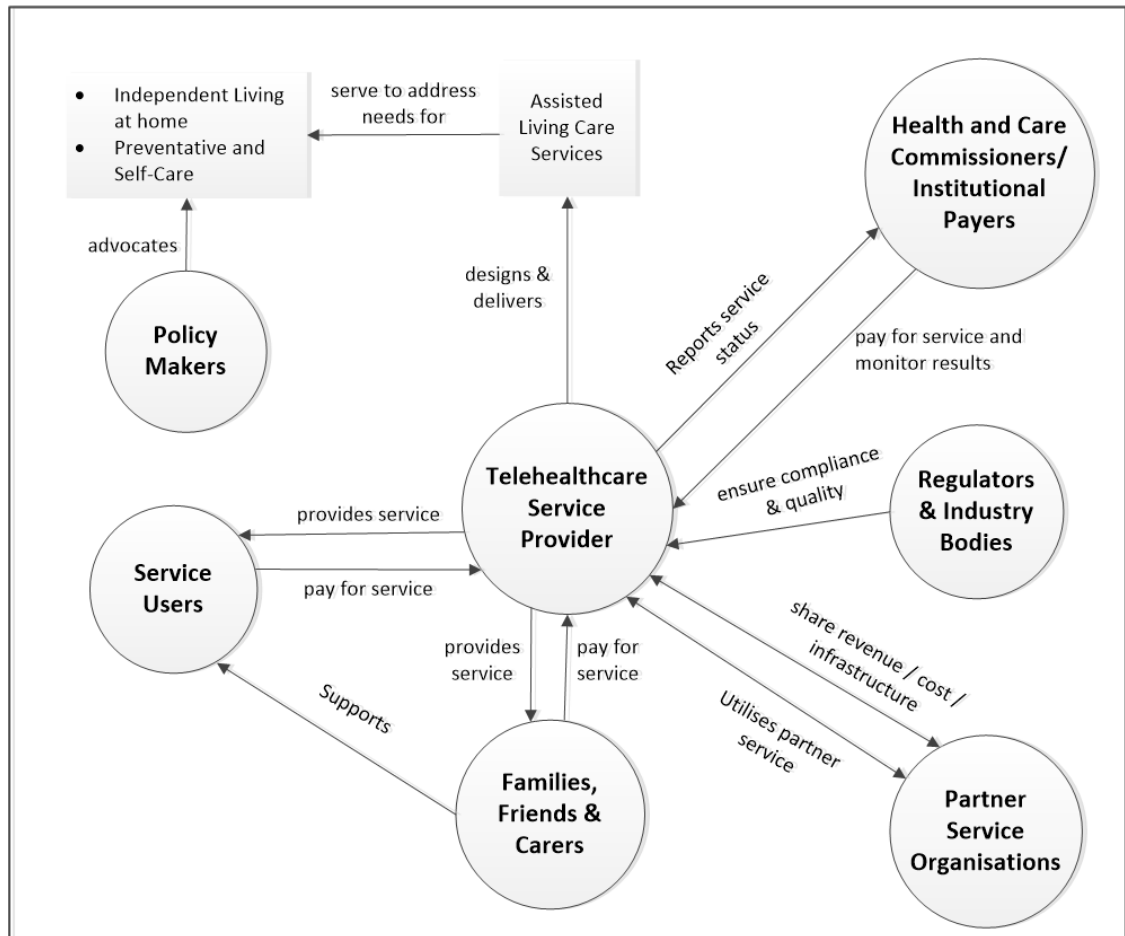
- Commissioners of adult social care services (local authorities),

- Commissioners of Health services (NHS CCG),
- Providers of other public services (such as Ambulance and Fire services),
- Providers of Housing services
- Providers of other care services, for example, Homecare services,
- Health organisations, for example, GPs, District Nurses and Hospitals and,
- Partners and Collaborators within the TECS industry such as manufacturers /suppliers, solution providers and TSA.

The **macro** level of a telehealthcare service ecosystem concerns the policy context, including national health and social care policies and strategies; technology settings related to ICT infrastructure and Information governance such as digital strategies, interoperability standards and roadmaps; and finally, market environment for TECS at the national level.

Such conceptualisation of a telehealthcare service ecosystem necessitates an illustration of the core interactions happening within the ecosystem, concerning the relationships among a diverse set of actors involved, and their objectives. Figure 2.8 provides an overview of interactions in a telehealthcare service ecosystem by locating the service (and the provider) at the centre and describes the respective roles of the stakeholders within the ecosystem. It can be argued that the success of a telehealthcare service (and the provider) is contingent on its interdependence on the other stakeholders in the environment (Adner and Kapoor, 2010). There, the concept of a service ecosystem should allow investigating the issues of adoption and sustainability within it, in a holistic way.

Figure 2.8 Key Stakeholders and their Roles within a Service Ecosystem
(Source: own illustration)



2.9. Chapter Summary

This chapter starts by examining the issues around the confusing and overlapping terminology used to describe assisted living technologies and, subsequently, presents a working definition of a telehealthcare service that is to be adopted throughout this study. The macro level contexts concerning key organisational settings, national policies and strategies, technology, and market environments within which telehealthcare services are planned, provisioned, and delivered in England, are discussed next. A conceptualisation of a telehealthcare service ecosystem with three distinct levels – *macro*, *meso*, and *micro* – is described in relation to the key focus areas at each of these three levels. A high-level

interactional view of the service ecosystem, indicating the roles and relationships for all the stakeholders within the ecosystem concerning the service, is illustrated further. In focusing on the macro level settings involving national policies, strategies, technology, and the market for telehealthcare services within the English health and social care systems, this chapter has established the macro level context for a telehealthcare service ecosystem. Chapter 3 examines the broader academic literature on telehealthcare services to draw useful insights related to adoption, design, and implementation practices, both at the *meso* and *micro* levels of the service ecosystem.

Chapter 3: Reviewing the Literature on Telehealthcare

3.1. Introduction

In the previous chapter, the macro levels contexts shaping the telehealthcare service ecosystems within the English health and social care systems and providing a background for this study have been discussed. This chapter presents **an in-depth review of literature related to telehealthcare services, with particular attention on adoption and implementations at the *meso* and *micro* levels.** The purpose of this review to elicit valuable insights from prior research on telehealthcare, including aims, approaches, theoretical perspectives, and findings of the investigations conducted so far. By drawing upon a thematic analysis of a range of academic literature, this review aims to highlight gaps in the extant literature, and also, to understand the key challenges as well as opportunities related to the current state of adoption and organisational practices for telehealthcare services. A summary of key insights gained through the review of literature is presented, which should inform the aim of this research relating to future designs of service models. Finally, knowledge gaps identified through this review are fed into sharpening the focus of the study. The chapter begins with the aims and questions employed for the literature review.

3.2. Review Focus and Questions

The aim of the literature review conducted in this chapter was primarily to explore extant academic literature on telehealthcare technologies and services, in order to understand the strategic goals, key issues, and barriers concerning them. Such exploratory focus allowed the review findings to be aggregated and to be

summarised in a developmental way to build a foundation for the study providing 'knowledge support' rather than to offer 'decision support' in a specific policy or management context (Mays et al., 2005, p. 8). In the introductory chapter, the following research question was proposed:

How can telehealthcare technologies act as drivers for new models of care in the context of North East England?

Since this initial research question is broad and multi-faceted, a review and synthesis of the literature review necessitated a more granular set of questions from both feasibility and practicality point of views. Mays et al. (2005, p. 9) suggested that a preliminary scoping of the potentially relevant literature to ascertain the nature and distribution of relevant studies is helpful in establishing specific review questions. Following Greenhalgh et al. (2005, p. 420), an initial search led by intuition, informal network, advice from the supervisors, and browsing 'seminal conceptual papers' in the technology-enabled health and care domain was performed, to map the diversity of perspectives and approaches. This exercise aided in the conceptual sharpening, attempting to define and refine precisely the question to be pursued in review synthesis (Pawson et al., 2004, p. 13). Ideas derived from the above exercise, supplemented with the explications of the underlying contexts shaping telehealthcare services in England made in the previous chapter led to the following review questions:

1. How are the telehealthcare technologies currently being implemented in practice?
2. What are the key barriers and challenges in the adoption and implementation of telehealthcare services?
3. What are the opportunities for designing new models of telehealthcare services?

3.3. Review Methodology

3.3.1. Review Approach

In healthcare research, it can be beneficial to follow a systematic approach in literature searching, appraisal, analysis, and synthesis that enables information and research about the domain to be viewed within its particular context and provide a complete picture of the topics under study (Aveyard, 2014). The broad nature of initial research question demands inclusion of a wide range of research topics from academic disciplines, which renders more science-based stricter protocol-driven and rigorous systematic review methods of evidence synthesis such as the Cochrane Collaboration or statistical meta-analysis / meta-ethnography inappropriate for this PhD study (Popay et al., 2006, p. 8; Aveyard, 2014, p. 10).

To maintain many of the benefits of following a systematic review protocol within a social science and business research paradigm, it is proposed that a more contextually suitable approach is taken (Aveyard and Sharp, 2013). To address similar issues, adapted methodological guidance on systematic review processes and synthesis of literature was developed by Popay et al. (2006); this is termed a narrative synthesis approach. This approach was, therefore, adopted for the literature review in this chapter. 'Narrative synthesis' refers to an approach to the systematic review and synthesis of findings from multiple studies that rely primarily on the use of words and text to summarise and explain the findings of the synthesis (Popay et al., 2006, p. 6). The authors prescribed the following stages in the review process:

1. Identifying the review focus, searching for and mapping the available evidence
2. Specifying the review question
3. Identifying studies to include in the review

4. Data extraction and study quality appraisal
5. Synthesis
6. Reporting the results of the review and dissemination

3.3.2. Strategy for Searching the Telehealthcare Literature

In order to address the review questions outlined in the previous section, a literature search was performed. In Chapter 2, the issue of consistent terminology in the telehealthcare technologies domain has been highlighted, as terms such as ‘assistive technology’, ‘telecare’, ‘telehealth’, ‘telemedicine’, and ‘telemonitoring’ are often applied loosely and interchangeably, in both academic and practice literature. Telecare and telehealth technologies draw research interests from a wide range of academic disciplines – Healthcare Information Systems (Collinge and Liu, 2009), Gerontology (Morris et al., 2013), Health Science (Rogers et al., 2011), Health Economics (Henderson et al., 2014), Healthcare and Public Policy (Goodwin, 2010), Social Sciences (Fry, 2014), Healthcare Management (Barlow et al, 2005), among others. Such a wide range of research literature necessitated a search strategy that includes a variety of terms applied in association with telehealthcare technologies in different contexts. In the academic journals, the purpose of telehealthcare services are often described using various terms, such as ‘ageing in place’ (Proctor et al., 2014; Sixsmith and Sixsmith, 2008), ‘independent living’ (Brownsell and Bradley, 2003; Peek et al., 2015) or ‘assisted living’ (Wherton et al., 2012; Greenhalgh et al., 2013). In a similar vein, the support provided by the telehealthcare technologies is expressed in the literature using keywords such as ‘long-term care’, ‘homecare’, ‘home-based care’, ‘self-care’ or ‘self-monitoring’. Accordingly, the search strategy adopted for this review employed a wide-ranging set of keywords to locate relevant literature across academic disciplines. A complete list of search terms and parameters employed for searching academic literature can be found in Table 3.1.

Table 3.1 Search Terms and Parameters used for locating the Literature

Category	Key search terms / criteria	Search parameters
1	'Telecare' or 'Telehealth' or 'Telemedicine' or 'Telehealthcare' or 'Assistive Technology' or 'Social Alarms' or 'Telemonitoring' or 'Remote monitoring' or 'Home health monitoring' or 'Technology enabled care' or 'Technology assisted care' or 'Digital health' or 'Connected health' or 'eHealth' or 'mHealth'	Terms under category 1 are employed in searching bibliographic databases in variable combinations with terms listed under categories of 2 to 4 – creating search strings with 'AND' and 'OR' Boolean operators. Category 5, 6 and 7 search criteria remain fixed.
2	'Service' or 'Design' or 'technology' or 'Technologies'	
3	'Ageing in place' or 'Smart home' or 'Independent living' or 'assisted living' or 'Integrated care' or 'health and social care' or 'long-term care' or 'homecare' or 'home care' or 'home-based care' or 'self-care' or 'self-monitoring'	
4	older' or 'elderly' or 'ageing' or 'aging' or 'senior' or 'learning disabilities'	
5	Year of publication	1998 or later (see footnote ⁸ below)
6	Type of publication	'Journal Article' or 'Book Chapter' or 'Conference Proceedings'
7	Language	'English'

Considering the diverse range of perspectives that need to be drawn from literature across diverse disciplines, the following online databases were purposefully chosen for searching relevant academic literature.

1. Web of Science
2. Scopus
3. Health Research Premium Collection (includes Medline via ProQuest)
4. Science Direct (Elsevier)
5. Cinahl (via EBSCOhost)
6. Social Policy and Practice (via Ovid)
7. IEEE Explore digital library
8. Taylor and Francis Online
9. Springer Link (ejournals)

⁸ No substantial study that concerns telehealthcare and got published before 1998 was found during preliminary search

Northumbria University Library provides subscribed access to all these databases, and the library portal offers an advanced search interface to aid the literature searching process. In order to bring flexibility in the searching process, natural language-based keywords were used to search for matching words or phrases anywhere in the database records (such as title, abstract, journal title) instead of subject headings such as MeSH (Medical Subject Headings) terms. In addition to the systematic searches carried out as above, additional hand searches using reference lists and citation tracking from highly-cited articles and authors (snowball effect) were also performed. Google Scholar was used for electronic searches with the option of displaying links for import into EndNote reference manager. Citations for all the references located after systematic and hand searches were imported into EndNote X9 library with the full-text, if available. In case full-texts are not available for online reading or download, the references were cross-checked for request and subsequent access through the inter-library loan system of the university library.

3.3.3. Inclusion and Exclusion Criteria

Once literature citation records and full-texts were imported into an EndNote library, the next step was to check for duplicate references and remove them. To identify the papers that were relevant in addressing the review questions, a set of inclusion and exclusion criteria was applied to the imported literature. The titles, abstracts, and introductory sections of the papers were read and adjudged against these criteria - to ascertain the relevance of the studies and to guide decisions in considering a reference for further review and inclusion. The studies that address the issues relevant to the literature review questions, even partially, were included.

The following inclusion criteria were used:

- Empirical studies, systematic and other literature reviews as well as conceptual papers (including research briefings)
- Studies concerned with assisted living technologies and services that adhere to the definition and scope of telehealthcare, as adopted in this thesis
- Studies concerned with the delivery of services to adults
- Studies concerned with the provision of services in the users' homes /community settings
- Studies concerned with services providing support to patients, users and carers with care needs rather than support to clinicians

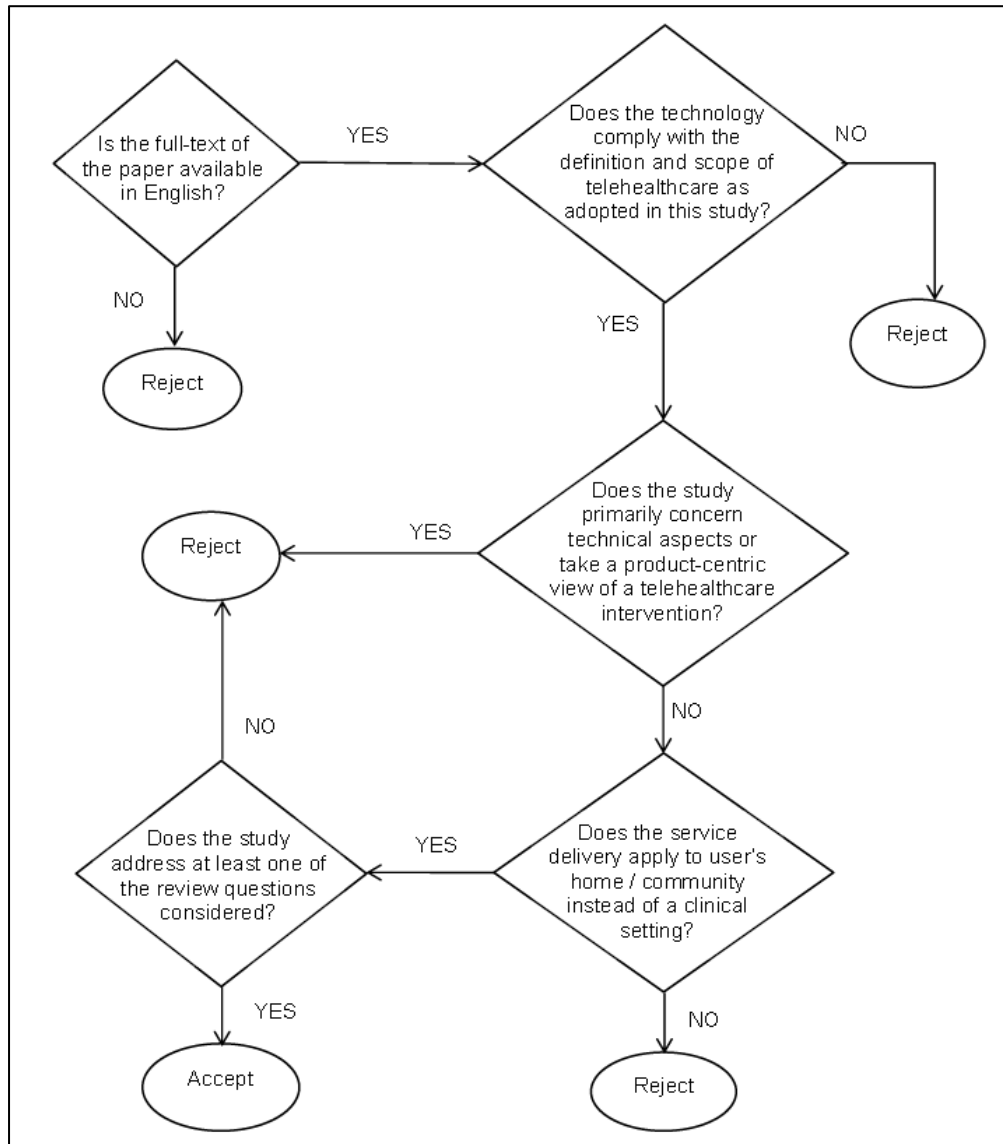
The exclusion criteria used, are as follows:

- Papers for which full text is not available in English
- Paper that are focused on evaluation or technical aspects of a specific telehealthcare product or solution
- Studies concerned with technology interventions in a clinical setting, such as in a hospital or a primary care practice
- Telemedicine services using video-consultation / video conferencing or telecoaching services (see footnote⁹ below)
- Mobile-based health technology solutions (or apps) for personal fitness and well-being

A decision tree diagram (see Figure 3.1) illustrates the logical steps followed in screening the literature against the inclusion and exclusion criteria outlined above.

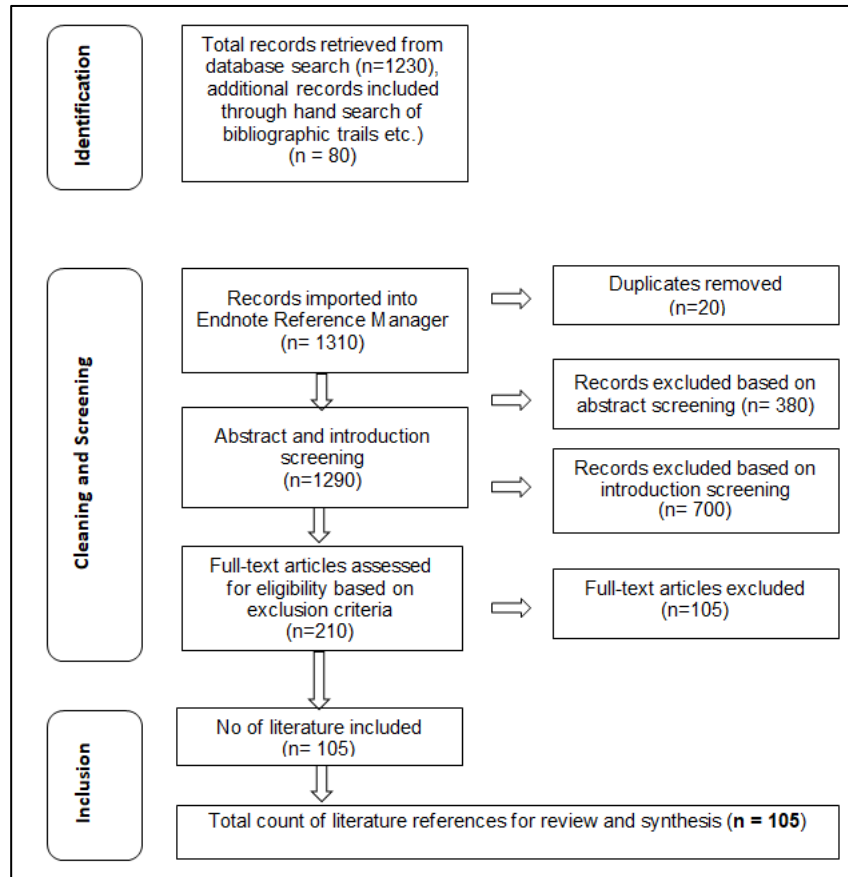
⁹ As explained in chapter 2, telemedicine or telecoaching are categories of services that are beyond the scope of telehealthcare defined by this study

Figure 3.1 Decision tree for the literature screening process



Having established the screening process for acceptance and rejection of papers for review, a detailed view of the search strategy and selection process is illustrated in Figure 3.2. The flowchart shows a sequence of steps followed for the literature, at both identification and screening levels, before a final count for inclusion in review is reached.

Figure 3.2 Flowchart illustrating Search and Selection strategy for the Literature



3.3.4. Data extraction and quality appraisal

At this stage, the studies selected for inclusion were assessed individually for their quality as well as relevance, leading to a decision on whether to include or exclude a study for synthesis purpose. In consideration of the exploratory nature of the review questions, the studies included in the review are drawn from a range of academic disciplines and involve different types of designs. Appraisal of methodological quality or robustness for such studies could be problematic given a lack of academic consensus around standard criteria and procedures for evaluation of qualitative studies (Mays et al., 2005, p. 10). Accordingly, a pragmatic choice to include all studies for synthesis was taken by the researcher. Decisions about which data should be extracted from individual studies were guided by the review questions (Popay et al., 2006, p .9). For this literature review

exercise, captured data cover specific study contexts such as country (if applicable), discipline, study design and/or methods, aims, and finally, the key findings.

3.3.5. Review synthesis

At the synthesis stage of the review, identification and extraction of common themes across the literature reviewed were brought together to produce useful insights (Mays et al., 2005, p. 7). A narrative approach to synthesis entails summarising and explaining the findings from the literature using words and texts. Several tools and techniques are available to aid the process of narrative synthesis, and the choice of the technique depends on the nature of review questions and evidence for a specific synthesis (Popay et al., 2006). The thematic analysis technique aids in the process of narrative synthesis, through 'translation' of key themes or concepts reported across studies by exploring similarities as well as variances between different studies (Popay et al., 2006, p. 16). In this review, a thematic analysis approach was adopted for the narrative synthesis of the literature.

3.4. Review Findings

This review covers **105 papers** from a range of academic publications. A complete list of studies included for review and the relevant data extracted from the review can be found in Appendix 3.1 and 3.2 respectively. In the following section, the nature of literature reviewed in terms of range of disciplines for the studies, geographical spread, year of publications and methodological approaches are discussed.

3.4.1. Academic Disciplines

The studies included in the literature review came from a range of academic disciplines, covering a wide range of perspectives. In a majority of these studies,

the research focus is spread across multiple disciplines, and thus, it becomes problematic to provide a meaningful break-up of the number of review papers by discipline. A large cohort of studies concern Health Science related topics such as Health policy, Healthcare technology or evaluation of Health Economics. A significant number of papers address the topics on the provision of social care and related topics concerning public policy, gerontology, learning disabilities, and dementia, among others. Some studies emphasise on the sociotechnical design and adoption aspects from the information system discipline, such as smart homes. A few papers investigated the telehealthcare technologies and interventions using critical perspectives borrowed from the discipline of biomedical ethics and psychology. A small cohort of studies has investigated the implementation of telehealthcare services from the angles of management studies discipline, notably implementation science and change management.

3.4.2. Geographic Spread and Year of Publication

The majority of studies concern empirical research conducted in the UK (64 studies), mostly in England (58) followed by Scotland (5) and Wales (1). There are also some international studies, mainly from various European countries (13), including The Netherlands, Germany, Norway, Spain, and Sweden. Only few papers are from USA (3), Israel (1), and Ireland (1). Also, a small number of papers include empirical research across multiple European countries.

Although the earliest publication date of the papers reviewed is 2000, the majority of the papers included in the review (82%, 86 papers) got published in the last ten years, and a substantial proportion (33%, 35 papers) got published only in last five years. This pattern possibly indicates that while the first generation of telehealthcare technologies, in the form of 'social alarms' or 'community alarm services' has been in practice since last five decades (Fisk, 2003, p. 57), the

research interest in this area can be considered as emerging but steadily increasing.

3.4.3. Methodological Approaches

Data extraction sheets for the literature reviewed in this chapter (can be found in Appendix 3.2) reveals that a variety of research designs and data collection methods were used in the empirical studies. Empirical studies examining the effectiveness of telehealthcare interventions have applied quantitative designs such as randomised controlled trials and simulations. A majority of empirical studies, however, employs qualitative research designs such as case studies, ethnography, and discourse analysis. Likewise, a range of data collection methods, including surveys, interviews, focus groups, document analysis, observations, and ethnographic field notes, are utilised in the empirical studies. In undertaking data analysis exercise, most empirical studies have adopted either qualitative analysis techniques such as thematic analysis of interview or focus group data, or quantitative analysis of survey questionnaire data.

A sizeable proportion of the cohort of conceptual papers (approximately 5% of total) has performed systematic reviews of telehealthcare technologies in various contexts and to address different research questions. Such systematic reviews following a stricter protocol-driven approach (such as the Cochrane Collaboration), typically employed statistical analysis techniques, such as meta-analysis.

Only a limited number of studies explicitly mentioned the use of theoretical perspectives. Some noteworthy examples of theoretical frameworks employed in the studies are organisational theories of Innovation Adoption and Sense-making (Chrysanthaki et al., 2013); Diffusion of Innovations theory (Peeters et al., 2012; Sugarhood et al., 2014); Normalisation Process theory (Mays et al., 2011); and

System Integration theory (Waring and Wainwright, 2015). Such a paucity of theoretical perspectives in the studies can be explained by the argument put by Gammon et al. (2008) that theoretical concepts play only a modest role in telehealthcare literature.

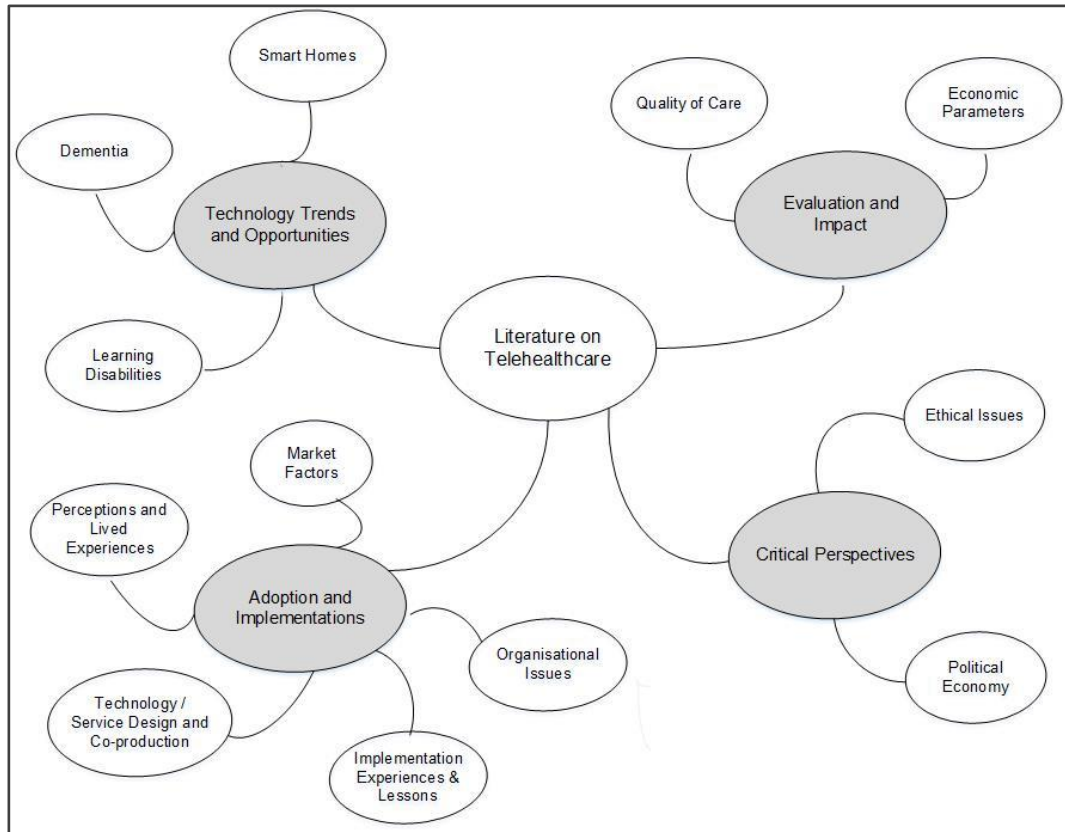
3.5. Thematic Analysis of the Literature

Thematic Analysis provides a useful means of organising and summarising the findings from large and diverse bodies of research, typically developed in an inductive way, without a set of *a priori* themes to guide the analysis (Popay et al., 2006, p. 18). In line with the current review focus, a thematic analysis approach reflects the focal concepts across the wide range of interdisciplinary studies included under this review, highlighting overlapping research interests and identifying gaps. While the number of concepts reflects variations in the research topics and questions, an effective and meaningful analysis warrants a nuanced approach in identifying and aggregating a set of related concepts (or sub-themes) under a broader category theme. In organising the literature categorised under a set of common themes or concepts, a tabular concept matrix is helpful (Webster and Watson, 2002). Accordingly, a concept matrix is compiled by mapping each literature reference with the primary theme it contains, leading to a thematic map of literature with the key themes and related sub-themes (see Figure 3.3). The map depicts four main themes, under which the papers can be broadly categorised, are listed below.

1. Technology trends and future opportunities
2. Evaluation of effectiveness and impact
3. Adoption and implementations
4. Critical perspectives

In the following section, each of the above themes is discussed in detail.

Figure 3.3 A Thematic Map of the Literature



3.5.1. Technology Trends and Future Opportunities

A cohort of nineteen studies in the literature review focused on discussing the visions, trends, and future opportunities of telehealthcare services. Following Greenhalgh et al. (2012), this particular theme can be loosely compared to the ‘modernist’ discourse in telehealthcare literature, which explores the possibilities of technology innovations, and depicts a futuristic vision of technology solutions in addressing present as well as future health and care challenges.

The potential opportunities for telehealthcare services in addressing complex health and care needs for people living with cognitive impairments, such as dementia and ‘learning disabilities’ were discussed in several studies. Following the vision of UK government’s policy, as outlined in ‘Prime Minister’s challenge on dementia 2020’ (DOH, 2009; 2015), several studies proposed accelerated

investment in telehealthcare technologies to address complex care needs associated with people with dementia (Cahill et al., 2007; Knapp et al., 2016; Gibson et al., 2016). Wilkie (2010) envisioned the high potential of telehealthcare technology services for people with learning disabilities. The author argued that people with learning disabilities are often frightened of visiting hospitals, especially 'if they have difficulties in communicating with doctors and nurses' and this group of users would greatly benefit from the telehealthcare technologies that allow them 'to live independently with staff available to respond to alerts as and when required' (Wilkie, 2010, p. 53). Citing examples from a telecare service provisioned for people with learning disabilities in Nottingham City Council, Nottingham, UK; Miles and Doughty (2007) suggested that telecare service providers need to extend the range of their service offerings to include all forms of assistive technologies, which are particularly relevant to families of the users.

One of the future telehealthcare technology opportunities cited in the literature is a potentially comprehensive 'smart home' solution (Barlow et al., 2005; Demiris and Hansel, 2008; Ehrenhard et al., 2014) that integrates functioning of a wide range of physiological and environmental sensors for holistic health and care needs in a common platform – bringing telehealth and telecare together. However, technology issues in terms of interoperability of connected devices and/or systems, uninterrupted connectivity, and secure management of voluminous data generated across the network require due attention for such an all-inclusive automated solution (Mostaghel, 2016; Majumder et al., 2017). In their paper, Hargreaves and Wilson (2013) presented findings of a content analysis of industry-produced smart home marketing materials and discussed the implications of the insights of the study in relation to the adoption of smart home technologies. The authors found that the industry vision of 'smart homes' has been driven by

'technology push' that lack a clear understanding of user-centric benefits. The findings of the study further suggested that 'smart home' technology solutions need to address issues of trust and privacy for their users, maintaining a delicate balance' between automation with intelligent technologies and reassuring users of control (Hargreaves and Wilson, 2013, p. 1779). While technology trials and pilots of such futuristic 'connected homes' in England are gradually picking up (Tech UK, 2018), it is fair to assume that wide-spread adoption of these technologies will take longer.

In their paper, Buckland et al. (2006) illustrated an innovative information provision approach through the use of a telecare service that was trialled as a pilot in Liverpool, UK, involving three organisations - British Telecom (BT) and Liverpool Direct Limited and Liverpool City Council. One of the key design objectives for the pilot, besides 'to act as an intelligent alarm system', was to explore how it could potentially serve as an information provision tool for the carers involved (McCreadie, Wright, and Tinker, 2006).

3.5.2. Evaluation of Effectiveness and Impact

Eighteen studies included in this review put focus on evaluating effectiveness and impact of telehealthcare interventions, primarily in the context of large telehealthcare programmes, implemented at a national scale, such as Whole System Demonstrator (WSD) (Cartwright et al., 2013; Henderson et al., 2014; Hirani et al., 2014; Rixon et al., 2013), and Scottish Telecare Development Program (Beale et al., 2010). These studies have primarily employed empirical methods such as randomised control trials across multiple sites and population groups.

Several studies highlighted the sparse and questionable quality of 'evidence base' around the effectiveness of telehealthcare interventions and their benefits to the

users, especially on their cost-saving potential at a system level (Henderson et al., 2014; Barrett et al., 2015). Barlow and Hendy (2009, p.8) noted that results from almost 9,000 studies involving telecare trials and pilot projects had been published in academic journals, 'yet within this wealth of information very little strong conclusive evidence has emerged'. In the context of evaluating the effectiveness of Scottish Telecare Development Program, (Beale et al., 2010, p. 70) found that absence of rigorous processes and standards for data collection within the partnerships, and thus, the reporting of the impact of telecare interventions relied predominantly on 'the expertise and experience' of a few stakeholders. The authors maintained that while service users have widely reported benefits and positive experiences of telecare, the evidence for benefits has been largely subjective (Beale et al., 2010). Health Technology Assessment (HTA) using quantitative techniques such as Randomised Control Trial (RCT), an established model for the production of evidence within Clinical medicine dominated English healthcare culture, is considered to be inappropriate for assessment of benefits for complex and multi-stakeholder service delivery interventions such as telehealthcare (Williams et al., 2003). Echoing this view, Pleace (2011, p. 11) observed that the evaluating costs for provisioning of telecare services could be problematic, given the variations in the range of telecare equipment and services provided and also, because telecare services are often used in combination with other care services which makes isolating the cost for telecare challenging.

3.5.3. Adoption and Implementations

A large selection of papers (49), comprising nearly half of all the studies included in this literature review examined a wide array of aspects concerning adoption and implementations of telehealthcare services. The primary aims of these sets of studies are to discuss challenges and barriers as well as lessons learnt from

existing telehealthcare implementations. The implications of the review findings from these studies bear relevance in addressing the reviews questions (see section 3.2 of this chapter) that seek to understand how telehealthcare services are currently being realised in practice, and also, to identify the key barriers and challenges related to adoption and implementation such services. Since the findings from the literature highlight a range of issues across all three levels of a telehealthcare service ecosystem (defined in Chapter 2) - **macro**, **meso** and **micro**; studies within this theme have been categorised and discussed with reference to these three levels.

- **Micro level issues**

Among these papers, a group of studies paid attention to the *micro* level issues around adoption of telehealthcare services concerning everyday use, perceptions about and lived experiences of service users (and their carers and families) of telehealthcare technologies, in order to identify the factors that influence poor uptake and /or abandonment of these solutions. Telecare equipment is often perceived by older people as a source of embarrassment and stigma and is associated with old age (Hamblin, 2014). In her working paper 'Lifestyles in Later Life: identity, choice and stigma' from the AKTIVE (Advancing Knowledge of Telecare for Independence and Vitality in later lifE) project, she considered that the challenge for the manufacturers, designers and service providers would be to redesign and remodel telecare solutions, in order to make them not just tolerable but desirable to the older people. In their study, Roulstone et al. (2013) found that wearing a pendant alarm, typical for a telecare service, could be perceived by some older participants as symbols of a 'fragile body' and as 'a badge of vulnerability'; and accordingly, building resistance in using the telecare devices. Likewise, in their study examining the barriers to participation and adoption of

telehealthcare within the WSD programme, Sanders et al. (2012) observed that many older people viewed the technology interventions as potential threats to their identity related to positive ageing and self-reliance. The authors further suggested that the adoption of assisted living technologies could be adversely affected by the users' reluctance to embrace the potentially disruptive changes associated with telecare as a substitution of existing services.

Hagen et al. (2004) in their study recommending a set of assessment protocols for using telecare for people with dementia, find that attitude of the user towards technology influences the perception and subsequent usage. Installation situations and first impressions of the technology influence the willingness to use the service and even a single negative experience that manifests the equipment as 'not user friendly' (Horton, 2008, p.177), could deter the continued use of telecare (Koivunen, 2014).

A few studies (Sanders et al., 2012; Roulstone et al., 2013) in this collection addressed the issue of awareness, information, and skills related to the usage of telehealthcare equipment by the service users and their informal carers. Sanders et al. (2012) found that users could be discouraged from using assisted living technologies if they have concerns about learning special skills in order to operate the equipment. Echoing a similar view, Clark and McGee-Lennon (2011) highlighted the vital role of education and training to raise awareness of assistive technologies for service users, informal carers, and family members. Emphasising the important role of information provision to older people, McCreadie et al. (2006) advocated that such information needed to be easily accessed and accepted by the users, in order to address the challenge with a shortage of 'objective' information about telecare devices (Woolham et al., 2018, p. 48).

Presenting an analysis of data within a telecare contact centre in North East England, Cook et al. (2013) investigated how the telecare service was being used by the users. They noted that the contact episodes between the users and the service, on many occasions, concern non-emergency reasons, and telecare were being used as an information providing resource, has provided support to service users to 'age in place'. Such findings echo the observations of Dewsbury (2001), who argued that traditional view of telecare service packages as 'technologisation of needs' requires a change towards meeting users' social, psychological, physical, and emotional needs. Fry (2014) explored how different generations of telecare technologies could positively impact the daily activities of older people, by addressing their differentiated functional and emotional needs for daily living; and highlight the need for 'holistic' assessment of all aspects of older people's lives.

Examining the role of social relationships of service users in a telecare service, Koivunen (2014) suggested that networks of social relationships, including family members and social contacts, could play a more prominent role in shaping older service users' positive perceptions and experiences with the service. The author found that such social connections could lead to better adoption of service through the process of 'domesticating' technology into the routines of everyday life of elderly users. The author stressed that the installation of telecare without involving the service users and also their family members could affect the adoption and subsequent use of the equipment (Koivunen, 2014, p. 6). In a similar vein, in an empirical study involving elderly people's experience of assisted living service, Halloran (2016) underscored the substantive and inimitable role of human relations in securing and maintaining user engagement with the technology through 'social leveraging'. In the author's words (p. 439, emphasis added by the researcher):

“ALT (Assisted Living Technology) should be designed to support the relationship between residents and providers; **the relationship itself can leverage use engagement with the technology**, through appropriately skilled staff who continuously and sensitively encourage, teach, remind or even cajole. The implication of this is that the **human element in independent living services**, at least for current technology, **is not replaceable: it is substantive for securing and maintaining user engagement.**”

Another strand of studies has focused on exploring issues around sociotechnical designs that could potentially be barriers to adoption by the users. Hamblin (2014, p. 16) noted that there must be ‘*a trade-off between how telecare made people feel or look and its contribution to their identities as active, independent and embedded in places and communities which they valued*’. In a study that involves evaluation of a telecare product for about 1300 users in North East Scotland, Taylor and Agamanolis (2010, p. 54) found that many users expressed concerns around the personal alarms often getting triggered accidentally and also, some wished their alarm devices ‘to be less bulky and less conspicuous, and to look more like a piece of jewellery’. Examining the users’ compliance with prescriptive assistive technology devices, Wielandt and Strong (2000) highlighted that the design of equipment including the aesthetic appearance, and the perception about safety and reliability influence compliance decisions to some extent.

These *micro* level insights underscore the crucial role of design aspects concerning aesthetics, safety, and reliability that could influence the uptake of the technologies. As Buckle (2014) claimed, irrespective of how advanced a particular technology is, its full realisation will not be realised without due considerations on the usefulness and reliability of the technology.

- **Meso level issues**

A group of studies within this theme aimed to explore *meso* level issues within telehealthcare implementations, especially focusing on the key barriers and facilitators for adoption at the organisational levels. These studies investigated a

range of organisational aspects including culture, practices, technology infrastructure, among others.

In their study, Sugarhood et al. (2014) described telecare as 'a complex innovation' based 'user system' in which the complexity of interventions, diversity of stakeholders, and dynamics of participants' interactions make alignment of interests and goals across various stakeholders a challenging task. In the words of the authors (p.86, emphasis added by the researcher):

“Low levels of uptake and use may in part be explained by the **different priorities of these stakeholders** and the **different meanings and implications** which telecare holds for them. **Aligning interests** across the **multiple stakeholders** remains a challenge.”

In a similar vein, Barlow et al. (2005) maintained that telecare services are inherently complex due to the long duration for which users need monitoring and also, the involvement of a large number of stakeholders within the service. The authors further emphasised that organisational and structural issues contribute more to the implementation difficulties than the technology itself. Lending support to this line of argument, Goodwin (2010, p. 9) argued that both clarity of organisational goals – enabling 'collective buy-in from the full range of stakeholders: professionals and practitioners, commissioners and service providers, users, carers and patients'; and also, coordinated organisational structure and practices are vital for adoption of telehealthcare technologies.

To explore collaborative organisational practices that could potentially enhance opportunities of co-production in design and implementation of telehealthcare services, a set of studies focused on drawing lessons from field experience - both at the *micro* and *meso* levels (Wherton et al., 2015; Sugarhood et al., 2014; Procter et al., 2014; Wherton et al., 2012; Greenhalgh et al., 2015). The opportunities for co-production were discussed primarily with reference the issues

of user participation and engagement in the service design and delivery processes (Greenhalgh et al., 2015), through practices such as using ‘cultural probes’ (Wherton et al., 2012) or assessment tools (Dewsbury, 2009).

The central role of a person-centric and holistic approach in assessing the suitability of telehealthcare technologies to address users’ care needs had been emphasised in several studies (Wey, 2006; Orton, 2010; Dewsbury, 2009; Fry, 2014). In their recent study, Woolham et al. (2018) disseminated the results of a large-scale survey involving all 152 English local authorities with social care responsibilities as part of the UTOPIA (Using Telecare for Older People In Adult social care) project. The project, led by the Social Care Workforce Research Unit at King’s College London, conducted a three-month long survey in late 2016 and received an overall 75% response rate. The study highlighted a challenge related to social workers’ skill deficits in assessing care needs for telecare, which potentially could lead to a mismatch of technology with the specific need or even worse, an ‘over-prescribing’ of technology. Accordingly, the importance of imparting education and training to service professionals and carers got underscored in the literature (Alaszewski and Cappello, 2006; Powell et al., 2010; Yeandle and Fry, 2010).

- **Macro level issues**

A few papers reviewed under this theme have studied large-scale telehealthcare implementations, such as ‘Whole System Demonstrator’ (WSD) trials, and examined macro-level contextual factors related to policy, market, and technology domains that influence the current state of adoption of telehealthcare services in England. Among these factors, market-related aspects concerning telehealthcare services had been discussed in these studies. Examining the lessons learnt from a national digital health program, DALLAS (Delivering Assisted Living Lifestyles at

Scale), Lennon et al. (2017) discuss the barriers and enablers for the 'market readiness' for telehealthcare services in the English context. They cite several challenges for the development of a market, including the diversity and complexity associated with it and the absence of a clearly marked boundary between health and social care services. In their study that aimed to explore the key issues around use of telecare in facilitating chronic disease management in the community settings, May et al. (2011) made similar observations that uncertainties about coordinated policies to develop services, ownership and responsibilities make it difficult for the service providers to define their service and business models. According to Sugarhood et al. (2014, p. 83), the *'lack of a consumer market for telecare was seen as both evidence of and a causal factor in limited adoption'*.

In discussing the maturity of telehealthcare technology infrastructure in the country, Greenhalgh et al. (2016) argued that lack of adaptiveness, standardization, interoperability has been impacting the growth of telehealthcare industry. In the backdrop of the 'Better Care' policy initiative (NHS England, 2013), Waring and Wainwright (2015) adopted a lens of *Systems Integration* theory to investigate the key issues and challenges in developing new models of integrated health and social care. The authors highlighted the issues surrounding interoperability, integration of disparate health, and social care information systems and, furthermore, an information governance mechanism for adequate data sharing across organisational boundaries. Buckle (2014) examined the issue of perception of risk and reliability of technology designs from a macro perspective that calls for a debate on the relationship between how telehealthcare helps to manage risk and how its reliability may, in turn, influence the perception of risk. The author advocated that suppliers and implementers of such technologies need

to maintain transparency about reliability to assure the users to adjust their risk perceptions.

Two studies by Chrysanthaki et al. (2013) and Hendy et al. (2012) investigate the barriers as well as opportunities of a 'whole system redesign' in the context of national healthcare policy agenda, in order to achieve 'integrated care' pathways (Lluch, 2013). The gap between health and social care sectors, notably in terms of prevailing cultures and practices got highlighted by Hendy et al. (2012, p. 3). Authors argued that such a divide challenges effective working relations and communication between health and social care sectors, resulting in a lack of cross-sector collaboration and integrative work (Sugarhood et al., 2014, p. 85). Within the tenet of current policy related to health and social care, Barrett et al. (2015) emphasised the need for a strategic approach to workforce development for future services.

3.5.4. Critical Perspectives

A total of nineteen studies included in this review examined the telehealthcare technology interventions using ethical and critical arguments that counter 'technological determinism' or "techno-utopian' vision and policy agenda of telehealthcare. These studies represent two sets of related concepts (or sub-themes) within the theme. One cohort of studies that follow a 'humanist' discourse (Greenhalgh et al., 2012, p. 4), examines ethical tensions around the application of telehealthcare technologies, especially among older and/or vulnerable people. These studies raise ethical concerns around telehealthcare technology interventions, and caution against their potential downsides, namely loss of autonomy and privacy (Draper and Sorell, 2013; López & Domènech, 2008); social isolation and loneliness (Eccles, 2015; Huang and Goldhaber, 2012); and 'feelings of dehumanization' (Pritchard & Brittain, 2015), among others. A few

studies raised ethical questions on safeguarding for users with intellectual disabilities or with other cognitive impairment (such as dementia) with the perceived transfer of control of the decision-making process, from the agency of the user (or the carer) to a technological system (Perry et al., 2009; Landau & Werner, 2012).

Another set of studies that espouse a 'political economy' discourse (Greenhalgh et al., 2012, p. 4) questions the government's politico-economic agenda of promoting telehealthcare in the backdrop of a narrative of 'crisis account of ageing' (Mort et al., 2013, p. 803). These studies raise concerns about potential of stigmatisation of older people (Sixsmith and Sixsmith, 2008), disempowerment through surveillance in remote electronic monitoring of telehealthcare (Percival & Hanson, 2006; Essen, 2008), and coercion of older people to telecare during the time of austerity (Mort et al., 2013). Challenging the notion of 'digitally engaged patient' as articulated in the mainstream healthcare policy literature, Lupton (2013, p. 265) argued that such a concept fails to acknowledge the complexities and uncertainties associated with patient engagement for self-monitoring technologies.

While this cohort of studies included in the review provides a useful understanding surrounding ethical issues involved in telehealthcare services, the review findings presumably hold only limited relevance to the research question that this thesis pursues. However, as review questions proposed earlier in this chapter (see section 3.2) concern the challenges as well as opportunities for new telehealthcare service designs, it becomes necessary to reflect upon the insights from the literature that address such design considerations. Two essential conclusions that emerge from the review findings relate to the area of ethical design and implementation of telehealthcare services. One conclusion concerns a set of practical principles in ethical design that underscore transparency, freedom,

and choice for users in terms of access to their care data, and rights for carers' involved (Huang and Goldhaber, 2012, p. 46); and that acknowledges the vital role of trust between the users and telehealthcare technologies, and also, between the users and institutional providers of such services (Lie et al., 2016, p. 1520). The latter insight refers to an ethical framework and strategies for designing telehealthcare services for people with intellectual disabilities or cognitive impairments (Perry et al., 2009; Landau & Werner, 2012).

3.6. Chapter Summary

In this chapter, a large volume of literature drawn from a variety of academic disciplines was reviewed to address the exploratory review questions put forward at the beginning of this chapter (see section 3.2). Following a narrative synthesis approach, a thematic analysis of the reviewed literature was performed. The analysis revealed four broad categories of themes: **technology trends and future opportunities of telehealthcare, evaluation of effectiveness and impact; adoption and implementations; and critical perspectives**. Individual themes were further discussed in detail in connection with the related set of concepts (or sub-themes) that emerged from the review findings.

While the review findings provided valuable understandings on different aspects of telehealthcare services, it is fair to mention that some of the insights gained from the review exercise hold either little or no relevance for this study. This study does not aim to evaluate whether telehealthcare interventions are effective either from the outcome (or impact) to the user or from an economic perspective. Likewise, while this study acknowledges the critical perspectives in the literature surrounding the usage of telehealthcare, including perceived loss of privacy, autonomy, and identity, the relevance of these ethical concerns are restricted to accommodating them through appropriate considerations for future service

designs and implementations. On the other hand, some of the review findings, for example, the concepts informing opportunities of ‘co-production in practice’ (Wherton et al., 2014) with service users and other stakeholders, carry useful implications for new service designs or delivery models. Therefore, it remains essential to identify a set of factors cutting across all the four themes that potentially offer valuable considerations for designing new service models. A list of such key insights has been summarised in Table 3.2.

Table 3.2 Summary of key insights from the Literature

Key insights from literature	Implications for future service design
Technology design for special segments of users, such as people with dementia and intellectual disabilities	Opportunities for new service designs that accommodates special and holistic needs for service users with cognitive impairments. One example could be location tracking-based services (Robinson et al., 2009).
User engagement and participation surrounding technology usage and adoption – ‘co-production in practice’	Opportunities for person-centric design (Harte et al., 2006; Buckle, 2014; Pols and Willems, 2011)
Visions around supporting independent living through ‘smart home’ solutions	Opportunities for new service models that address a comprehensive set of health and care needs using a common platform (Majumder et al., 2017)
Critical role of assessment for telecare needs	Service design needs to consider holistic and appropriate assessment of care needs (Wey, 2006; Orton, 2010; Dewsbury, 2009)
Development of technology skills	Imparting quality training to service professionals and carers (Alaszewski and Cappello, 2006; Powell et al., 2010; Woolham et al., 2018)
Problem of ‘evidence base’ around benefits of telehealthcare services	Need for developing of ‘business cases’ through collection of data and articulation of value provided by the service (Barlow and Hendy, 2009)
Ethical concerns around privacy, autonomy and identity	Designing services with transparency that embeds trust in technology (Lie at al., 2016)

It can be noted that the majority of literature reviewed in this chapter paid attention to investigating either technology adoption issues at the *micro-level*, primarily concerning perceptions and lived experiences of service users; or evaluations of effectiveness for existing implementations. The opportunities for new care service models need to be explored in relation to the opportunities related to

telehealthcare technologies; and further, concerning co-design / co-production opportunities around participation, engagement, and collaboration of stakeholders within organisational and design practices. Only a limited number of academic studies have touched upon business perspectives of telehealthcare services with explicit aims for creating new service models or addressing specific challenges or opportunities for the design and delivery of these services.

Findings from the literature suggest that only very few published papers have attempted to examine the business aspects involved (Oderanti and Li, 2016). Even the limited number of studies that take business-centric views are found to primarily focus on telemedicine services in the United States (p. 289). A similar view has been echoed by Mostaghel (2016), as the author perceived that business perspectives are under-represented in the literature pertaining to telehealthcare. Out of a limited number of studies within this review that address business aspects have been predominantly found to be situated in European contexts (Ehrenhard et al., 2014; Nikayin et al., 2013). While such a paucity of academic literature is understandable in the English context, it points to knowledge gaps relating to 'supply-side' perspectives of telehealthcare services related to market development, the sustainability of care services, or opportunities for service providers.

The current policy environment supports a 'mixed economy of supply' of telehealthcare services, involving both public services run by the local authority providers and private services offered by commercial as well as non-profit providers (Rodrigues and Glendinning, 2015, p. 649). Recent policy reforms through the introduction of direct payments and personal budgets have created more choices for service users, thereby affecting the entire care market dynamics, including the demand-side issues such as procurement, commissioning and

funding of services (Glasby et al., 2009; House of Commons, 2016). Therefore, empirical examination of supply-side aspects of telehealthcare services embedded within the current policy context demands the attention of academic research inquiries. While a substantial amount of research interests lie in examining the 'demand-side' aspects of telehealthcare services, such as evidence base for effectiveness, adoption of technology interventions by users and integration between health and care service sectors, the supply-side perspectives, such as scale and sustainability of care services, innovative service models, maturity of market, among others are under-represented in the literature (Barlow et al., 2012). This study, therefore, aims to address the research gap by focusing on issues around service designing and delivery.

As noted earlier in this review of academic literature, extant research in the domain of technology enabled care services such as telehealthcare engages with theory only in a modest way. Even for a limited volume of studies with theoretical underpinnings, scholars argue that the studies employ primarily social science theories to examine issues surrounding telehealthcare. However, such theories are inadequate in addressing core issues or in illuminating unique features of telehealthcare as a distinct area of research. Identification of this research gap motivates the researcher to undertake a theoretically-informed inquiry in the following chapter (Chapter 4).

This study proposed earlier the following research question:

How can telehealthcare technologies act as drivers for new models of care in the context of North East England?

After conducting a literature review and synthesis of the literature, it became necessary to refine and reframe the broad and multi-faceted research question, using insights derived through the thematic analysis of literature. The purpose of

reframing was to redefine both the problem focus and the scope of inquiry. Accordingly, a reframed research question is proposed below.

How can new telehealthcare service models be designed and delivered in the context of North East England?

Chapter 4: Developing a Theoretical Framework

4.1. Introduction

As noted earlier in this thesis document (Chapter 3), extant research in the domain of technology enabled care services such as telehealthcare engages with theory only in a modest way (Gammon et al., 2008). Even within the limited volume of literature with theoretical underpinnings, the perspectives have been drawn mostly from evaluation theories or social science theories, which could be inadequate in addressing core issues or in illuminating unique features of telehealthcare services (Mackert, 2006). Because of this gap in knowledge, it becomes necessary to strive for a theoretically-informed inquiry that could potentially address distinct challenges faced by the telehealthcare services in North East England.

A review of the prior research literature (performed in Chapter 3) suggests that despite strategic visions expressed in published UK government documents (Audit Commission, 2004; POST, 2014), policy guidance by the Department of Health (DoH, 2005; 2012a) and the NHS England (NHS England, 2014; NHS Digital, 2016) the full potential of telehealthcare systems in transforming healthcare services are yet to be realised on a large scale in the UK (Barrett et al., 2015; May et al., 2011, Greenhalgh et al., 2016). The evaluation of benefits and outcome-related effectiveness has often been cited as critical factors affecting the widespread diffusion and adoption of integrated healthcare information, social care systems, and technologies (Barlow and Hendy, 2009; Beale et al., 2010). One of the fundamental aspirations of the policy initiatives

like *3millionlives* and *DALLAS* (see Chapter 2 for details) was to engage with the private industry sector and encourage a retail market for telehealthcare services (DoH, 2012b; Harper, 2016). However, findings from the literature suggest that private industries are generally restrained in investment owing to several factors such as the relatively weak maturity of the digital health sector, and the difficulty in accessing and navigating the UK telehealthcare market (Lennon et al., 2017, p. 9).

Insights gathered through the review of telehealthcare literature in Chapter 3 further highlighted that the supply-side business perspectives are under-represented in the academic literature for healthcare (Mostaghel, 2016). Sugarhood et al. (2014, p. 86) argued that telecare is not a “plug and play” technology, but rather a complex technology innovation requiring communication and coordination between users and provider organisations of telecare services. Uncertainties about coherent and sustainable service business models are perceived as one of the critical barriers to the implementation and integration of telecare systems (May et al., 2011).

Health and Care services in the UK are now being seen by policy makers and stakeholders alike, as increasingly market-orientated and more controversially, perhaps, moving to become increasingly privatised (Barron and West, 2017, p. 141). Underpinned by the policy discourses of user choice, control, and empowerment of older persons as ‘consumers’ (Lundsgaard, 2005; Peine et al., 2014); the care market for long-term social care services for older people is evolving with a ‘mixed economy’ of supply (Rodrigues and Glendinning, 2015, p. 649) and operate as a ‘quasi-market’ (Bartlett and Le Grand, 1993; Fotaki, 2011) within a publicly funded system. An increasing shift from a predominantly statutory to more self-funded provision indicates a move towards a more consumer-led

business model catering to the health and care service needs for the ageing population (AKTIVE, 2013; COMODAL, 2017).

Chapter 6 discusses key findings from a pilot field study of a telecare service in a local organisational site, which further highlighted the problems of growth and sustainability for these services in North East England. The above insights combined with the rapid pace of technology innovation, for example, Internet of Things (IoT), mobile computing, and broadband connectivity have exposed a need for adopting theory and practice from the business community – especially those which could potentially help in developing better justifications and arguments for telehealthcare services (business cases) with strong value propositions (both financial and non-financial) and sustainability.

These findings emphasise a need for a theoretical lens that focuses on conceptualisations of value in telehealthcare services. Value is typically one of the most complex, ill-defined, and subjective constructs in the business and management literature (Sanchez-Fernandez and Iniesta-Bonillo, 2007; Grönroos and Voima, 2013). In discussing value in healthcare, Porter (2008, p. 2477) argued that ‘value is neither an abstract ideal nor a code word for cost reduction’ and the concept should be defined around the customer. To elucidate what value means, the management literature has paid attention on the process of value creation under different contexts and levels (Lepak at al., 2007) – such as in the context of customer experiences (Priem, 2007; Prahalad and Ramaswamy, 2004), or in dynamic business networks (Alle, 2000). Following a similar approach, conceptualisations of value in telehealthcare services need to be explored - in relation to the processes of value creation and realisation - to investigate opportunities for new sustainable telehealthcare service designs.

This chapter begins with an overview of business models, mainly focusing on the primary concepts used in the literature around the definitions and classifications. Next, a review of existing literature, examining how business model concepts have been applied in digital healthcare services, is made together with identification and discussion of key themes. In the following section, literature from the discipline of service research, primarily on service marketing and design, is reviewed. The thematic links between business model concepts and service dominant logic are explored, in order to establish how these interdisciplinary theoretical frames complement each other. A conceptual framework for the telehealthcare service business model is developed next by combining conceptualisations and insights derived from both business models and service literature. Finally, the conceptual framework is proposed in order to serve as an *a priori* framework to guide further empirical investigation for this study.

4.2. An Overview of Business Models

4.2.1. Conceptualisations and Components

The term 'business model' was initially used in the 1950s and 1960s, with aims to represent a simplification of the reality of a business through a model (DaSilva and Trkman, 2013). The concept was used in the context of data and process modelling for ICT system designs during the 1970s (Konczal, 1975; Stahler, 2002). However, the term gained prominence among both practitioners and business scholars during the late 1990s, with the rapid development of ICT technologies and electronic commerce (Linder & Cantrell, 2000). Since the last fifteen years or so, business models are increasingly gaining the attention of academics and practitioners alike, and the substantial volume of literature exemplifies such interests, including special issues published by prominent management journals (Baden-Fuller and Haefliger, 2013).

As the term 'business model' proliferated during the dot-com boom, lack of theoretical rigour and underpinnings led to confusion in terminology, since business models, strategies, business concepts, revenue models, and economic models are often used interchangeably (Morris et al., 2006). George and Bock (2011, p. 83) find that 'while the term 'business model' has gained widespread use in the practice community, the academic literature on this topic is fragmented and confounded by inconsistent definitions and construct boundaries'. Such ambiguity and the different views towards what exactly a business model is lead to the point that when people talk about it, they are not necessarily referring to the same thing (Linder & Cantrell, 2000) or, that they only mean parts of a business model (Linder & Cantrell, 2001). While there have been numerous attempts of theorising the business model concept to develop a common and widely accepted language among researchers, there exists no generally accepted definition of a business model (Mahadevan 2000; Zott et al., 2011). Such lack of agreement is possibly due to the varying contexts and scopes under which business models are studied (Zott et al., 2011). Based on a review of relevant literature, a summary of selected definitions of a business model is shown in Table 5.1.

While the definitions suggest that different conceptualisations towards the business model phenomenon exist in the literature, some shared themes act as a common denominator among the various meanings of a business model (Zott et al., 2011, p. 1021).

Table 4.1 Selected definitions of a business model (Source: own elaboration)

Author(s), Year	Definition
Amit and Zott (2001, p. 511)	A business model depicts 'the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities'
Magretta (2002, p. 4)	Business models are, at heart, stories – 'stories that explain how enterprises work'. A business model should answer two fundamental questions, one related to the value provided to the customer and the other to the organization's ability to capture value in the process of serving customers.
Chesbrough and Rosenbloom (2002, p. 529)	Business model is a blueprint for how a network of organizations co-operates in creating and capturing value from technological innovation. It acts as 'the heuristic logic that connects technical potential with the realization of economic value'
Osterwalder and Pigneur (2002, p. 2)	'A business model is nothing else than a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate probable and robust revenue streams'
Shafer, Smith and Linder (2005)	A business model is a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network
Teece (2010, p. 179)	'A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value'. In other words, a business model represents the organizational and financial 'architecture' of a business.
Zott and Amit (2010, p. 216)	a firm's business model can be conceptualised as 'a system of interdependent activities that transcends the focal firm and spans its boundaries'
Al-Debei and Avison (2010, p. 372)	A business model is 'an abstract representation of an organization, be it conceptual, textual, and/or graphical, of all core interrelated architectural, co-operational, and financial arrangements designed and developed by an organization as well as all core products and/or services the organization offers based on these arrangements that are needed to achieve its strategic goals and objectives'

The common themes can be identified as:

- Business models emphasise a system-level holistic approach involving activities orchestrated to create value;
- business models seek to explain both how the value gets created and gets captured and, value remains the central focus for the concept; and
- a business model can be a useful unit of analysis for examining how an organisation does business (Stähler, 2002)

As with the definition of business models, there are divergent views on what constitutes a business model, and many scholars have proposed various frameworks to describe the components of business models. This study adopts a framework developed by (Al-Debei and Avison, 2010), which identifies four fundamental components of a business model and provides a reasonably comprehensive ontological structure of the construct. These four elements of a business model are accordingly described below.

- **Value Proposition**

A business model has been described as a way that demonstrates business logic through which organisations create value for their customers (Amit and Zott, 2001; Teece, 2010). Almost all definitions of business models include **value proposition** as one of the core elements although it might have been referred under various terms such as ‘create value’ (Shafer et al., 2005), ‘customer value proposition’ (Johnson et al., 2008), ‘value creation’ (Mahadevan, 2000), ‘customer value’ (Afuah and Tucci, 2001) or ‘value offering’ (Gordijn et al., 2001). Value proposition element of a business model explains how an organisation creates value for its customers through target customer segment based product or service offerings (Magretta, 2002; Osterwalder et al., 2005). In some conceptualisations of business model, a value proposition is described with a broadened scope – to create value for other stakeholders such as partners in addition to the customers (Stahler, 2002, p7; Andersson et al., 2006).

- **Value Architecture**

This component of a business model describes resources in human, physical, and organisational forms that need to be configured and organised in a manner to facilitate a competitive value proposition (Hedman and Kalling, 2003). In several conceptualisations of a business model, this component is mentioned as 'organization architecture' (Osterwalder et al., 2005; Venkatraman and Henderson, 1998) to create and deliver value for the customers. Strategic resources (Hammel, 2000) include physical resources such as technology infrastructure and assets, capabilities such as employee skills, knowledge base, business practices and processes, and also 'the implicit aspects of organizational structure, like culture' (George and Bock, 2011, p 100).

- **Value Network**

This business model component depicts the perspective of cross-organisational collaboration, partnerships, and relationships in creating and delivering value. A value network can be described in a way in which an organisation enables transactions through coordination and collaboration among multiple stakeholders/parties (Shefar et al., 2005; Andersson et al., 2006). Definitions for business model describe value network of the organisation using a variety of terms, such as 'key partners' or 'network of partners' (Osterwalder et al., 2005), 'Network Architecture' (Mason and Spring, 2011), 'Activity System' (Zott and Amit, 2010), and 'Business Webs (b-webs)' (Tapscott et al., 2000, p. 17). A value network also shows the position of an organisation with partnerships (Rappa, 2001) and the roles of different actors - illustrating how value is exchanged among stakeholders in a multi-party network (Gordjin et al., 2001). The relative strength or influence also determines the roles of actors in a value network through governance mechanism (Amit and Zott, 2001; Nenonen and Storbacka, 2010).

Relationship Capital that the firm creates and maintains with the customer (Dubosson-Torbay et al., 2002) constitutes another vital element of the value network. An organisation needs to employ effective customer channels (Osterwalder and Pigneur, 2010) to facilitate customers in transacting across multiple interfaces and to participate in the value co-production process through 'engagement platforms' (Viljakainen et al., 2013, p. 8).

- **Value Realisation**

This element defines 'how a company makes money' (Afuah and Tucci, 2001) and describes monetisation aspects of a business model. It is described under various terms carrying similar meaning, such as 'capture value' (Shafer et al., 2005), 'revenue logic' (Fielt, 2014), 'revenue model' (Linder and Cantrell, 2000; Petrovic et al., 2001), 'profit formula' (Johnson et al., 2008), 'finance' (Bouwman and Fielt, 2008), 'financial aspects' (Dubosson-Torbay et al., 2002), 'revenue' (Mahadevan, 2000; Alt and Zimmerman, 2001), revenue sources (Timmers, 1998) or 'Cost Structure & Profit Potential' (Chesbrough and Rosenbloom, 2002). This component explains why a definition of the term business model should include revenue-earning logic to be profitable or sustainable. While this dimension is primarily described in terms of capturing financial value for commercial organisations, other value considerations such social value in the form of social impact, sustainability and 'profit with purpose' (Osterwalder and Pigneur, 2011) are discussed in the context of social business models (Yunus et al., 2010, p. 319).

It is important to note that literature on business models have mentioned both static and dynamic aspects of a business model (Demil and Lecocq, 2010). While the static approach is useful 'as a blueprint for the coherence between core business model components' (Demil and Lecocq, 2010, p.227), the dynamic

approach studies the transformational aspects such as, how business models evolve over time due to external factors such as market changes, introduction of new technologies and regulatory adjustments (Bouwmann et al., 2006). Such dynamic approach links to the idea of business model innovation through examining the relationship between an organisation's choices and their consequences over a period of time (Casadesus-Masanell and Ricart, 2007).

4.2.2. Archetypes of Business Models

In the literature on business models, little attention has been given to designing business models (Teece, 2010). Information Systems (IS), with a methodological root in design science thinking (Hevner and Chatterjee, 2010), can be useful in designing business models as artefacts (Osterwalder and Pigneur, 2013). Various scholars have made attempts to identify different types of business models through either a 'taxonomy' (types defined bottom-up, through observation and empirical work) or a 'typology' (types derived top-down through conceptual and theoretical work) based approach (Baden-Fuller and Morgan, 2010). Archetypes of business models are envisaged as 'generic' business models (Baden-Fuller and Morgan, 2010) or like 'patterns' used in architecture and software engineering designs (Seddon and Lewis, 2003; Mettler and Eurich, 2012). Such archetypical designs are often applied to specific industries, like a 'low-cost carrier' model of SouthWest Airlines (Casadesus-Masanell and Ricart, 2007); or to particular domains like web business models (Timmers, 1998; Rappa, 2001; Weill and Vitale, 2001); or a specific element of the business model such as the 'free' business model pattern (Osterwalder and Pigneur, 2010) for the revenue logic. Table 5.3 illustrates some of the well-known and successful business model patterns used in various industries.

Table 4.2 Some exemplar business model design patterns

(Source: adapted from Mettler and Eurich, 2012)

Pattern	Idea	Value Drivers	Example (s)
Freemium	Basic services are offered for free, while a premium is charged for a service with advanced features	Creating a subscriber lock-in or leveraging effect of networks	Skype service, Web Portals
Multi-sided or Hybrid	Easier access or affordable cost for a service to a party to serve a financial or social interest of other. Works through subsidisation made to one at the cost of another	Value creation happens through the interactions among concerned parties	Facebook Developers, Internet Search Engines, Printed Newspapers
Crowd Sourcing or Open	Commitment and enthusiasm of motivated individuals (champions) produce value for the organisation for free	Creativity, knowledge, passion, effort or money of many individuals in co-creating and co-financing of service	Huffington Post, Wikipedia
Razor and Blades	A special one-time deal is offered to the customer for a product bundled with consumables and then use the engagement to sell consumables or complementary goods ongoing basis	Customer lock-in effects for a steady flow of revenue	Printers and ink cartridges Razor and Blades
As a service	Only the usage of the service is charged to the customer but not the product itself	Rental model (pay by service) ensures optimal utilisation and flow of revenue across lifecycle	Rolls Royce's "Power by the hour", Machine tools

4.3. Findings from a review of Healthcare Literature related to Business Models

In order to identify and review the relevant academic literature on telehealthcare concerning business model aspects, a systematic approach was followed to locate the literature (see section 3.3 in Chapter 3). During the literature search process, it was found that a significant proportion of available studies either include technology interventions in a clinical setting, such as in a hospital or a primary care practice or discuss specialised remote care services, such as tele-

coaching and video consulting under the umbrella terms of telemedicine and eHealth. Twenty-seven academic papers were identified based on their partial relevance to this research and considered for further review (a complete list of the references can be found in Appendix 4.1).

These twenty-seven papers were broadly categorised into the following two thematic areas, based on the aims and focus of the studies.

1. Application of business model concepts for digital health and care
2. Prescriptive business models for digital health and care

4.3.1. Digital Healthcare Services using Business Model concepts

A cohort of studies uses business model concepts or frameworks as an analytic lens to investigate different segments of digital healthcare services (see table 4.3 below). It can be seen that nine of these studies (out of fourteen) are concerned with examining business model perspectives for either telemedicine (Acheampong and Vimurland, 2015; Chen et al., 2013; Lin et al., 2011), or eHealth / Digital Health (Parante, 2000; Chen et al., 2014; Hwang and Chirstensen, 2008; Van Limburg et al., 2015; Fife and Pereira, 2011).

Table 4.3 Summary of the literature that apply business model concepts

(Source: own illustration)

Technology	Key theme(s) addressed	Reference(s)
Telemedicine	Review and analysis of extant literature using business model framework	Acheampong and Vimurland (2015), Chen et al. (2013)
eHealth	Using business model concepts to drive service innovation	Chen et al. (2014)
Telecardiology	Analysis of a service using business model concepts	Lin et al. (2010)
Telehealth	Service-oriented business model that allows multi-sector collaboration	Huis in't Veld et al. (2011).
eHealth	Business model design for eHealth applications	Van Limburg and Van Gemert-Pijnen (2010)
eHealth	Business model design with focus on co-creation with users	Van Limburg et al. (2015)
Telehealth	Using business model to analyse the adoption issues of technology	Pereira (2017)
Telehealth	Review of evolving business models for remote management of patients with chronic diseases	Coye et al. (2009)
Telemedicine	A business model framework to analyse telemedicine services	Lin et al.(2011)
Telecare, Telehealth, Telemedicine	A framework for sustainable business models in assisted living technology services	Oderanti and Li (2016)
eHealth	Business model innovation for disruptive technologies	Hwang and Chirstensen (2008)
eHealth	Taxonomy of eHealth business models	Parante (2000)
Digital health	Analysis of services using business model framework to explore adoption issues	Fife and Pereira (2011)

In Oderanti and Li (2017), the authors examined the application of business model concepts in the literature on assisted living technologies using a systematic review. Their findings suggest that whilst strategic models of telehealthcare services got discussed in a substantial volume of literature, business model aspects have been barely addressed. Limited numbers of published studies that discuss the business model perspectives in the telehealthcare domain are predominantly from the USA and Western European countries. There has not been much-published research on business model aspects of telehealthcare services in the UK (Oderanti and Li, 2017 p. 13).

4.3.2. Prescriptive Business Model Designs for Digital Healthcare

This category of studies focused on the development of prescriptive and generic business models for eHealth - using a business model framework or business model design patterns (see table 4.4 below). Under this category, a few studies concerned the technologies related to *Independent Living Systems* or telehealthcare, primarily discussing opportunities for generic service business models (Dijkstra et al., 2006; Van Ooteghem et al., 2007; Sarela et al., 2009); or in examining the role of strategic value configurations in designing new business models for telecare services (Boonstra et al., 2011).

Aiming to provide instruments for e-health marketers to develop more sustainable business models through innovation and experimentation, Mettler and Eurich (2012) suggested a design pattern-based approach using examples of archetypical design solutions of successful business models practiced in other domains. Such e-health design patterns could potentially provide insights into business model logics, actors, and the respective value flows, foster discussions and creativity, and offer guidance in design decisions (Sprenger and Mettler, 2016).

Table 4.4 Summary of the literature that concern empirical business model designs (Source: own illustration)

Service / Technology	Key theme(s)	Reference (s)
Independent living systems	Generic business model for eHealth services	Van Ooteghem et al. (2007)
Home-based telehealth	Service business model	Sarela et al. (2009)
Teletreatment	Business model engineering	Kijl et al. (2010)
Telehealthcare	Service business model	Dijkstra et al. (2006)
eHealth	Use of design patterns to describe sustainable business models for e-health	Mettler and Eurich (2012),
eHealth	eHealth design pattern based approach to analyse eHealth business models	Sprenger and Mettler (2016)
Ambient assisted living	Framework for collaborative business models in eHealth	Osl et al.(2008)
eHealth	Prescriptive business model design practices for sustainable eHealth	Spil and Kijl (2012)
Digital health and well-being	Designing a digital ecosystem model using business model framework	Leon et al. (2016)
eHealth	Strategy map for development of new business models	Tseng and Chen (2007)
eHealth	Policy and practice recommendations for successful business model designs	Valeri et al. (2009)
Telecare	Application of strategic value configuration in designing telecare business models	Boonstra et al. (2011)

4.3.3. Implications of the findings

Findings from the review of the literature revealed that the majority of the studies that applied business model perspectives are from the USA and Western European countries. Such a trend is corroborated by the findings from a detailed review of telehealthcare literature conducted in Chapter 3. Out of 105 studies reviewed, only a handful of studies mentioned the term 'business model' either concerning the issues of open standards and interoperability for telecare systems (Greenhalgh et al., 2016; Lennon et al., 2017) or to describe key barriers of implementation and integration of telecare systems for chronic disease management (May et al., 2011). The lack of business aspects in the UK

healthcare literature could be attributed to the nature of funding and provisioning models for health and social care services. In contrast, health and care models in other developed countries, such as the USA, are mostly market-driven, and it is only natural that exploration of business perspectives has drawn research interests from both academia and practice. Following Oderanti and Li (2016, p.13), it can be reasoned that any extrapolation of findings from North American or Western European evaluations to the UK healthcare systems could be problematic. However, some of the insights from the above literature, such as a design pattern-based approach (Mettler and Eurich, 2012) to offer generic service business models (Sarela et al., 2009) that could provide useful perspectives for designing archetypical solutions of telehealthcare.

4.4. A Review of Literature on Service Research

Innovation, a term applied almost exclusively to products in the past, is increasingly used concerning services (Miles, 2000, p. 373). Over the last several decades, the importance of services to the global economy has grown steadily in such a way that services now make up about 70% of the aggregate production and employment in the Organization for Economic Cooperation and Development (OECD) nations (OECD, 2005). The rising importance of services in the global economy (Bitner and Brown, 2008, p. 39) has drawn considerable attention on the phenomenon of service innovation from scholars and practitioners alike (Berry et al., 2006; Chesbrough and Spohrer, 2006).

Bitner and Brown (2008) **found** that organisations aim to pursue service innovation, primarily from two perspectives. One focus is on the increase in efficiency and productivity and thus achieving more cost-effectiveness in the development and delivery of the services. The other perspective is grounded on growing service revenues/market share, creating new markets through innovative

service design (Berry, 2006, p. 56) or enhanced customer experience. While the focus on service innovation is mostly to improve economic measures, the potential of consumer-centric service innovation in bringing large-scale changes and benefits in sectors such as healthcare, education, and public is widely recognised (Bitner and Brown, 2008, p. 44). Environment-friendly and sustainable services can address societal challenges in improving the quality of life at the 'bottom of the pyramid' population (Prahalad, 2006). Innovations in service strategies and patient-centric service quality ideas hold critical importance for a highly complex, universally used, and expensive service like healthcare (Berry and Bendapudi, 2007, p. 119).

Service definitions, traditionally has been influenced by a strong need to differentiate services from physical products (or goods) as market offering and such early definitions are based upon the 'IHIP' characteristics for services: Intangibility, Heterogeneity (or non-standardisation), Inseparability (of production and consumption), and Perishability (or exclusion from inventory) (Kotler, 2003). However, such definitions have been criticised as provider-centric and too narrow in capturing the essence of services through generic service characteristics (Edvardsson et al., 2005). Gronroos (2006, p. 323) provides a more comprehensive definition of service as 'processes that consist of a set of activities which take place in interactions between a customer and people, goods and other physical resources, systems and/or infrastructures representing the service provider and possibly involving other customers, which aim at solving customers' problems'. Such perspective conceives service as a value logic rather than a category of market offerings. Following this paradigm of value logic, two similar yet distinct and parallel research traditions have evolved in the service marketing discipline - the Nordic School thinking of 'Service Logic' (Gronroos, 2006; 2011)

and the North American perspectives 'Service-Dominant Logic' (Vargo and Lusch, 2004; 2008).

4.4.1. Service-dominant Logic Framework

Service-dominant logic (SDL) is foundational to service science research discipline and the study of value-creation in service systems (Maglio and Spohrer, 2008). The philosophical and theoretical roots for the SDL can be traced to the works of the nineteenth century's French economist Frederic Bastiat (Bastiat, 1850). SDL introduces a radically new conceptualisation of the value construct in its proposition that argues service value is always co-created, jointly and reciprocally, in interactions among providers and beneficiaries through the integration of resources and application of competences (Vargo et al., 2008). **The customer-centric and relational view of SDL makes distinctions between 'value-in-use' which is value co-created and phenomenologically determined by the service beneficiary and 'value-in-exchange' that refer to the value proposition offered by the provider and the exchange value realised of the service in economic or other currencies** (Vargo and Lusch, 2008). Such a nuanced distinction between these value concepts - 'value-in-use' and 'value-in-exchange', offer a conceptualisation of value, which is notably different from that found in the business model-based research. These two value concepts are further explained in relation to the foundational principles of SDL, later in this section.

The fundamental premises (FP) of SDL have been developed, modified, and elaborated since they were first described in 2004. The emphasis of the foundational premises is to clarify new conceptualisations of constructs such as service, value, customers, exchange, and resources. Table 4.5 summarises the foundational premises below.

Table 4.5 Foundational premises of SDL (Source: Vargo and Lusch, 2004, 2008)

FP number	Foundational premise
FP1	Service is the fundamental basis of exchange
FP2	Indirect exchange masks the fundamental basis of exchange
FP3	Goods are a distribution mechanism for service provision
FP4	Operant resources are the fundamental source of competitive advantage
FP5	All economies are service economies
FP6	The customer is always a co-creator of value
FP7	The enterprise cannot deliver value, but only offer value propositions
FP8	A service-centred view is inherently customer oriented and relational
FP9	All social and economic actors are resource integrators
FP10	Value is always uniquely and phenomenologically determined by the beneficiary

For this study, it is important is to discuss some of these ideas in detail, particularly in relation to service, value, customers, and resources.

4.4.1.1. Reconceptualising Service and its Customers (FP1, FP3, FP6, and FP8)

SDL uses the singular term 'service' to reflect the process of doing something beneficial for and in association with some other entity, rather than units of output – intangible goods as implied by 'services' in the traditional goods-dominant (G-D) paradigm (Vargo and Lusch, 2008). Service, conceptualised as the application of specialised competences such as knowledge and skills by an actor for the benefit of another actor, is considered the primary unit of exchange (FP1). SDL does not recognise goods and service as alternative forms of products and views goods as appliances - tools or transmitters of operant resources (embedded specialised skills and knowledge) to direct service provision (FP3). In this view, the role of a customer is not a passive consumer of the service as advocated by the output-based, goods-centred logic; instead the role of experience and perception of customers are recognised as central to the process of value creation (FP6); and accordingly, such active role signifies the relational aspects of the service (FP8). Such a customer-centric value co-creation perspective takes a holistic view of service offering, encompassing the core solution, and also the hidden services that are supportive of customer's value-enhancing processes (Gronroos, 2008).

Traditional, good-based, industrial perspective views production and consumption as separate processes and the role of marketing as targeting customers as passive consumers of goods. In SDL, the customer is primarily an operant resource (co-producer) rather than an operand (target) in the entire value creation process (Vargo and Lusch, 2004). Experience and perception of customers are recognised as essential in creating the value (value-in-use). Therefore, according to SDL, customers are co-creators of value along with providers (FP6).

4.4.1.2. Reconceptualising Value (FP7 and FP10)

SDL maintains that 'there is no value until an offering is used – experience and perception are essential to value determination' (Vargo and Lusch, 2006, p. 44). The distinction between the two aspects of value - 'value-in-use' and 'value-in-exchange' is fundamental in this conceptualisation. While value-in-exchange refers to the traditional view of value embedded in commodities in a tangible economic exchange (Smith, 1776), value-in-use always refer to the value derived by the participation of and determined by the beneficiary through use or consumption in the process of acquisition, usage, and disposal (Holbrook, 1987). Vargo and Lusch (2008) posited that value is always co-created among multiple stakeholders and determined phenomenologically by customers or beneficiaries of the service in a specific context. The importance of context is noteworthy since the value of any given resource may be evaluated differently by different actors, or by the same actors in different contexts (Akaka and Chandler, 2011). The contextual nature of value creation entails accommodating multiple viewpoints, social relations, collective norms, and meanings in the co-creation process (Chandler and Vargo, 2011).

4.4.1.3. Reconceptualising Resources (FP4 and FP9)

In the traditional view of services, associated resources are typically viewed as tangible assets (infrastructure, people, partners, and so forth). SDL broadens the concept of resources by recognising vital importance of interactional and often intangible resources – labelled as ‘operant resources’ in SDL parlance - such as skills, competencies, technology and social resources (for example, institutional norms and symbols) in this integration process (Lusch and Vargo, 2014; Maglio and Spohrer, 2008). Such a system perspective views organisations as ‘resource integrators’ that integrate transform and apply resources, in order to increase not just the wealth of an organisation, but also the adaptability, survivability, and system well-being through service (Vargo, Maglio and Akaka, 2008).

4.4.2. Insights from Design Research on Services

Scholars identified the area of service design as a research priority (Ostrom et al., 2010) and highlighted the need for an interdisciplinary approach since service design is closely intertwined with the business strategy, operations, and the service business model (Kimbell, 2008). While value as a standalone concept is scarcely discussed in the design literature, **the purpose of service design to deliver clear, meaningful and effective solutions to serve users’ needs fit with the concept of value-in-context in SDL** (Edman, 2012). **The human-centred, experiential and participatory ethos of design thinking provides value relations between diverse actors within a socio-material configuration** (Kimbell, 2011) and provides complementarity to the studies of services science, management, and engineering (Holmlid and Evenson, 2008; Edman, 2012).

In the design literature, there is an increased interest on the integration of ethical and moral elements, such as trust (Vermaas et al., 2010; Van den Hoven, 2013)

into the design of ICT systems; and the discourse manifests in a paradigm of 'value-sensitive design' (VSD) (Manders-Huits, 2011). Such viewpoints get reinforced by the findings from the review of telehealthcare literature in Chapter 3, which highlighted the importance of ethical design and implementation of telehealthcare services.

4.4.3. Service Logic based thinking in Public Service Management Literature

Contemporary public management theories and practices are broadly embedded within the 'New Public Management' (NPM) paradigm (Osborne et al., 2013, p. 137). In recent years, there has been increasing pressure on public services in adopting operation management practices such as "lean" or "business process reengineering" that are widely employed in private organisations to achieve operational efficiency (Osborne et al., 2013, p147). Such operation management practices anchored on principles of traditional product-dominant orientation have been perceived to ignore the experiential, collaborative, and systemic nature of public service delivery (Radnor et al., 2014). **A new conceptualisation of co-production in public services that draws inspiration from SDL based thinking (Osborne et al., 2013), has been proposed in the public policy literature (Osborne et al., 2016), to facilitate value co-creation in public services, by utilising the insights gained from services research.** The literature on public policy and service management further highlights the critical role of relational capital-based social marketing practice in facilitating co-creation in public services (McLaughlin et al., 2009). The above insights from public management literature could arguably provide useful ideas in designing telehealthcare services, which are predominantly funded and provisioned as public services in the English healthcare system.

4.5. Findings from a review of Healthcare Literature related to Service Research

Findings from a detailed review of telehealthcare literature in Chapter 3 and also, a review of healthcare literature in general, suggest that the ideas on 'co-production' or 'co-design' with the patients (or users) within the public policy and practice context of health and social care services have been discussed in the literature at breadth (Needham and Carr, 2009; Dunston et al., 2009; Sugarhood et al., 2014). The concept of co-production in healthcare services has been examined concerning the policy agenda of 'patient-centric care' (Leone et al., 2012; Epstein and Street, 2011); to explore a range of service aspects including patient (or user) participation, empowerment and engagement (Crawford et al., 2002; Badcott, 2005; Amstrong et al., 2013; Coulter, 2012; Batalden et al., 2015); or to pursue opportunities of participatory and experience-based designs in developing user-centric healthcare services (Bate and Robert, 2006; Bowen et al., 2013).

While scholars recognised the usefulness of applying ideas from service research discipline in the healthcare domain (Berry and Bendapuddi, 2007), prior research does not sufficiently address the issue of value co-production through patient and public engagement within individual service encounters (Coulter, 2012). In Joiner and Lusch (2016), the authors advocated for embracing a service logic-driven approach, anchored on the principles of systemic and collaborative thinking, in the healthcare research in order to explore and exploit opportunities for better co-creation of value between users and providers. In order to understand and derive important insights from prior research concerning the application of SDL-based thinking in the healthcare domain, a review of the literature was accordingly undertaken following a systematic approach (see section 3.3 in Chapter 3).

Twenty-eight academic papers were identified based on their relevance to this research and considered for further review (a complete list of the references can be found in Appendix 4.2).

A systematic search strategy applied to identify relevant literature resulted only in a modest number of twenty-eight studies. Given all these studies got published in the last ten years only, a trend reflecting growing research interest in this area can be noted. A majority of the studies included in this review discuss service concepts concerning healthcare services, predominantly in clinical settings. Out of all the literature reviewed, only four studies concern various segments of telehealthcare services, such as community-based assisted living healthcare service (Gill et al., 2011); home-based telehealth services (Giuseppe and Geisler, 2009; Spano et al., 2018), and telemedicine service (Srivastava and Shainesh, 2015). It is also interesting to note that only two studies are situated in the UK context (Hardyman et al., 2015; Fotaki, 2011). This gap can arguably be attributed to the evolving nature of contemporary service research in healthcare, which is yet to attract researchers' attention on the application of service concepts to telehealthcare studies. Nonetheless, the literature on service research on traditional healthcare settings could provide useful insights, especially in illuminating the value co-creation aspects with a service ecosystem - challenges as well as opportunities - for accommodating those in the future telehealthcare service designs.

Studies included in this review of the literature (a complete list can be found in Appendix 4.2) examined healthcare services under a variety of contexts using notions of value co-creation borrowed from service literature, especially in relation to SDL. It may be worthwhile to note a shift in mainstream terminology in these studies, in which the vocabulary of **'value co-production'** as found typically in

the traditional healthcare service related research, has been replaced in favour of ‘value co-creation’ while referring to the collaborative generation of value across the service ecosystem. Findings from the review of these twenty-eight studies highlight four thematic focus areas (see Table 4.6) under which the studies can be broadly categorised.

Table 4.6 Summary of the literature on healthcare services that applied service logic

Id	Key Themes	Selected References
1	Relational and experiential aspects of service in contributing value co-creation in healthcare services, patient/customer-centric care	Gill et al. (2011); Handyman et al. (2015); Spano et al. (2018); Srivastava and Shainesh (2015); Sukkrid and Shirahada (2015); Zanetti and Taylor (2016); Rehman et al. (2012); Seppanen et al. (2017); Osel-frimpong and Wilson (2015)
2	Systematic nature of value co-creation in healthcare service ecosystems	Ciasullo et al. (2017); Palumbo et al. (2017); Frow et al. (2016); Frow and Payne (2011); Villapol et al. (2018)
3	Prescriptive models, frameworks and design practices for enhancing value co-creation in healthcare services	Zhang et al. (2015); Nambisan and Nambisan (2009); McColl-Kennedy et al. (2012); Kuala and Haapasalo, 2017; Elg et al. (2012); Peine et al. (2014); Marufu and Merwe (2019)
4	Role of relational and social marketing	Wright and Taylor, 2005; Zainuddin et al., 2013; Giuseppe and Geisler, 2009; McGuire, 2012

A set of studies investigated the phenomenon of value co-creation in relation to accommodating multiple stakeholder perspectives on value propositions for the service (Frow and Payne, 2011), and in examining role of customers’ participation and engagement (Rehman et al., 2012; Seppanen et al., 2017; Gill et al., 2011). It has been perceived that service research in healthcare could potentially address a broad range of issues including the concept of service productivity concerning the overall value creation (Nordgren, 2008), the relation of interaction behaviour of service providers with the loyalty and confidence of consumers (Singh Gaur et al., 2011) and the behavioural aspects of customer participation in services (Gallan et al., 2013). In their study investigating patient engagement in the UK context,

Handyman et al. (2015) drew upon emerging literatures from service marketing, and the recent application of service logic in public management (Osborne et al., 2013); and suggested that exploring value co-creation through patient engagement at a micro-level is essential for health care policy and practice.

Following the ethos and foundational principles of SDL, another strand of studies focused on a broader relational and systemic understanding of the interactions occurring within the healthcare service ecosystems (Frow et al., 2016; Ciasullo et al., 2017; Villapol et al. 2018). Through the investigation of opportunities of value co-creation in the healthcare services, several studies offered prescriptive frameworks, and design practices for value co-creation in healthcare services models. The role of several service elements in designing new services, such as learning with customers (Elg et al., 2012) and patient feedback (Zhang et al., 2015) got highlighted. Two studies concern the typology of healthcare customer value co-creation practice styles (McColl-Kennedy et al., 2012) and a framework for consumer value creation (Nambisan and Nambisan, 2009). In the context of a developing economy in Asia, one empirical study explores the value co-creation opportunities in telemedicine services through configuration and orchestrations of interactional resources, notably ICT infrastructure and skills (Srivastava and Shainesh, 2015). Peine et al. (2014) examines the relationship of ageing with technology and presents an alternative perspective that frames older people as active consumers of technology rather than passive recipients as understood by traditional design practices.

Drawing inspiration from the public management literature concerning the role of social and relational marketing in public services (McLaughlin et al., 2009), a small cohort of studies discussed how such marketing principles could potentially be applied in the healthcare contexts (McGuire, 2012; Zainuddin et al., 2013). Citing

the example of the UK NHS, Wright and Taylor (2005) advocate the use of relationship-based marketing to transform public healthcare - from a predominantly supplier and product-driven service to one that is genuinely patient-centric and relationship orientated. In their empirical study involving a home telehealth service, Giuseppe and Geisler (2009) emphasise the importance of marketing in technology adoption and value co-creation.

Themes derived from the review of healthcare literature related to service concepts (see Table 4.6) provide several insights that could have important implications for future telehealthcare service designs, notably in three areas. First, the *systemic nature of value co-creation* underscores the vital role of collaboration and partnerships across the service ecosystem. Secondly, *the emphasis on relational and experiential aspects of service* in service literature reiterate the goals of 'user-centric' telehealthcare service designs, through co-designing and co-learning opportunities (Elg et al., 2012) with elderly service users (Peine et al., 2014). Finally, *a lack of awareness and promotions* has been cited as one of the challenges in large-scale adoption of telehealthcare services in the English healthcare system (Barrett et al., 2015). *Ideas on relational and social marketing* derived from service literature could provide useful guidance in addressing those gaps.

4.6. Comparing the two Theoretical Frames

This section aims to explore thematic links between the two theoretical frames - business model and service logic and subsequently, to establish how the synergies surrounding the value-centric conceptualisations could complement each other to derive a set of holistic and better insights for designing telehealthcare service business models. As product-oriented companies face challenges in shifting towards 'servitization' of their business (Vandermerwe and

Rada, 1989), Kindstorm (2010) noted that many product-based companies are now seeking to increase their competitiveness by moving towards a service-based business model.

Although business model based thinking has drawn significant attention from the academic researchers (Zott et al., 2010), studies around the application of business model concepts in a service environment, particularly from the perspectives of value co-creation logic, remain limited (Zolnowski and Bohmann, 2011). However, a set of studies located in contemporary literature (Bouwamn et al., 2008; Fielt, 2012; Viljakainen et al., 2013) bears testimony of growing research interest in exploring business models designs based on service logic as a foundation for customer value creation. While such an integrated approach can potentially broaden the application possibilities of business model thinking in service sectors, it warrants a fundamental re-design of the business model as infusing service logic affects all elements of a company's business model (Clauss et al., 2014).

An increasing interest in the healthcare service research can be noticed, to examine these two theoretical frames together with a variety of goals, such as applying business model concepts for systemic service innovations (Chen et al, 2014); and to develop co-creative service business models that focus around value co-creation with stakeholders in a network (Kuala and Haapasalo, 2017; Van Limburg et al., 2015; Huis in't Veld et al., 2011). In order to draw comparisons between the thematic elements across the two theoretical frames, a comparative analysis of the key aspects is presented below (see Table 4.7). It can be seen that business model based thinking offers a theoretical lens to understand how a focal organisation could create, deliver and capture value for its customers - through unique value propositions, configurations of organisational capabilities and

resources, and revenue logic. Such value-centric perspectives could provide useful guidance in designing telehealthcare business models. On the other hand, service-based logic emphasises value co-creation aspects at a system level through the integration of stakeholders' interactional and relational resources that aim to benefit all the participating actors within the service ecosystem.

Table 4.7 Comparing the two theoretical frames – business models and service logic (Source: own elaboration)

Theme	Business model (BM)	Service-based logic
Primary goal	To describe an organisation's logic for creation, delivery and finally, capture value in a service	To offer a logic for value co-creation in a service ecosystem through integration of resources of participating actors
Conceptualisation of value	<u>Value proposition and value creation</u> Distinguishes between the two concepts value proposition (perceived value) and value creation (that happens during the service design and /or delivery through users' participation and engagement)	<u>Value co(creation) in a service context</u> Argues that value cannot be proposed / embedded in products or services and it always get created through the process of consumption by the customer or the beneficiary (Gronroos, 2008; Edvarsson et al., 2010). Such value co- creation happens in social context (Edvarsson et al., 2011).
Role of customers (or beneficiaries)	<u>Conceptualised as target 'market segment'</u> Traditionally, BM based thinking adopts a narrower role of customers in the value creation process that views customers as 'market segment' (Chesbrough and Rosenbloom, 2002), or 'customer segments' (Osterwalder and Pigneur, 2010) for value proposition / value creation purpose	<u>Central to the value co-creation concept</u> Customers (or beneficiaries) are considered fundamental to the value co-creation process since value is not embedded in services and created through the process of consumption (Gronroos, 2008; Edvarsson et al., 2010). Thus, a broader level of engagement with the customers in the co-creation of value remains vital (Pralhalad and Ramaswamy, 2004; Ramaswamy, 2011)
Organisational resources and capabilities	<u>Configuration of resources to maximise efficiency</u> BM concept consists of elements from both the demand and supply sides, such as the resources of a firm, value proposition, market characteristics and revenue model (Seppanen and Makinen, 2007).	<u>Resource integration - effectiveness over efficiency</u> Service based logic emphasises on the role of interactional 'operant resources', such as skills, know-how and information which are often dynamic and intangible. Integration of such resources helps organisations to transform individual micro-specialised competences into complex services that the people want and are willing to pay for (Vargo and Lusch, 2006).
System-level focus	<u>Value-network or value-chain based focus</u> Typically, BM take the perspectives of the focal company in defining the phenomenon of value creation and does not consider the idea of 'value co-creation' in which the focal company, its customers and partners are equal actors (Viljakainen et al., 2013, p. 7).	<u>Service ecosystem based approach wider focus</u> Service based logic highlights the opportunities of co-creating value not just with the customers but also with the partners and collaborators across the value network (Gummesson, 2007). This view recognises that the locus of value creation is no longer perceived to reside within the firm boundaries but value is considered to be co-created among various actors within the networked market (Nenonen and Storbacka, 2010), or in a service ecosystem (Vargo and Akaka, 2012).

As Sugarhood et al. (2014) observed that assistive technology solutions such as telehealthcare involve complex and unique “user system” – a network comprising the user, his / her care network including the family and health and care service providers, technology suppliers and aligning interests across a wide range of stakeholders remains vital yet challenging. Health and Care services are characterised by systemic challenges such as sharing of risks, alignments of incentives (Arrow, 1963; Christensen and Remler, 2009). Following Chughtai and Blanchet (2017), it can be argued that designing future telehealthcare service business models will necessitate a ‘Systems Thinking’ based approach, which effectively captures the complexity of relationships and interactions, diversity of the social and economic actors connected by shared institutional logics, norms and mutual value creation (Lusch and Nambisan, 2015).

Another critical aspect that a comparative analysis of the two theoretical frameworks reveals (see Table 4.7) concerns the role of customers (or service user/beneficiaries) in the service ecosystem. As the majority of telehealthcare service users are older adults with physical, cognitive, and sensory limitations, treating these vulnerable people as fully informed, empowered, and rational consumers could be problematic (Daly, 2012). In contrast to choice-based commercial transactions that are common in other industries, subscribing to telehealthcare service packages are perceived by many as “not like shopping” (Daly, 2012, p. 185), as intermediaries, in the form of local authorities or social carers, are often necessary to support and guide users in making appropriate choices. Healthcare services often fail to achieve patient-centric value creation owing to the health policies that are focused on costs and efficiency improvements (Wildavsky, 1977; Wenzl et al., 2017). A customer (user)-centric and relational

view of service logic, which affirms the importance of achieving effectiveness over efficiency gains (Lusch and Vargo, 2014, p. 86) offer a conceptualisation of value in a service which is remarkably different from that found in the business model-based research.

Business model based thinking emphasises on the realisation of value, primarily in terms of economic currencies, through a revenue logic that defines 'how a company makes money' (Afuah and Tucci, 2001). While such monetisation aspects demand important considerations for designing sustainable telehealthcare service models, literature on healthcare services suggests that the value created by a service should not be measured purely in traditional economic currencies. Long-term benefits that can be measured using intangible social currencies, such as citizens' well-being, support to independent living, and better quality life, are vital in assessments of these services (Luch, 2011; Goodwin, 2010). Thus, it can be argued that while value capture through monetisation is critical for telehealthcare service providers to keep the business running and become sustainable, capturing the value in other currencies is no less important for the provider to attract public or philanthropic funding and also, to contribute to the broader goals related societal benefits at a macro level.

From the above discussion, it can be concluded that there are enough synergies between the two theoretical frameworks to consider them as complementary to one another. Therefore, it can be reasoned that combining the perspectives from the business model-based thinking with service logic could contribute towards the necessary theoretical grounding for a future telehealthcare service design.

4.7. Proposing a Conceptual Framework

In this section, a conceptual framework of a telehealthcare service business model is proposed based on the conceptualisations of value creation and value

realisation from both business model and service logic based literature; and also the insights gained through review of extant literature on how these two theoretical frames have been applied in a healthcare context.

4.7.1. Building blocks of a Telehealthcare Service Business Model

4.7.1.1. Building block: Value Proposition of the service

A business model based thinking offers ideas around enhanced value propositions for the customers or service beneficiaries. Currently, customers (or users) of telehealthcare services are predominantly older people with frailty and/or disability. Telehealthcare services designed to address special care needs such as young people with learning disabilities (Miles and Doughty, 2011; Wilkie, 2010) and people with dementia (McCabe and Innes, 2013; Cahill et al., 2007) could provide tailored offerings targeted to specific customer segments. Designing GPS-based location tracking services for people with dementia can be an example of such a new service (Robinson et al., 2009). The literature on telehealthcare services suggests that telecare service providers need to broaden the scope of services to address holistic needs of vulnerable people (Miles and Doughty, 2011), for example, 'smart home' solutions to meet social interaction needs of service users (Demiris and Hensel, 2008). Ethical issues play a vital role in the adoption of telehealthcare services (Eccles, 2015; Perry et al., 2009) and accordingly, any value proposition for telehealthcare services need to include ethical aspects, such as trust (Bhattacharya et al., 2017; Lie et al., 2006).

A business model perspective also highlights the importance of marketing elements in the value proposition of service. Likewise, insights from service research emphasises on social and relational marketing aspects in healthcare technology adoption and service value co-creation (Giuseppe and Geisler, 2009; McGuire, 2012; Wright and Taylor, 2005). Organisational marketing initiatives

largely ignore the older consumer and concentrate on younger targets (Szmigin and Carrigan, 2001), and service marketing literature provides some useful insights into older consumers in the UK (Ahmad, 2002) and practical strategies to engage this segment of consumers (Nielsen and Curry, 1997; Melkas, 2008). To summarise, the value proposition element of a telehealthcare service business model needs to address the following key issues:

- Addressing differentiated needs for service users and potential customers
- Embedding ethical aspects, such as trust in the service design
- Relational and social marketing around the service

4.7.1.2. Building block: Value Network connecting actors across Service Ecosystem

A value network for a telehealthcare service comprises the actors at the *micro* and *meso* level of the service ecosystem (see Chapter 2 for an illustration of a telehealthcare service ecosystem). One of the key objectives of the value network is to co-create value with the customers (or service users). Co-designing with elderly users for aesthetics and usability aspects of telecare equipment (such as alarm pendants and wearables) can potentially address the challenges associated with stigma, cognitive, and functional aspects associated with ageing (Wherton et al., 2015; Proctor et al., 2014). In a nutshell, value network element of a telehealthcare service business model needs to consider the following key aspects:

- Opportunities for co-designing technology solutions with service users (and their families)
- Collaborations and partnerships with other economic and social actors across the service ecosystem

4.7.1.3. Building block: Value Architecture of the provider

One of the crucial elements that define the value architecture of a telehealthcare business model is its information infrastructure (Collinge and Liu, 2009). As Lennon et al. (2017) noted, technology interoperability across health and care sectors remains a big challenge. A robust information infrastructure, backed up by effective information governance to support interoperability, data sharing and integration of information systems are critical to driving collaboration across health and social care organisations (Waring and Wainwright, 2015). In its current form, telecare in England is mostly restricted to PSTN based (fixed telephone line) systems. An upgrade to digital technology will enable opportunities for more 'value-added' service designs – allowing integrations with other 'smart home' digital services built around home security, home communication, entertainment, and home care (TSA, 2017a).

In addition to infrastructure, digital skills, and competence of the service provider organisation are vital elements in the value architecture. Lack of knowledge and skills concerning digital health technologies (Lennon et al., 2017) and technical competence in operating equipment (Sander et al., 2012) have been cited as one of the critical barriers in large scale deployment of telehealthcare implementations. An open organisational culture that encourages risk-taking and innovations (Bock et al., 2012) could facilitate the development of such skills. A service logic-based perspective underscores the role of interactional 'operant' resources – technology, knowledge, and institutions in forming value architecture. Institutions concern the organisational policies, business processes and practices, and the relationships with other stakeholders. A detailed discussion of these resources is made later in this chapter (see section 4.6.2), in connection with the value co-creation in a telehealthcare service ecosystem. To summarise the key points, the value

architecture element of a telehealthcare service business model needs to focus on the following key areas:

- Digital technology skills for the staff involved in provisioning and delivery of service
- An information infrastructure that allows inflow of information within as well as across organisational boundaries
- Business processes and practices
- Organisational culture that promotes openness and innovation

4.7.1.4. Building block: Value Capture from the service

Business model-driven thinking emphasises both the creation and capture of value. A value-driven dialogue helps the provider organisation to achieve the efficiency through gains in productivity and cost reduction, without compromising the effectiveness or quality of the service. This is important for the scalability and sustainability of the service. As the literature on healthcare services suggest, the value created by a service should not be measured purely in tangible and traditional economic currencies, rather in the form of long-term benefits that can be measured using intangible social currencies, such as citizens' well-being, support to independent living and better quality life (Schwamm, 2014; Lluch, 2011; Goodwin, 2010). It can be argued that while value capture through monetisation is critical for service providers to keep their business running and become sustainable, capturing the value in other currencies is no less important for the provider to attract public or philanthropic funding and make visible organisation's contribution towards social responsibility.

Introduction of personal budgets and direct payments for social care (Glasby 2007; Carr, 2009) has brought opportunities for service providers to offer customers with more choice-driven, personalised services. For such consumer-led

yet public-funded telehealthcare procurement options, service providers need to perform an intermediary role through information sharing and advocacy (Barrett et al., 2015). To summarise, the value capture element of a telehealthcare service business model needs to put attention on the following issues:

- Opportunities for additional revenue channels
- Cost efficiency
- Value assessment mechanisms and tools

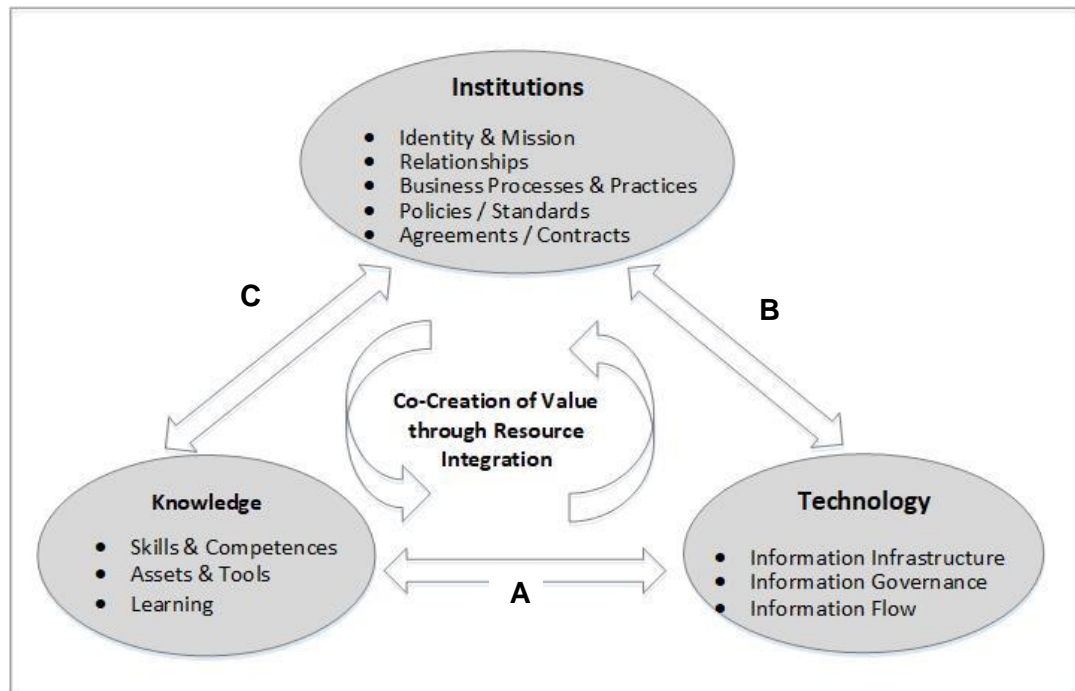
4.7.2. Value Co-creation process through Resource Integration

Technology has been envisaged as an operant resource that is capable of acting on other resources to create value and hence, a critical driver for value co-creation in a service ecosystem (Akaka and Vargo, 2014). Technology, as a vital interactional resource, potentially combines with another two resources - knowledge and institutions to orchestrate value-creating relationships among the service actors and beneficiaries (Srivastava & Shainesh, 2015).

Drawing inspiration from this line of thinking, a conceptual model in which three interactional resources – knowledge, technology, and institutions combine under varying contexts to co-create value, is presented below (see Figure 4.1). Telehealthcare services are sociotechnical systems embedded in their organisational, social, and political contexts (Greenhalgh et al., 2016), and the role of institutional elements such as cultural norms and practices is vital for technology adoption and usage.

Figure 4.1 Value co-creation in a telehealthcare service ecosystem

(Source: adapted from: Akaka and Vargo, 2014)



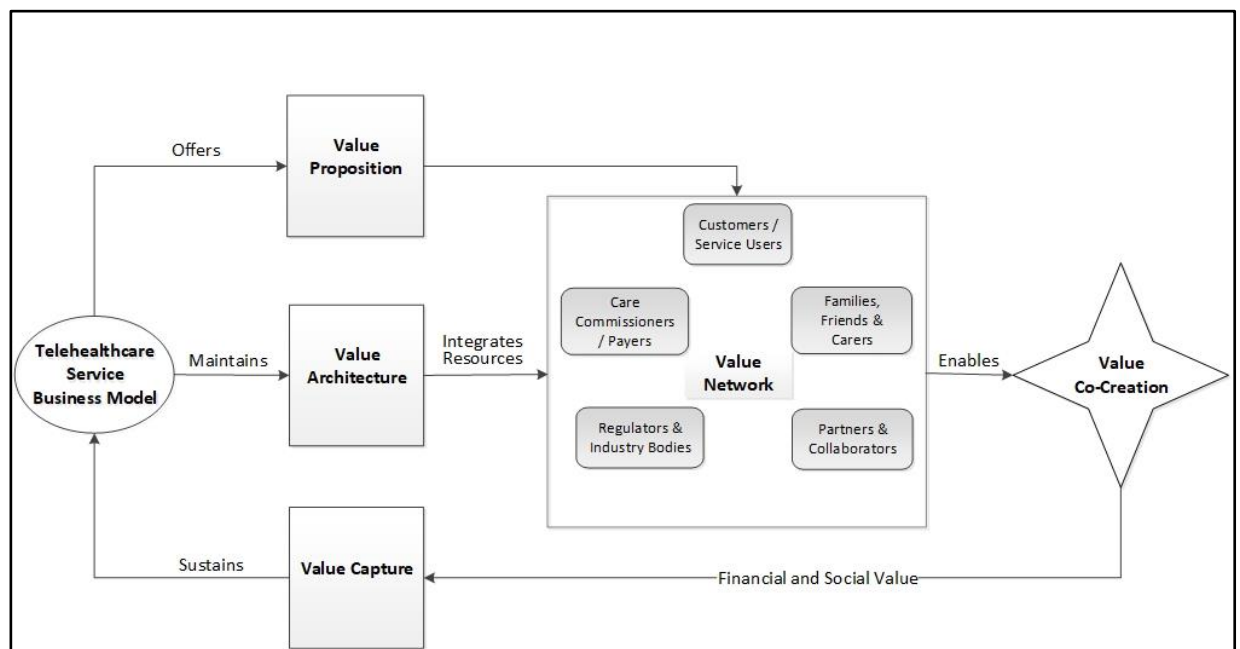
The bi-directional relationship between the human agency – knowledge, skills, and competence and technology (arrow 'A') denotes technology as a product for value proposition as well as a medium of human action for value determination. In a similar vein, the relationship (arrow 'B') between technology and institutions outline the mutual influence they apply on each other in shaping up new relationships or practices and in determining the value of the technology (Spohrer and Maglio, 2010). The institutional properties guide the human agency in its usage of technology by providing policies, standards, and agreements (arrow 'C'). Interoperability standards, information sharing policies, and information governance could be some of the examples of institutional elements in the telehealthcare service ecosystem.

4.7.3. A Conceptual Framework for a Telehealthcare Service Business Model

In the previous section, the building blocks of a telehealthcare service business model are described. The process of value co-creation by the business model, through integration of interactional resources across the service ecosystem has been illustrated also. Now, a conceptual framework for a complete telehealthcare business model is presented with a diagram (see Figure 4.2), demonstrating how different components of the business model work together in proposing value, co-creating value, and also, capturing some part of the created value.

Figure 4.2 Proposed conceptual framework for a service business model

(Source: author's own illustration)



Value architecture element embodies a service provider's resources comprising skills and competences of staff, information infrastructure capabilities, and practices, which allow the provider to propose its value-based service offerings to the customer or the service user (see Figure 4.2). However, the value is not created till the customer, being a part of the value network of the business model, is engaged in the value co-creation process, and start using his/her interactional

resources, such as competence of operating the technology devices and relationship with the provider's call centre agents and wardens – co-creating the experiential value. Similarly, the service provider can co-create value with other partners and collaborators in the value network, using appropriate interactional resources. Therefore, value architecture is the enabling component that, by working with the value network, generates co-created value for the service (see Figure 4.2). Finally, the value capture component needs to realise a part of the co-created value, which should be adequate to cover the cost of service operation, and any profit or surplus gets accrued to the provider - thus ensuring the sustainability of the service.

4.8. Chapter Summary

This chapter has started with a discussion that suggests that perspectives from business literature, anchored on value-oriented thinking, could potentially help in offering better value propositions and sustainability for telehealthcare services. It has been recognised that such business perspectives are under-represented in the current academic literature. Accordingly, literature from two business disciplines – business models and service research are reviewed and synthesised with identification of themes related to the creation, delivery, and realisation of value in a healthcare service context. Subsequently, thematic links between business model concepts and service-dominant logic have been explored, to establish how these two interdisciplinary theoretical frames complement each other. Various building blocks for a telehealthcare service business model have been articulated next, in relation to the processes of value co-creation, value delivery, and value realisation. Finally, a conceptual framework for the telehealthcare service business model is proposed to serve as *a priori* schema in guiding empirical investigation for this study.

At the end of the literature review of telehealthcare services (in Chapter 3), the following research question was proposed.

How can new telehealthcare service models be designed and delivered in the context of North East England?

Further to the examination of two value-centric and complementary theoretical perspectives from the reviewed business literature – business models and service research, and subsequent development of a conceptual framework, now it becomes vital to finalise the research question(s) for this study. Accordingly, the primary research question needs to concern designs of new service business models that would offer better value propositions, could accommodate opportunities for higher value co-creation within the service ecosystem, and finally, would be sustainable. Accordingly, three research questions are formulated and presented below. These research questions are going to be addressed in the continuing chapters of the thesis.

Research Question 1:

How can new service business models, with better value propositions for the users and other stakeholders, be designed?

Research Question 2:

What are the opportunities for value co-creation within such designs of new telehealthcare service business models?

Research Question 3:

How can telehealthcare services achieve sustainability through sufficient realisation of value within these business models?

Chapter 5: Research Design and Methods

5.1. Introduction

The previous chapter has established the theoretical underpinning for this research and proposed an analytical framework for empirical investigation. Researchers bring their own assumptions and worldviews to the research project and for any good research it requires that these assumptions are explicitly revealed in the writing of a study (Cresswell, 2007). The purpose of this chapter is to discuss the philosophical orientation leading to the choice of methodology, the design of the study, the methods selected for collection of data, and finally, the approach for analysis and interpretation of data.

The social science literature offers a number of frameworks to guide the research process, which reflect different 'basic sets of beliefs that guide action' or paradigms (Guba, 1990, p. 17), and their descriptions in terms of how various philosophical assumptions such as ontology and epistemology should influence design and methodology for a research project. Ontology refers to the assumptions about the nature of reality; epistemology deals with the question of '*how we know what we know*' and concerns providing the evidence that we need to justify our knowledge claims. Methodology is concerned with the process or procedures by which we create these knowledge claims (Guba, 1990). Epistemological assumptions are fundamentally linked with the ontological question concerning the nature of reality like if a real world is assumed, then what can be known about it is 'how things really are' and 'how things really work' (Guba and Lincoln, 1994, p. 108).

The chapter begins with a brief overview of critical realism, which is the chosen research approach for this study and subsequently, to discuss in detail the ontological, epistemological and methodological issues relating to a critical realist inquiry. During the last decade, critical realism has been gained rising interest and legitimacy as an alternative to both positivist and interpretive approaches to IS research (Bygstad et al., 2016; Mingers et al., 2013). In the healthcare literature, several studies (Connelly, 2001; Hart and Freeman, 2004; McGuire, 2005; Angus et al., 2006; Clark et al., 2007; Kontos et al., 2010; Harwood and Clark, 2012) have applied philosophical and theoretical tenets of critical realism. However, it is fair to mention that critical realism is not a commonly used approach in mainstream IS research related to healthcare domain. Therefore, the subsequent section aims to explore possible alternative philosophical positions and to provide a justification on how a critical realist approach fits with the research aim and questions posed in the study. Next, the research design, including the strategy and methods for collection of data, approach for analysis, and ethical considerations are described.

5.2. An Overview of Critical Realism

Proponents of critical realism have asked questions like: 'what properties do societies and people possess that make them possible objects of knowledge for us' (Bhaskar, 1998, p. 13). In their words, philosophical suppositions concerning 'what social reality is held to be also is that which we seek to explain' (Archer, 1995, p. 17) i.e. the ontology plays an integral and vital role in the research process (Dobson, 2002, p. 5). Accordingly, the starting point for critical realism as a philosophy of science is ontological, not epistemological. Instead of asking how we can know something, a critical realist asks 'what the world must be like to generate a particular phenomenon' (Smith, 2006, p. 199).

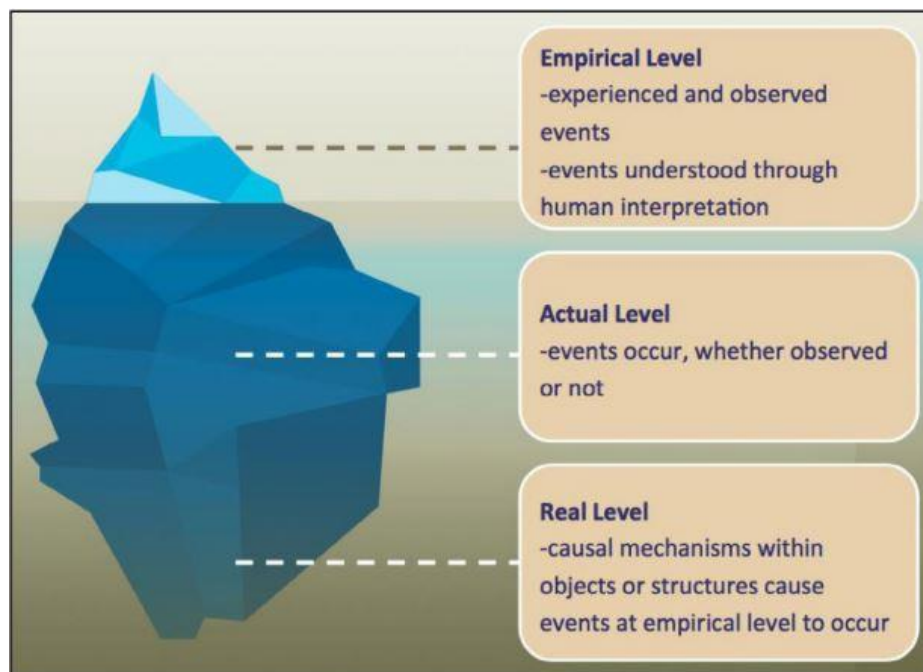
5.2.1. Key Tenets of Critical Realism Ontology

5.2.1.1. Stratified Reality

Critical realism differentiates between transitive and intransitive dimensions of reality (Bhaskar, 1978). It acknowledges an existence of a world which exists independent of human knowledge or perception (intransitive dimension of reality). The transitive dimension comprises of objects produced by the work of humans in the course of scientific inquiry, like existing theories and discourse (Collier, 1994, p. 51) or 'thought-objects such as our beliefs, theories and concepts about the entities that constitute' intransitive dimension of reality (Wynn and Williams, 2012, p. 790). Critical realism envisages reality as stratified within three distinct domains comprising: empirical, actual and real. Figure 5.1 illustrates the stratified ontology of critical realism through an iceberg metaphor.

Figure 5.1 An iceberg metaphor for Critical Realist ontology

(Source: Fletcher, 2017)

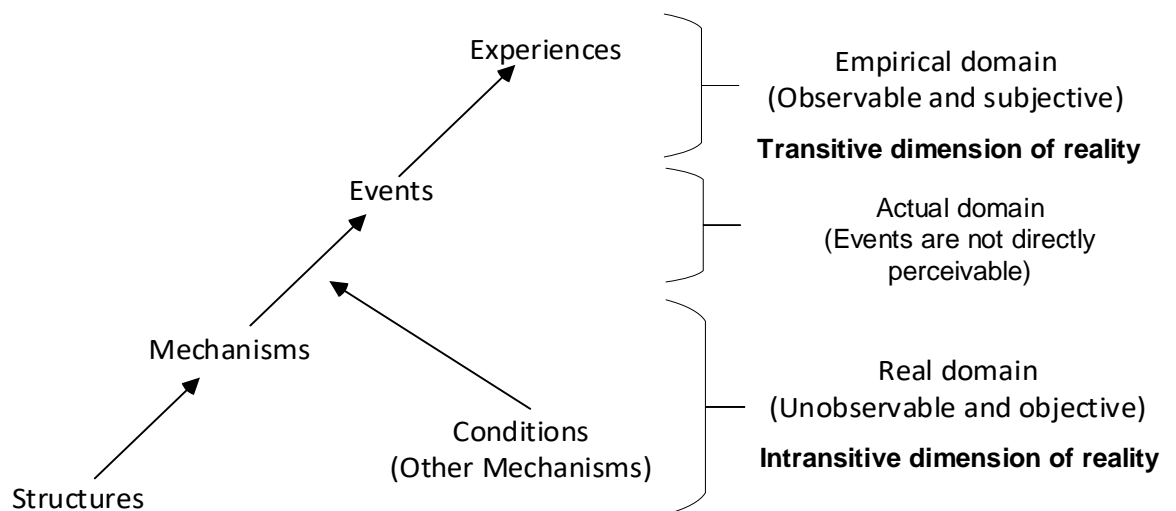


The first level (*the Empirical*) is the realm of events that we actually observe or experience but that can only a subset of actual events generated in a given

context (Wynn and Williams, 2012, p. 792). At this level, events can be empirically measured through human experience and interpretations (transitive dimension of reality). In the middle level of (*the Actual*), there is no filter of human experience as events happen whether or not we experience or interpret them (Fletcher, 2017, p. 183). Finally, the domain of (*the Real*) is the realm of the objects or entities, physical or social structures identified as having causal powers (Sayer, 2000, p. 11) representing the intransitive dimension of reality. A critical realist view of the three domains of reality is depicted in Figure 5.2.

Figure 5.2 Three domains of reality in Critical Realism

(Source: adapted from Sayer, 2000)



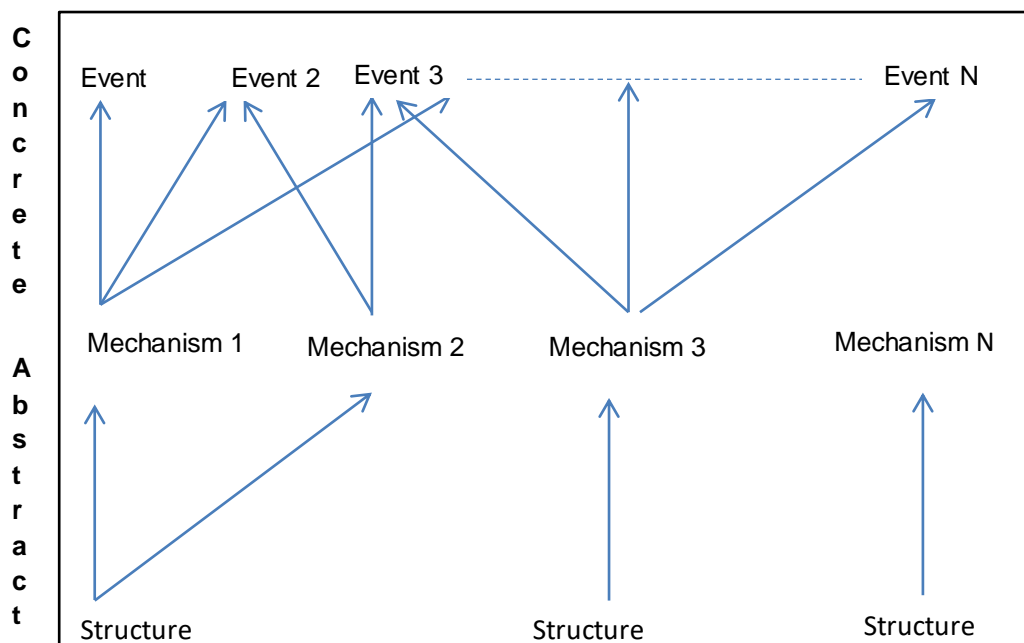
5.2.1.2. Entities, Structures and Mechanisms

Objects or entities provide the basic building blocks for critical realist explanation and can interact to create a structure. Structure is defined as ‘a set of internally related objects or practices’ (Sayer, 1992, p. 92) and could be physical as well as social. Entities and accordingly the structures the entities constitute, possess causal powers or causal tendencies that are ‘specific susceptibilities to certain kind of change’ (Sayer, 2000, p. 11). In critical realist terminology, the causal powers or tendencies are mentioned as ‘mechanisms’, which are capable of

triggering events under the influence of contextual conditions (see Figure 5.3). For example, a particular mechanism can produce completely different outcomes (events) at different contexts, and inversely the same event can have completely different causes (Sayer, 2000, p. 58).

For critical realists, in an open system, causality is not understood on the traditional ‘successionist’ approach where explanation depends on the deterministic regularity of patterns of observations or experiences. Rather causality needs to be explained in terms of the tendency or possibility for certain causal powers and mechanisms to exist and how the underlying structures affect outcomes in a specific context (Sayer, 1992). The concept of mechanisms constitutes the core of a critical realist investigation for a phenomenon of interest in a specific context, in answering the question: what must the structures and mechanisms be like, within the domain of *the real*, in order to explain the occurrence of a given set of events observed empirically (Bhaskar, 1978; Wynn and Williams, 2012, p. 794).

Figure 5.3 Relationships between structures, causal mechanisms and events
(Source: adapted from Sayer, 1992, p. 117)



5.2.1.3. Structure and Agency

Social theories, such as Structuration theory (Giddens, 1974) following the constructivist / interpretivist research tradition, posits that there exists a duality of structure and agency, where structure and agency cannot be physically (or analytically) separable. Critical realism argues for an ontological distinction (a possible separation) between society and people because 'all activity presupposes the prior existence of social forms' (Bhaskar, 1998, p. 34). Such position maintains that the world consists of social structures that are relatively enduring and independent of actors' current activities (Archer, 1995). Agency refers to the causal powers of people and agents can use knowledge, ideas and beliefs to determine, justify and pursue their interests through actions, to bring change in a purposeful way (Morton, 2006). It also attributes causal efficacy to social structures that both constrains and enables human activity (Bhaskar, 1998, p. 40). Accordingly, a critical realist perspective suggests that explanatory accounts need to encompass both human agency and the social structures within which the agents exist and operate.

5.2.2. Key Tenets of Critical Realism Epistemology

5.2.2.1. Sources and Characteristics of Knowledge

The recognition of a reality that exists independent of our knowledge and stratified ontology of critical realism present deep implications on what constitutes knowledge and how to acquire such knowledge in a critical realist research. As Sayer argues 'critical realism acknowledges that social phenomena are intrinsically meaningful, and hence that meaning is not only externally descriptive of them but constitutive of them....Meaning has to be understood, it cannot be measured, or counted, and hence there is always an interpretive or hermeneutic element in social science" (Sayer, 2000, p. 17). Therefore, our knowledge of the

objects in the intransitive dimension, reflecting an independent reality needs to be mediated through our sensory and conceptual interpretations.

5.2.2.2. Basis of Knowledge Claim

The objective of a critical realist study is to explain a given set of events, by unearthing the hypothesised existence of underlying mechanisms, which, if they exist and are activated, could have generated these events (Bhaskar, 1978). Critical realism posits that multiple possible explanations for a social phenomenon are possible owing to the open nature of social systems in which the phenomenon takes place. Critical realism acknowledges the fallibility of truth since our access to the world is in fact limited and always mediated by our perceptual and theoretical lenses (Mingers et al., 2013). Accordingly, a critical realist perspective accepts epistemic relativism of knowledge, in other words, 'all beliefs are socially produced' (Bhaskar, 1998, p.57). However, such position does not support *judgemental relativity* which maintains that 'all beliefs are equally valid, in the sense that there can be no (rational) grounds for preferring one to another' (Bhaskar, 1998, p. 57).

5.3. Choice of Methodology

Critical realism's ontological and epistemological assumptions offer a methodological pluralism for critical realist research and as Sayer argues that 'compared to positivism and interpretivism, critical realism endorses or is compatible with a relatively wide range of research methods, but it implies that the particular choices should depend on the nature of the object of study and what wants to learn about it' (Sayer, 2000, p. 19). Nevertheless, scholars note that qualitative methods play more profound role in critical realist studies, as they are more capable of describing a social phenomenon and identifying structured interactions among complex mechanisms (Mingers et al., 2013).

Several critical realist researchers have identified the case study as the best approach to seeking causal explanations of complex social phenomenon (Easton, 2010; Wynn and Williams 2012). A case study is 'an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident' (Yin, 2003). It has been argued that case studies are particularly well suited to contemporary research areas such as the telehealthcare domain, for which development of theory is at its early formative stage (Benbasat et al., 1987; Eisenhardt, 1989; Rowley, 2002; Siggelkow, 2007). A case study approach is particularly useful in explanatory research which addresses 'how' and 'why' questions (Yin, 1994) in an attempt to understand complex and dynamic relations and interactions within single or multiple settings (Eisenhardt, 1989). As Gerring (2007, p. 348) posits: 'Case studies, if well-constructed, may allow one to peer into the box of causality to locate the intermediate factors lying between some structural case and its purported effect'.

However, explanatory research using the case study approach is conducted with different ontological and epistemological assumptions. For example, case study research has been performed to explain a phenomenon by postulating relationship between the conceptual entities, through utilising a positivist stance on causality (Benbasat, 1987; Dubé and Paré, 2003; Lee, 1989). Another approach with an interpretive position (Walsham, 1993; Walsham, 1995; Barrett and Walsham, 2004) focuses on detailed description of events that reflects the primary actors' and researchers' interpretations of meanings, beliefs and intentionality, and the reciprocal influences of social action and context (Orlikowski and Baroudi, 1991, p. 14). Such studies are characterised by a rich tradition of "idiographic" social science that prioritise interpretive 'sense-making' or

'verstehen' (understanding an action through the actor's subjective experience of it) and insist on 'the difference between case studies seeking to identify cause and effect relationships and those seeking understanding of human experience' (Stake, 1995, p. 38). Proponents of interpretive case studies emphasise that researchers need to embrace context, narratives and personal engagement (Stake, 1995: p. 39) to develop 'thick description' (Geertz, 1973) of accounts.

Thus, the issues of causality, explanation and generalization receive little or no attention in research following interpretive approach, whereas such issues are of key concern to critical realism, specifically through the concept of generative (causal) mechanisms (McGrath, 2013). Case studies conducted with critical realist assumptions are cited as well suited to maintaining a balance of context, which recognizes the influence of specific situational factors (Kessler and Bach, 2014, p. 2), with a broader perspective, exposing hidden mechanisms and developing causal explanations (Danermark et al., 2002). **Critical realism provides a way to reconcile explanation (erklären) and understanding (verstehen); and accordingly, a critical realist case study allows researchers to theorise through using in-depth contextualised explanations** (Welch et al., 2011, p. 748) of specific sociotechnical phenomena such as adoption and sustainability of telehealthcare ecosystems. Critical realism based case study research is suited to explore social events within contexts and to reveal underlying causal powers and mechanisms that reflect the complex interaction between structure and agency (Kessler and Bach, 2014).

While the application of critical realism in case study research is perceived to be "underdeveloped" (Elger, 2010, p. 256), in the last few years, there has been a growing interest among researchers to conduct empirical case studies with critical realist lens. These studies are made across various academic disciplines -

International Business (Morais, 2011), Entrepreneurship (Blundel, 2007; Hu, 2018), Healthcare (Hart et al., 2004 ; Angus et al., 2006; Clark et al., 2007 ; Kontos et al., 2010 ; Harwood and Clark, 2012 ; Kessler and Bach, 2014), including Information Systems (Bygstad, 2010; Wynn and Williams, 2012; Henfridsson and Bygstad, 2013; Aaltonen and Tempini, 2014; Chandwani et al., 2018). This study adopts a critical realism informed case study design, the details for which are described in section 5.4.

5.4. How a Critical Realist Approach fits with this Research

Following Easton (2010, p.117), the researcher considers that critical realism provides a relatively coherent and logical perspective of the world that helps to explain social reality better than the other alternative inquiry approaches. However, while researcher's own worldview and belief system is important, the choice of method or approach must be 'appropriate to the nature of the object under study and the purpose and expectation of the study' (Sayer, 1992, p. 4). Therefore, it becomes vital to explain how critical realism fits with the research aims and questions of this thesis.

Positivist studies related to the telehealthcare topics aim to evaluate effectiveness or impact of technological interventions, mainly through experimental research designs such as randomised control trials (Cartwright et al., 2013; Steventon et al., 2013) but the objective measurements associated with these studies fail to take into account the contextual issues (Clark et al., 2007). A telehealthcare service ecosystem, defined in Chapter 2 of this thesis, is embedded within the social, organisational, technological contexts (Greenhalgh et al., 2016) and in such an open and complex sociotechnical system, explanation and understanding are not possible through law-like predictions, but causal tendencies or "demi-regularities" (Lawson, 1997) needs to be looked for (Danermark et al., 2002, p. 70). A

critical realist approach embodies the systemic and holistic thinking (Mingers, 2010) that are necessary to explore challenges and opportunities for better co-creation of value within the service ecosystem (Joiner and Lusch, 2016). It can be argued that a critical realism informed study should allow examination of both the underlying structures including the social, organisational, and policy structures – having causal powers (mechanisms) and the agencies of actors within a telehealthcare service ecosystem, together with the meso and macro level contextual conditions that influence activation of these mechanisms.

Studies with interpretivist (or constructionist) approach (Wherton et al., 2012; Greenhalgh et al., 2013; Hamblin, Yeandle & Fry, 2017) examine telehealthcare technology adoption issues within a variety of complex sociotechnical and organisational contexts. Majority of these studies employ a hermeneutical or interpretive approach that aim to understand an action through the actor's subjective experience of it. This approach indicates epistemic relativity, so that when judging among competing interpretations, 'there is no way to establish, beyond contention, the best view' (Stake, 1995, p. 108).

Critical realists do not stop their search at the level of meaning, but prefer to see its interpretation as merely the starting point for the pursuit of deeper causal explanations (Blundel, 2007). As Layder (1993, p. 16) says, "put very simple, a central feature of realism is its attempt to preserve a 'scientific' attitude towards social analysis at the same time as recognizing the importance of actors' meanings and in some way incorporating them in research". Considering the sociotechnical and complex nature of the telehealthcare service ecosystem, it is only plausible that such complexity entails investigation of both macro (structural, institutional and political) phenomenon as well as the more micro-level phenomena involving human interactions and field activities (Layder, 1993, p. 7-

8). A critical realism driven approach of 'research map', a layered model of social organisation (see Figure 5.4) helps to address the 'macro-micro' divisional challenge in social research and 'thus, the research and theory it produces have a textured or interwoven quality' (Layder, 1993, p. 8). Also, it can be argued that a critical realism-based approach addresses the stated aim of this study in theorising in the telehealthcare service domain (Gammon, 2008) - in the form of a mid-range theoretical framework (Chandwani et al, 2018, McGrath, 2013), through in-depth contextualised explanation (Welch et al., 2011).

The review of telehealthcare literature conducted in Chapter 3 suggests that one of the key barriers of large scale adoption of telehealthcare technologies remains lack of evidence around justifications and arguments (business cases) for telehealthcare services. Healthcare research following an 'evidence based practice' (EBP) is based on positivist notion of closed systems (Cruickshank, 2012, p. 72). Critical realist-informed research in healthcare could provide an alternative approach through high quality explanations and the strength of empirical associations that may point to deep causal mechanisms (McGuire, 2005; Clark et al., 2007). Several authors observe that the notion of "judgmental relativism" as espoused in social constructionist / interpretivist view could have problematic implications for practice-based disciplines such as health and social services since such views undermine the notion of professional knowledge in healthcare domain (Cruickshank, 2012; Clark et al, 2007).

It can be argued that the research on the technology enabled health and care services, such as telehealthcare is laden with a desire for improvement, policy change and actions – exploring citizen's well-being issues around healthy lifestyles, ageing in place and empowerment (Schermer, 2009; Proctor et al., 2014; Hamblin, 2014). Unlike positivist research, critical realism informed

investigations acknowledge that social sciences are not 'value-neutral' and asserts an axiological commitment of research to human well-being, empowerment and democratic emancipation (Wynn and Williams, 2012, p. 806; Connelly, 2001, p. 117). While an interpretivist approach recognises that social research is 'value-laden', its focus on individual agency and ignoring the macro structural issues limits the influence at a micro-level (Clark et al., 2007, p. 521). It can be considered that such broader notions of emancipation in critical realism have significance to enhance and enable the transformative capacity of telehealthcare policies and practices in the English Health and Social Care systems (DoH, 2012; NHS England, 2014).

5.5. Research Strategy

To guide the selection of research design for this study, a 'research map' suggested by Layder (1993, p. 72) is utilised. The Research map (see Figure 5.4) is a framework that aligns with critical realist thinking and provides a layered view of research elements consisting of both macro and micro level phenomena involved in a telehealthcare service ecosystem. As the various elements of the research map suggest, both human actions - social interactions of research participants (situated activity) and *meso / macro* structural forms of the service ecosystem (context and setting) need examination during the empirical work.

Figure 5.4 Research Map: a stratified framework for examining a service ecosystem

(Source: adapted from Layder, 1993, p. 72)

		Research Element	Research Focus
H I S T O R Y	CONTEXT		Macro social organisation: UK Govt. Health and Care policies, Technology, Market & Industry landscapes, Political and Economic conditions etc.
	SETTING		Intermediate (meso) social organisation: Telehealthcare Service Ecosystem comprising service provider organisation, health and care commissioners partners, collaborators, regulators etc
	SITUATED ACTIVITY		Dynamics of face-to-face interaction (Field work at case organisations)
	SELF		Biographical experience and social involvements (Mental model and reflexivity of the researcher)

In Chapter 2 and Chapter 3 of this thesis, macro-level contextual issues, including government's health and social care policies, relevant organisations, market and technology landscapes for telehealthcare services are discussed through a detailed review of relevant literature. Thus, the map aids in 'selective focusing' (Layder, 1993, p. 74) of the empirical investigation on examining the issues of value co-creation and value realisation of telehealthcare business models - within the 'intermediate social organisational' settings of service ecosystem (see Figure 5.4 above) - through 'situated activity' that involve engagement and further interactions with relevant organisational stakeholders.

5.5.1. Multiple Case Study Design

Ackroyd (2009, p. 534) compares different case study designs relevant to critical realism informed research, highlighting the distinctive analytical focus and explanatory power afforded by each design. He proposes several research designs along a continuum between 'intensive' or 'extensive'. Table 2 outlines

possible designs relevant to critical realism informed case study research, in terms of research focus and goals and the dominant logic of discovery.

Table 5.1 Research designs relevant to critical realist case study research

(Source: adapted from Ackroyd and Karlsson, 2014, p. 27)

Distinctive Case Research Strategy			
Focus	Intensive ←-----→ Extensive		
Research question	What is the mechanism? (context as given)	How do the context and the mechanism interact?	What is the context? (mechanisms inferred)
Research design	Single case study	Comparative case studies (number of cases > 1)	Research surveys and census data
Dominant logic of reasoning	Abduction	Abduction and retroduction	Abduction and retroduction

Intensive research provides strong causal explanation by seeking substantial relations of connection and by situating practices within wider contexts (Sayer, 2000, p. 21). While intensive single case study provides greater depth and deeper insights, such study demands prolonged and deeper access to and commitment of the considerable resources by the participating organisation (Sayer, 2000, p.21; Fletcher and Plakoyiannaki, 2011, p. 186). For this research, an opportunity for a longitudinal case study through research collaboration with a local care provider organisation, Your Homes Newcastle (YHN) was explored (refer Chapter 6 for details). However, the endeavour was not successful given the volatility owing to business transformation priorities and financial challenges faced by the concerned organisation. As Crowe et al. (2011) noted, access to a case study site remains a vital consideration since the case organisation needs to be hospitable to the enquiry and the researcher needs to work cooperatively with the organisational team members. After some failed attempts in securing research collaborations, it became clear that conducting a single longitudinal case study in a care organisation would be challenging - owing to the factors such as sensitivity

(privacy and ethical concerns) involved with healthcare services and lack of resources and/or commitment, in supporting this doctoral thesis. Furthermore, a multiple case study design, examining several similar or related cases allow comparison of similarities and differences between them, with more effective conclusions drawn on the causal mechanisms and outcomes (Ackroyd and Karlsson, 2014, p. 31).

This study adopts an intensive research design with four case studies concerning four telecare services that are provisioned and delivered in the North East England. For a critical realist standpoint, this study's research questions essentially aim to unearth mechanisms that concerns future designs of telehealthcare service business models, operating under varied contextual conditions. Accordingly, it can be reasoned that examining multiple services could help in examining the interplay between the contexts and mechanisms and in identifying cross-cutting patterns or demi-regularities (Lawson, 1997) in the empirical domain; and subsequently, in providing better explanations through identification of causal mechanisms across cases (Kessler and Bach, 2014, p. 183; Danermark et al., 2002, p. 166).

5.5.2. Role of A Priori Theory

Critical realism views the world as 'theory laden, but not theory-determined' (Fletcher, 2017, p. 182). Danermark et al. (2002, p. 10) asserts that 'our knowledge of reality is also something that is always conceptually mediated and this more or less truth-like'. Critical realist studies of social phenomena are necessarily deeply conceptual and the research needs iteration between conception and application so that ideas are tested against the empirical observations (O'Mahoney and Vincent, 2014, p. 13). Critical realists acknowledge the role of prior knowledge in justifying conceptual abstractions, which are

necessary to explain concrete phenomena through isolation of different mechanisms involved in producing related events (Danermark et al., 2002, p. 42). The theories that help us get closer to reality through identification of causal mechanisms driving social events, activities, or phenomena, are selected and formed using rational judgment of these social events (Archer et al., 1998, p. xi). In critical realist research, plausibility of competing explanations is established through comparing empirical findings and drawing on mid-range theory (Clark et al., 2007). In contrast to grand theories which address concepts at a highly abstract level, mid-range theories are context-bound, moderately abstract, of limited scope, and can easily lead to testable hypotheses (Gregor, 2006). Mid-range theories are suggested as particularly important for practice disciplines (Merton, 1968), like telehealthcare service research.

The theoretical framework developed in Chapter 4 is based on two mid-range theoretical perspectives – service-dominant logic (Vargo and Lusch, 2004) and business models (Lambart and Montemari, 2017). Such a mid-range theoretical framework allows the researcher to account for contextual nuances while searching for causal mechanisms and facilitate elaboration or enhancement of initial theory through contextualised explanations (Chandwani et al., 2018). Layder (1998, p. 109) suggests ‘orienting concepts’ as the initial means of organising data and argues that ‘the initial orienting concept may turn out to be a temporary means of imposing order on the data and may be supplanted or modified later on’. For this study, the theoretical framework described in Chapter 5, serves in providing useful orienting concepts for both collection and analysis of empirical data.

5.5.3. Selection of Cases

Scholars maintain that theoretical contributions of case studies and the potential to theorise from case studies depend on the thoroughness and explicitness of case sampling (Fletcher and Plakoyiannaki, 2011, p. 188). Purposeful or a directed approach in case selection is advocated, for replication purpose (Yin, 2009); and to support in building theories (Eisenhardt, 1989; Tsang, 2014). For an intensive multiple case study design, oriented on a critical realist approach, emphasis lies on exposing the causal mechanisms through an in-depth, contextually relevant analysis of a single, or a limited number of cases (Wynn and Williams, 2012). Since the results are not necessary generalisable across other contexts, selection of cases is not made as representative sample.

For critical realist studies involving multiple cases, Bergene (2007) argues that selection of cases should be done selectively on the basis of a belief that they exhibit the operation of the structures and mechanisms delineated by the adopted theoretical framework. Such purposeful selection strategy of cases is however, cited as problematic in terms of practical considerations such as in achieving research access and also owing to the researcher's temptation to select cases on the basis of convenience (Bryman, 2015).

Nonetheless, there should be a rationale in the selection processes whether it is driven by directed approach or from retrospective review of cases chosen on the basis of convenience (Kessler and Bach, 2014). Selecting the cases in a predetermined way could be insufficiently reflexive and ill-suited to the complexities of contemporary healthcare organisations (Crowe et al., 2011). Given the geographical boundary for this empirical research restricted to the North East England, the major considerations for selection of the cases have been the location or area of operation of the concerned service provider and also, the

potential information richness in terms of the context and the service profile. Selection of the four cases (excluding the pilot case) investigated in this thesis has been made using 'snowball sampling' strategy (Miles and Huberman, 1994).

A pilot case study has been performed for this research in collaboration with a large and reputed local care service provider (see Chapter 6 for details). Following the pilot, two additional telecare service providers located in the North East England, were identified as prospective case organisations. A series of interactions (both face-to-face and remote) with relevant senior stakeholders of these organisations helped the researcher in explaining the research aims and also, the importance of participation in this research - as a representative case – to support the multiple-case research design. The aspects of access and commitment to resources (interviews, documents related to the service etc.) and confidentiality issues were further discussed. Identification and subsequent selection of next two case organisations were materialised through recommendations and / or introductions made by informants from the former case organisations.

5.6. Methods for Data Collection

One of the key principles of critical realism is usage of 'multiple data sources' to support causal analysis (Wynn and Williams, 2012, p. 796) and case study research is essentially eclectic with respect to the kinds of data that might be collected (Easton, 2010). Scholars attribute strengths of case study design to its flexibility and adaptability that allows a potential range of data collection methods to investigate a research problem (Cavaye, 1996). Multiple data sources are essential to clarify meaning by identifying different ways a phenomenon is seen (Stake, 2005) or are preferable in order to triangulate (Yin, 2009). Qualitative methods play a more profound role for critical realist studies since such methods

are more capable of describing a phenomenon, constructing propositions and identifying structured interactions between complex mechanisms (Mingers et al., 2013, p. 800).

For this thesis, data collected primarily include thirty-two¹⁰ semi-structured interviews with senior representative stakeholders; secondary data from organisations' internal sources, governmental, media and practice community sources; field observations as part of researcher's engagement with the case organisations and also, informal conversations with a range of stakeholders related to the domain of telehealthcare - made possible through participation in several academic and industrial conference events. It may be noted that out of the thirty-two semi-structured interviews conducted for this study, twenty six interviews are performed with the employees of four service organisations while the rest involves senior managers representing other key organisations that are established in the north east of England and are part of the broader telehealthcare service ecosystem. These six interviewees represent a variety of organisations related to health and social care sector, namely *North-east Ambulance Services (NEAS)*¹¹, *NHS Sunderland CCG*, two leading telehealthcare product manufacturer / solution providers - *Tunstall UK*¹² and *Legrand UK*¹³, *Telecare Services Association (TSA)*¹⁴, and *Academic Health Sciences Network*¹⁵ (AHSN). Table 5.2 below provides a summary of the data sources together with the corresponding methods employed for data collection.

¹⁰ Excluding eight semi-structured interviews for the pilot case study at YHN (details can be found in Chapter 6)

¹¹ More information on NEAS can be found at <https://www.neas.nhs.uk/>

¹² More information on Tunstall UK can be found at <https://uk.tunstall.com/>

¹³ More information on Legrand UK can be found at <https://www.legrand.co.uk/>

¹⁴ More information on TSA can be found at <https://www.tsa-voice.org.uk/about-tsa>

¹⁵ More information on Academic Health Science Network (AHSN) North East & North Cumbria can be found at <https://www.ahsn-nenc.org.uk/>

Table 5.2 Data Collection Methods

Data Source	Method
Interviews	32 semi-structured interviews <ul style="list-style-type: none"> • 26 senior staff members across four service provider organisations • 1 representative from NHS CCG • 1 representative from NEAS • 1 representative from TSA • 1 representative from AHSN • 2 Industry representatives
Secondary Data	Analysis of following secondary documents / databases: <ul style="list-style-type: none"> • Case organisation websites, business plans, annual performance reports, local news, minutes of meetings, promotional literature, etc. • Key UK Government policy documents on telehealthcare / digital healthcare (example: NHS England, Depart of Health, National Audit Office (NAO), Office of National Statistics (ONS) etcetera) • Key reports on telehealthcare from consultants, think-tanks and industry bodies (example: Telecare Service Association (TSA), King's Fund, Local Govt. Association (LGA), Nuffield Trust, Ofcom etc.) • Relevant newspaper articles, blogs and newsletters (such as Telecare Learning and Improvement Network or Telecare LIN) • Databases such as POPPI and PANSI for demographic data related to elderly population
Field Notes	<ul style="list-style-type: none"> • Informal conversation with case organisation staff members • Academic and Industry conference events on digital healthcare organised by reputed Think-tank / Industry organisations.

5.6.1. Semi-structured Interviews

Interviews are a highly efficient way to gather rich, detailed and intensive empirical data (Silverman, 1998) and are arguably the primary source of information for qualitative studies since it is through interviews the researcher can best access the case participants' views and interpretations of actions and events (Walsham, 1995, p. 78). The strength of semi-structured interviews is derived from their flexibility (Easton, 2009, p. 124) and such interviews allow a good balance between excessive passivity and over-direction (Walsham, 1995). Thus, a semi-structured interview style has been adopted for this study which allowed the researcher to maintain openness in accommodating participants' free expressions while remaining focused on the research questions.

Smith and Elger (2014, p. 26) argue that the purpose of interviews are not simply to generate narrative accounts by participants but to provide key insights into substantive events and experiences which can be basis for analysing the interplay of social contexts and generative mechanisms. **Pawson and Tilley (1997, p. 164) maintain that interviews for a critical realist study need to be “theory-driven”. Thus, for a critical realism informed study, the interviewer needs to take an active, investigative and analytically-informed role, with focus on specific events and experiences (Smith and Elger, 2014, p. 26).** Accordingly, for this empirical research, an interview guide (can be found in Appendix 5.1) was prepared to loosely frame the questions or themes based on the researcher’s conceptualisation of service business model (see the proposed theoretical framework in Chapter 4). However, the questions were articulated to maintain simplicity, openness and exploration - with consideration to the case organisational context, the participants’ roles in their organisations and also, their potential unfamiliarity with theoretical concepts (and terminology) used in the thesis. The interview guide document was reviewed with the PhD supervision team and refined further based on the suggestions received.

Key informant sampling (Marshall, 1996) strategy has been applied for selection of interview participants with special or specific expertise within a case organisation. For example, a typical telehealthcare service provider organisation entails managerial roles such as service manager and operational roles such as contact centre representative, telecare consultant and mobile warden. Accordingly, the interview participants are chosen based on their privileged knowledge or experience at a particular area of expertise (Denscombe, 2010). Such purposeful sampling has also been used to identify key study participants at the broader ecosystem level such as representatives from NHS CCG and NEAS.

Further interviewees are identified through snowball sampling (Miles and Huberman, 1994) via introduction through already established contacts and study participants. It may be worthwhile to mention here that participation of actual service users was not considered appropriate for this research, primarily due to the particular focus of the research on the *meso* and *macro* aspects of the telehealthcare service ecosystem. Moreover, it was anticipated that receiving ethics clearance/approval for interviewing elderly (and vulnerable) service users as research participants could be considerably challenging.

Thirty-two interviews (see Table 5.3 for a list of interviewees across four case studies) were conducted over nine months, starting the month of October 2017. The availability of a few key-informants representing the telehealthcare industry delayed interview scheduling and thus, impacted the overall timeline for the primary data collection. Before the interviews, each interviewee was provided with a participant consent form (can be found in Appendix 5.2) for his/her review and sign-off. Only two participants (TSA-P1 and TES-P2, see Table 5.3) were interviewed over the telephone; the rest of the interviews were conducted in-person. The interviews lasted approximately between forty-five and seventy-five minutes and got recorded by the researcher using a digital voice recorder with the full consent of the participant. The recorded interviews were subsequently transcribed verbatim and both the digital and print versions of the transcribed text documents are stored and organised for data analysis. Further to a preliminary review of the interview audios by the researcher, no follow-up interview was deemed necessary for clarification of findings.

Table 5.3 List of Interviewees for the Four Case Studies

Id	Service	Case Id	Interviewee Id	Identifier Code	Org Role
1	Coast & Country HomeCall	HC	P1	HC-P1	Head of Service
2			P2	HC-P2	Business Development Manager
3			P3	HC-P3	Service Manager
4			P4	HC-P4	Quality Assistance and Performance Manager
5	Sunderland Telecare	ST	P1	ST-P1	Lead Manager
6			P2	ST-P2	Equipment Installation Manager
7			P3	ST-P3	Response Manager
8			P4	ST-P4	Response Supervisor
9			P5	ST-P5	Commissioning Policy Officer
10			P6	ST-P6	Customer Service Manager
11			P7	ST-P7	Customer Service Staff
12	Durham Care Connect	DCC	P1	DCC-P1	Lead Telecare Manager
13			P2	DCC-P2	Business Development Manager
14			P3	DCC-P3	Service Manager
15			P4	DCC-P4	Telecare Coordinator
16			P5	DCC-P5	Control Room Supervisor
17			P6	DCC-P6	Response Supervisor
18			P7	DCC-P7	Back Office Support Staff
19			P8	DCC-P8	Occupational Therapist
20			P9	DCC-P9	Commissioning Policy Officer
21			P10	DCC-P10	Social Carer
22	Gateshead Care Call	GCC	P1	GCC-P1	Telecare Manager
23			P2	GCC-P2	Business Development Officer
24			P3	GCC-P3	Director of Adult Social Care
25			P4	GCC-P4	Falls Coordinator
26			P5	GCC-P5	Service Manager
27	TSA		P1	TSA-P1	Manager
28	Tunstall		P2	TES-P1	Director
29	Legrand		P3	TES-P2	Sales Director
30	NEAS		P4	NEAS-P1	Service Improvement & Development Manager
31	AHSN NE and North Cumbria		P5	AHSN-P1	Associate Medical Director
32	NHS CCG		P6	NHS-P1	Programme Manager, NHS Sunderland CCG

5.6.2. Secondary Data

Secondary data sources provide rich, extensive empirical data, in supplementing primary, data, explicating and corroborating the causal explanations, through data triangulation (Yin, 2003). Secondary data available from a range of sources including the case organisation websites, business plans and annual reports (see

Table 5.2) provided useful guidance to the researcher in preparing the 'interview guide' (for the semi-structured interviews) and also, aided in understanding contexts for the case organisations and the services (White, 2010). Selection of secondary data that fits the needs of current research needs careful judgement and assessing the quality of information in secondary data sources should be an important factor (Hox and Boeije, 2005, p. 598). A complete list of secondary data sources can be found in Appendix 5.3.

5.6.3. Field Notes

Given the complexity of a telehealthcare service ecosystem and the diversity of organisations involved therein, it is vital to engage with a broader set of stakeholders beyond the study participants, especially from the telehealthcare practice community. During the tenure of PhD studentship, the researcher had the opportunity of attending a few conference events on digital healthcare, organised by reputed Think-tank / Industry organisations¹⁶. These events provided valuable opportunities to network and to have informal conversations with the relevant experts in the telehealthcare domain; and contributed to better understanding of the strategic issues / insights surrounding technology trends, best practices / lessons learnt, and success stories. A diary was maintained by the researcher with reflexive notes from the field throughout data collection process (Cresswell et al., 2010), which helped him during the coding and analysis of the empirical data.

5.7. Analysis and Interpretation of Data

5.7.1. Approach for analysis of data

Transcripts of the thirty-two interviews conducted for this study produced a large volume of data (approximately 650 pages of transcript), analysis which can

¹⁶ Two notable conference events were 1. Digital Health World Congress, held in London, UK on 22-23 June 2016, and 2. Digital Health and Care Congress, , organised by the King's Fund (<https://www.kingsfund.org.uk/>) in London, UK on 11-12 July 2017

potentially be an 'attractive nuisance' (Miles, 1979). The key issue concerning the design of qualitative data analysis is whether to adopt a purely grounded theory approach (Glaser and Strauss, 1967; Strauss and Corbin, 1990) or to adopt a more deductive approach based on a theoretical framework (Miles and Huberman, 1984). As explained earlier in section 5.4.3, following a critical realist approach, this study makes use of 'orienting concepts' derived from the theoretical framework described in Chapter 4, as the initial means of organising data (Layder, 1998, p. 109).

The use of *Computer-assisted Qualitative Data Analysis Software* (CAQDAS) facilitates organising large amounts of text and allows the researcher to work efficiently with complex coding schemes, facilitating depth in the analysis (King, 2004; Lewins, 2014). However, the application of analysis software does not substitute for the interpretive processes applied by the researcher and caution is necessary of not being 'locked in' to the themes as the only way of looking at data (Walsham, 2006, p. 325), thereby compromising the phenomenological and experiential richness of the data. There are some well-known CAQDAS packages available in the market, such as Atlas.ti, NVivo and MAXQDA, among others. NVivo 11 software, made available by the researcher's university was employed to assist the analysis process, primarily to organise and manage the voluminous data from the interviews, and to supplement the interpretative processes followed in manual coding.

Template analysis (King, 1998; Crabtree and Miller, 1999) is a form of thematic coding approach that offers a flexible and pragmatic technique and can be applied within a range of different qualitative research approaches. In health and care research studies, application of template analysis has gained credibility (King 2004; Waring and Wainwright, 2008). Template analysis supports qualitative

research which takes a 'realist' position and is concerned with the 'discovery' of underlying causes of particular social phenomena (Brooks and King, 2014, p. 5). Unlike with traditional thematic coding approach, template analysis uses an initial, predefined template with top-level *a priori* codes, to guide the analysis of unstructured qualitative data. The initial template (see Figure 5.5) was prepared with only a few predefined codes to allow the emergence of relevant themes from the data and to avoid blinkering of analysis with a theoretical bias (King, 2004, p. 280). A recursive exercise of reviewing the transcript data was followed in refining the initial template, with frequent additions and/or modifications of codes, till the 'integrative themes' which are of most central relevance to the investigation got identified (King, 2004, p. 287). The analytical procedure for coding the interview text is illustrated with two examples in Table 5.4, in which development of 'integrative themes' from the interview data can be seen. The final coding template (see Figure 5.6) shows the four key themes, along with the associated sub-themes emerging out of the empirical data.

Figure 5.5 Initial Coding Template for Data Analysis

Identifier	Theme (Top level)	Sub-theme (level-2)	Sub-theme (level-3)
1	Organisation		
1.1		Hierarchy and Roles	
1.2		Purpose and History	
1.3		Culture	
1.4		Resources and Capabilities	
1.5		Key Challenges	
2	Service		
2.1		Scope and Offerings	
2.1.1			Perception of the service Assessment of Performance and Quality
2.2		Customers (Users)	
2.2.1			Demographics
2.2.2			Experience with service
2.3		Financials	
2.3.1			Cost structure
2.3.2			Earnings
2.4		Technology	
2.4.1			Current state
2.4.2			Challenges
2.4.3			Opportunities
2.5		Partners and Collaborators	
2.5.1			Local Authority (Council)
2.5.2			Health bodies
2.5.3			Other services/organisations
2.5.4			Suppliers

Figure 5.6 Final Coding Template for Data Analysis

Identifier	Theme (Top level)	Sub-theme	Integrative themes from Coding
1	Nature of the Service		
1.1		Risk and Vulnerability	Perception of risk, Human aspects
1.2		Mismatched Expectations	Masking of other needs
1.3		Stigmas and Stereotypes	Perception of service users
1.4		Regulations and Standards	Defining the boundaries, Assurance of quality
1.5		Challenges of Evidence	Measuring the value, Payback period
2	Advocacy and Collaborations		
2.1		Divide between Health and Care	Buy-ins from Health
2.2		Awareness and Promotions	Technology push, Mainstream marketing
2.3		Role of Intermediaries	Inconsistent regional practices
3	Organisational Characteristics		
3.1		Policies, Frameworks, and Processes	Transactional relationships, Risk averseness
3.2		Identity and Culture	Structural and cultural barriers
3.3		Strategic Objectives	Reactive strategy
4	Technology and Information Systems		
4.1		Reliability of Technology	Technology design
4.2		Fragmentation of Technology Solutions	Abundance of choices
4.3		Information Sharing, Governance & Infrastructure	Integrated systems, Insights from data
4.4		Opportunities of New Technologies	Switchover to Digital, Trust in technology

Table 5.4 Illustrations of Analytical Procedure for Coding the Interview Text

Block of interview transcript text	Codes	Integrative Themes
Example 1:		
“We're owned by the council but we're not employed by the council, it's a weird kind of thing. It's a local authority trading company. It's a strange relationship we have with the council I think.”	relationship with the Council	Structural and cultural barriers
“But, we are currently going through a review and we don't know what the future delivery model for Sunderland Care and Support will look like. Different options are being considered by our commissioners, the Council”	Uncertainty over future of service	
“there are so many other things out there, but because we're a local authority and we're not running a business , we're part of an organisation, it's very difficult to limit yourself to be able to promote , to use that technology to help that independence more because of you being part of the council	Independence in decision making	
Top challenge is constantly being told you've got to be more commercial and every time you try to, they come down and say, you can't make a profit, you can't do that you're a local authority	Problem of having commercial focus	
Example 2:		
“We believe that we've got a fantastic improvement here, but our difficulty is, and will be, to demonstrate that. It's about providing evidence that digital or equivalent innovations are going to be good for patients and staff, but in addition, we'll save money. Because otherwise, people won't adopt them”	Difficulty to demonstrate evidence	Measuring the value, Payback period
“They want to actually see the study really produce quantitative and detailed analysis and information , which tells them that by doing that, we will benefit”	Hard evidence	
“I think there's no doubt in people's minds that telecare is excellent for a prevention agenda but that prevention is years away. You're investing in something now and the benefits you're going to get 5, 10, 15 years' time . Where in the world we're living today, that payback isn't soon enough .”	Return on investment	

5.7.2. Reliability and Validity pertaining to Data Coding

Conventional criteria of reliability and validity are developed within the quantitative research tradition and typically employed for assessment of research with positivist approaches. While judging the quality of qualitative research, the concepts of validity and reliability demand a different operationalisation (Pope, Ziebland and Mays, 2000). Even though a considerable debate on this issue exists, both at the philosophical and methodical level (Seale, 1999), there remains a consensus that qualitative research needs to embody credibility (or trustworthiness), transparency and authenticity (Creswell and Miller, 2000; Tracy, 2010). Qualitative research with a 'realist' position concerns issues related to researcher objectivity and coding reliability (Brooks and King, 2014, p. 5).

In order to address these issues of reliability in the process of coding of data, this research adopted primarily three procedures: maintaining 'audit trails' of the research process and related decisions at every stage of data collection and analysis; acknowledging self-reflexivity in the form of researcher's own beliefs, assumptions and biases; and finally, by utilising 'triangulation' technique to verify interpretations and to search for convergence among multiple data sources to form common themes (Creswell and Miller, 2000). Validating the themes emerging out of the data coding process with concerned study participants has been cited as a good practice to address the issue of self-reflexivity (King, 2004). For this research project, however, the collection of respondent feedback was deemed difficult, given the project timeline and availability of the organisational stakeholders concerning the four case studies. Accordingly, independent scrutiny in the coding process was incorporated to minimise possible biases in the analysis, through the application of 'peer reflexivity'. During the coding cycle, the initial, intermediate, and final templates along with a set of transcripts,

researcher's notes and memos were reviewed by a member of the PhD supervision team.

5.7.3. A Framework for Critical Realism informed Data Analysis

A critical realism informed research needs iteration between conception and application so that ideas can be tested against the empirical observations (O'Mahoney and Vincent, 2014, p. 13) and explanations are made through isolation of different mechanisms involved in producing related events (Danermark et al., 2002, p. 42). Such an approach calls for a strategy for analysis that aims to combine insights from empirical data with theoretical perspectives (or existing knowledge). Following the methodological principles and guidance available from extant critical realist case study research (Wynn and Williams, 2012; Bygstad, 2010; Meyer and Lunnay, 2013; Easton, 2010; Fletcher, 2017; Hu, 2018), a framework for analysis is developed and presented (see Figure 5.5). The framework comprises four main steps for the analysis, which have been designated in the diagram with the use of appropriate markers.

5.7.3.1. Step 1: Describing the case contexts and identifying the key themes

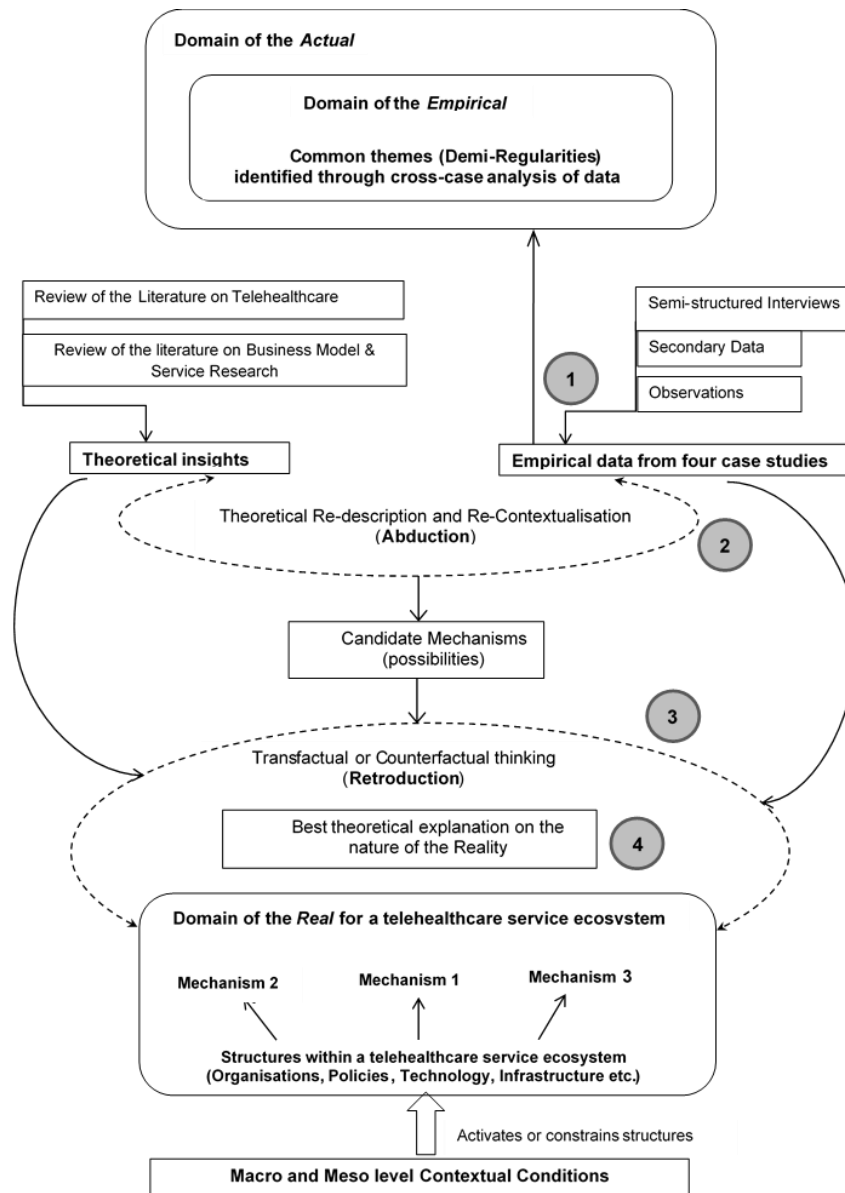
The initial step in data analysis involves describing the telehealthcare service that each case study represents, including the demographic, socio-economic, and organisational contexts in which a service is embedded. The aim is to depict the observed (or experienced) reality manifested in the domain of ***the Empirical*** (see Figure 5.5) by producing a "thick description" (Geertz, 1973) of the service and also, to identify the key events related to the service, for example, changes in the way the service has been funded or provisioned. Through a comparative analysis of findings from the four case studies, using the coding approach mentioned in section 5.7.1, a set of common themes or patterns are identified. Such **empirical patterns or 'demi-regularities'** (Lawson, 1997) highlight the critical realist

principle of causal tendencies, in contrast to the causal laws and deterministic regularity that are typically searched for, in positivist research (Danermark et al., 2002, p. 70). This step utilises all empirical data sources, as outlined in section 5.5.

5.7.3.2. Step 2: Explicating the structures and hypothesising mechanisms

A critical realist approach encourages the researchers not to stop their search at the level of experience and meaning, but more as a starting point for the pursuit of more in-depth causal explanations (Blundel, 2007). Moving beyond the empirical evidence becomes necessary because, unlike the events in the domain of ***the Empirical*** that can be experienced through direct perception and observations, events happening in the domain of ***the Actual*** are normally understood through abstraction from observable effects rather than direct perception (Wynn and Williams, 2012).

Figure 5.7 Framework for a Critical Realist Analysis (Source: own illustration)



This step involves explicating the underlying structures within the service ecosystem, and hypothesising mechanisms (causal powers or tendencies) that possibly link the structures with the observed events (outcomes). A process of **abduction** or (*theoretical redescription and recontextualisation*), which has been described as a process of ‘inference or thought operation, implying that a particular phenomenon or event is interpreted from a set of general ideas or concepts’ (Danermark et al., 2002, p. 205), is employed for this purpose (see Figure 5.5). The theoretical constructs concerning a service business model

defined in Chapter 4 are employed together with the empirical evidence derived in Step 1, (see Figure 5.5), to identify interesting gaps that enables the researcher 'to understand (the structural issues within the telehealthcare service ecosystem) in a new way' (Danermark et al., 2002, p. 80). An *abductive* inference leads to possible hypothesising causal powers (mechanisms) within the structures.

5.7.3.3. Step 3: Identifying the key mechanisms and their activation potentials

In this stage, the causal powers (or tendencies) of the structures within a telehealthcare service ecosystem are examined by using **a creative strategy of inference called *retroduction*, which remains central to the methodological element in critical realism research** (Lawson, 1998, p. 156). *Retroduction* can be described as 'thought trials' (Weick, 1989) to identify the 'hypothetical mechanisms that, if they existed, would generate or cause that which is to be explained' (Mingers, 2004, p. 94). ***Retroductive reasoning moves between the domains of the Real and the Actual / Empirical*** (see Figure 5.5), in order to identify causal explanations (or mechanisms) and to ascertain what the broader contextual conditions must be like for the mechanisms to be activated and result in the 'demi-regularities' found in Step 1. ***Retroductive reasoning provokes the researchers for 'counterfactual thinking'*** (Danermark et al., 2002) who use their 'stored knowledge and experience of social reality to explore questions such as 'could one imagine X without Y?' (Meyer and Lunnay, 2013, p. 3).

5.7.3.4. Step 4: Validating the proposed explanation

Assessment of quality and rigour for a critical realist study hinges on the validity of the knowledge claim, in terms of the casual explanation offered for the phenomenon under study. In analysing an 'open system' such as the telehealthcare service ecosystem in a critical realism informed research, it is possible to offer several alternative causal explanations for the outcomes. Thus, it

is important that the mechanisms with the most potent explanatory power concerning the empirical evidence must be chosen (Sayer, 1992; Bygstad, 2010). Such empirical corroboration is vital to overcome so that the tentativeness of inferences drawn through reproduction process is validated (Wynn and Williams, 2012).

Extant literature on critical realist research provides some guidance for the evaluation of quality and rigour of critical realist studies. Easton (2010) suggests that a critical realist study ideally needs to follow an iterative cycle of data collection and data analysis, up until to the point of an 'epistemological closure' when all rival candidate mechanisms could be ruled out. However, maintaining such rigour could be problematic for an academic PhD project due to the constraints of time and also, due to the practical challenges of re-engaging with the case organisations. Another approach could be to identify 'problem' and 'blocking' mechanisms (Pawson and Tiley, 1997, p. 75) and to provide a basis of a causal explanation of the eventual outcomes through supportive and unsupportive mechanisms (Morton, 2006). This research primarily employs comparison across the four cases to strengthen the validity of the theoretical explanations (Bergene, 2007). Empirical corroboration is performed by comparing the empirical data with theoretical insights from literature, to ensure that the inferences drawn through *retroductive* reasonings, offer the best possible explanation that caused the outcome, complemented by a 'judgmental rationality' on the part of the researcher (Wynn and Williams, 2012, p. 801).

5.8. Ethical Issues and Considerations

In qualitative research, it is important to address the ethical issues due to its very nature concerning live human subjects. Walsham (2006, p. 327) mentions about three domains of practice on the ethical issues: confidentiality and anonymity,

working with the organisation and reporting in the literature. This study is not clinical / medical in nature; it aims to improve service delivery and integration of health and care systems. Accordingly, this project did not necessitate ethics approval from concerned regulatory authority like NHS. While no major ethical issues were anticipated, the primary data collected from the participants or the secondary data provided by organisations might be of sensitive nature; therefore, data security and privacy concerns have been addressed in adherence to the ethics policy and guidelines from Northumbria University.

Each interviewee for this research was given an informed consent form to review and sign before the interview starts (see Appendix 5.2). This form details the broad nature of this research and mentions how confidentiality issues are addressed following Northumbria University's ethical policies and data governance guidelines related to storage, encryption and anonymisation. A copy of this form was given to each participant after the interview for his or her own records.

5.9. Chapter Summary

This chapter has informed the reader about the building blocks of the research process. The philosophical assumptions made by the researcher are made explicit and subsequently, the rationales for adopting a critical realist approach to address the research aim and questions have been explained. The choice of case study as the espoused methodology for the study is discussed next. A multiple case study research design has been explained along with the range of methods for data collection; and approach for analysis and interpretation. The next chapter will describe a pilot field study of a telecare service, present the key findings from the engagement, and further discuss the implications of the findings for the thesis.

Chapter 6: Pilot Study of a Telecare Service

6.1. Introduction

In an empirical research project, engagement with the study participants and primary data collection typically follow the stages involving a thorough review of relevant literature and development of the study design/methodology. During the early months of this PhD study, when a review of the literature was still in progress, an opportunity was presented to the researcher for research collaboration with a local telecare service provider organisation. For field studies in the health and care sector, such as in case study research, access to the organisation remains a central consideration (Crowe et al., 2011, p. 6). This early collaborative engagement with the organisation provided the researcher an invaluable opportunity early in the research cycle, to explore a telecare service on the ground, and to gather useful in-situ organisational and processual insights to provide a more in-depth contextual background to the research project which would then aid the further refinement of the research methodology and development of an investigative framework. This was used to supplement the knowledge of the telehealthcare domain already informed by an initial review of relevant literature.

This chapter aims to describe a field study of a telecare service, to disseminate the key findings from the engagement, help refine the research methodology, and finally, to discuss the implications of the findings for the overall PhD research project. This chapter begins with a background of the engagement with the provider organisation. In the following sections, the organisational context,

telecare service, and engagement details are discussed. The design and methodology employed for the collection and analysis of data are outlined subsequently. The findings from the study are elaborated in the following section. Finally, a summary of the implications of the field study findings for the overall research project is presented.

6.2. Background

This PhD studentship was funded by the Faculty of Business and Law, at the University of Northumbria at Newcastle. Two senior academic members from this faculty had the opportunities for collaborating with a local Housing (and Care) service provider organisation affiliated with the Newcastle City Council, during their study focussed on the challenge of information integration between health and care services (Waring & Wainwright, 2015). Following through on that relationship, an opportunity came up in early 2016 for a potential research partnership between the organisation, 'Your Homes Newcastle' (YHN), and the Faculty. An outline project proposal was accordingly prepared and submitted to YHN. The proposed project aimed to model and to analyse the lifecycle relating to elderly falls assessment, prevention, and response across localities within the Newcastle urban area, using a field research methodology. One of the primary objectives of the project was to develop best practice models (to-be models) as a means for the evaluation of new service scenarios and to identify an evidence base (benefits evaluation and realisation) to understand and promote the business case. During the time of writing this project proposal, there were UK-government implemented budget cuts, in the tune of £32 million on Newcastle City Council's budget (NCC, 2016), resulting in cuts to adult social care services. Because of those measures, the sustainability of YHN's telecare service was under intense pressure (The Elders Council, 2016). YHN management was interested in the

proposed project outcome, in the form of developing an evidence base to justify the effectiveness of its telecare service, in order to help YHN in putting a strong business case to draw adequate funding flows from the local authority.

One of the challenges for the project was the lack of funding from YHN. In view of considerable synergy between the researcher's PhD project and the proposed collaborative research partnership project, concerning the research domain and aims, the project was envisaged as a significant component of the overall PhD study. The initial stage of the project involved familiarising the researcher with the organisation, including its strategy, organisation structures, work practices, and telecare technology systems in use. Accordingly, the researcher was granted access to YHN's office to interact with selected staff members and also provided with documents relevant to the telecare service delivered by the organisation.

6.3. Organisational Context

Your Homes Newcastle (YHN, www.yhn.org.uk) is an *Arms-Length Management Organisation* (ALMO). YHN is one of the 30+ ALMOs in England (NFA, 2016), and the organisation was established in 2004 through a stock transfer arrangement with the Newcastle City Council (NCC, www.newcastle.gov.uk). As an ALMO, YHN is a not-for-profit organisation wholly owned by NCC and manages housing stocks for the local authority. At a broad level, YHN is organised across the following three lines of functions:

- Tenancy services – manages about 27,000 council properties and provides furniture services (across Northern England)
- Property maintenance and renovations for YHN tenants
- Support and Care services – YHN's telecare service, known as the 'Community Care Alarm Service' (CCAS) sits within this function

As of November 2015, there were about 4,200 Newcastle residents in receipt of the telecare service - out of which NCC paid to YHN the full cost of telecare services for about 2,800 users who got assessed by the council's adult social care department as having an eligible care need for telecare and meeting a pre-set financial eligibility criteria (NCC, 2016). There are some special provisions for telecare service, as indicated below:

- a. For people who are aged 85 or over and are new to telecare service, the service comes free of charge for a six month's trial period (after which the financial eligibility criteria applies)
- b. For people who have palliative care needs, the service comes free of charge (no financial eligibility criteria applies)
- c. For people who are in receipt of *reablement* service (short-term domiciliary care after hospital discharge) get telecare service free of charge for a six month's trial period by YHN

Historically, YHN has been heavily reliant on the local authority's (NCC) public funding budget in delivering telecare service to the majority of its customers who get assessed for telecare needs and, subsequently, are referred to the service. Cuts in public funding at both national and regional levels affected NCC's budget in supporting adult social care services (Phillips and Simpson, 2017). In NCC's 2016/17 budget proposal (NCC, 2016), a recommendation was made to remove funding support (based on existing eligibility criteria) to YHN, starting in April 2016. This proposal could potentially affect YHN in losing a substantial number of its customers since this plan requires every service user to pay for his/her telecare service fee. Therefore, the financial viability of CCAS service was perceived to be at risk by the management, and accordingly, YHN Board decided to subsidise the existing Council-funded customers for the period between April and June 2016 to maximise customer retention. Also, to target more self-funded new customers, YHN management undertook a rebranding exercise of CCAS. The new name of

the service 'Ostara'¹⁷ (www.ostara.org.uk) was chosen to convey a fresh, modern, and reinvented identity of the service to attract more self-funded users and tap into the private telecare market.

6.4. Community Care Alarm Service (CCAS)

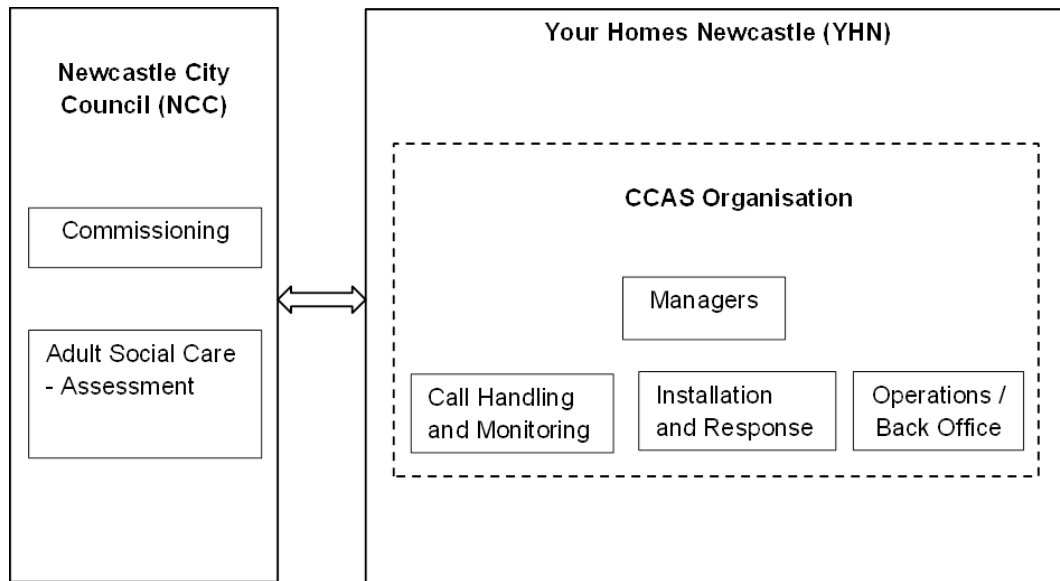
The Support and Care division within the YHN organisation provides Community Care Alarm Services (CCAS), which are essentially a telecare system that operates a 24x7 emergency call centre connected to a range of devices connected through analogue telecommunications in the users' homes linked to the CCAS monitoring platform. The service is delivered by a team of about forty staff members, with a budgetary provision of about £1.2 million. The service aims to monitor vital health status (such as falls) for elderly community members across the localities within the Newcastle urban area and to monitor the environment at their home (such as detection of flooding, gas leaks, smoke or fire) in order to assist with safe, secure and independent living of the people. Figure 6.1 illustrates the service organisation, including the various functions related to the service and its links with the Council.

YHN offers its CCAS service to about 4,000 of its customers through a subscription-based service agreement. At the time of this field study, YHN offers the following two levels of service:

1. Basic service – offers an alarm unit, pendant, up to two pieces of telecare equipment and 24x7 mobile warden response support, with a fee of £6.88 per week
2. Premium service – offers an alarm unit, pendant, up to five pieces of telecare equipment and 24 x 7 mobile warden response support, with a fee of £8.71 per week

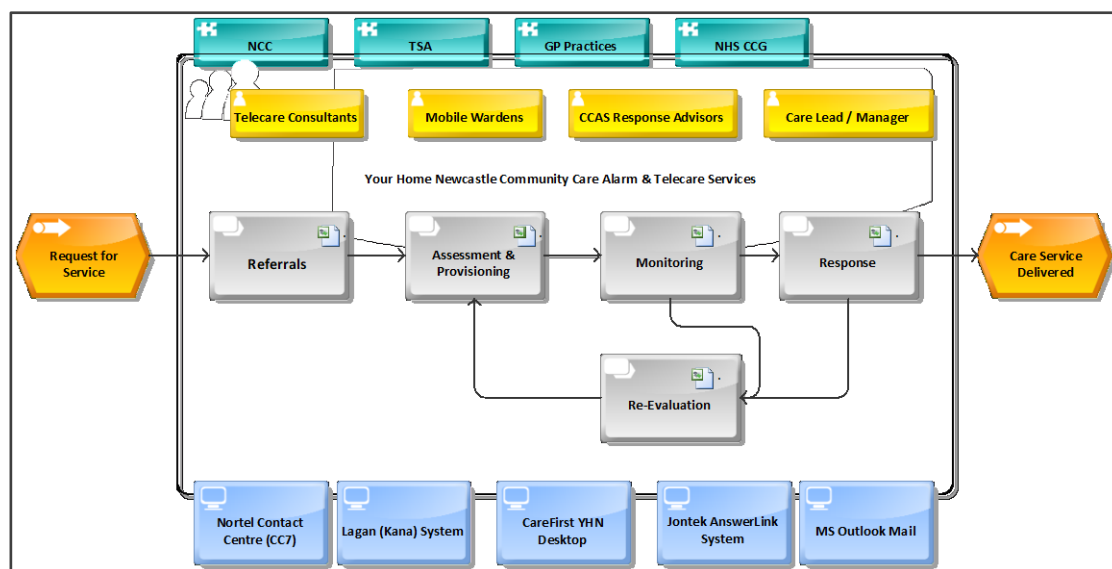
¹⁷ CCAS service got rebranded as Ostara and was launched around the middle of 2016. Throughout this chapter, YHN's telecare service has been referred by its original name, CCAS

Figure 6.1 CCAS Organisation (Source: own illustration)



CCAS covers a wide range of assistive living equipment, including Alarm units, Pendants, Fall Detectors, Bed Occupancy Sensors, Medication Dispensers, Door Exit Sensors, and Flood Detectors. The service uses a telecare technology management platform, known as Answerlink, provided by Jontek, currently a business unit of Legrand Electric Limited (www.legrand.co.uk). The Answerlink system provides an open platform that allows flexible service operation with other telecare devices irrespective of the manufacturer.

CCAS has consistently retained the highest level (Platinum) accreditation by the national Telecare Services Association or TSA (<https://www.tsa-voice.org.uk/about-tsa>) over the last few years. CCAS follows the TSA code of practice, and its processes are aligned with TSA prescribed 'Reference to Response' (R2R) service model for telecare service providers (TSA, 2013). These processes cover five key elements, namely referrals, assessment and provisioning, monitoring, response, and re-evaluation within the overall service provisioning and delivery. Figure 6.2 illustrates the business process landscape for CCAS.

Figure 6.2 CCAS Process Landscape (Source: own illustration)

6.5. Details of the Engagement

Once the partnership project proposal got accepted by YHN Support and Care services management and necessary ethical approval for this field study was granted by the Northumbria University's Faculty of Business and Law Ethics Review Committee; the researcher attended a kick-off meeting held at the organisation's office premises. The purpose of the meeting was to present a plan for the study and discuss the expectations in terms of access and resource support for this engagement. The study commenced in January 2016. During the field study (see Figure 6.2 for the timeline and sequence of activities), the researcher made several visits to YHN Benton Park office and other locations to perform the following activities:

1. Visit a service user's home accompanied by CCAS response team members, in order to observe installation of telecare equipment at user's home (30 November 2015)
2. Informal discussion with selected staff members to understand various aspects of the service, including the processes, technology platform and organisational resources.

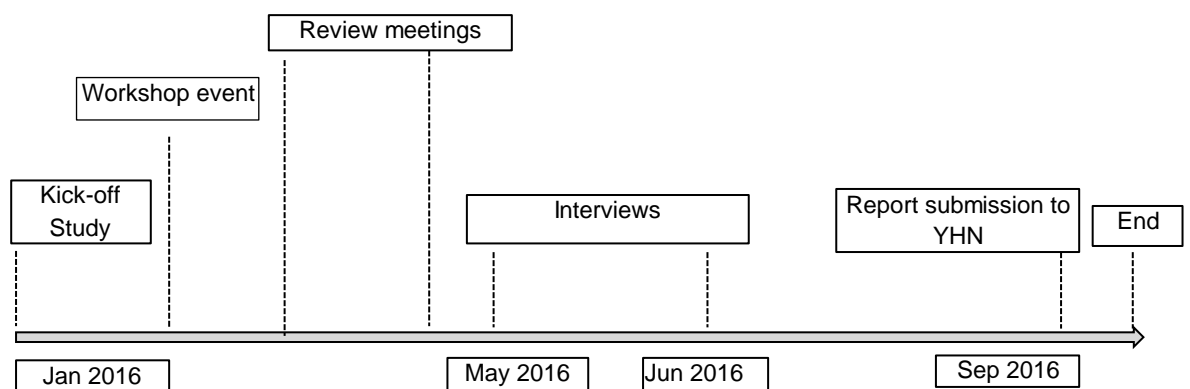
3. Formal, in-person semi-structured interviews (recorded and transcribed) of 8 members from YHN Support and Care division during the months of May and June 2016.
4. Attending two monthly service review meetings conducted by YHN management team, in order to get a better understanding of the strategic issues with the service
5. Participation in an interactive design workshop “North-east Leaders Network Event on Social Change” organised by YHN in Newcastle University (26 January 2016)
6. Attending a meeting between YHN and Denton Turret GP Cluster at Parkway Medical Centre, Newcastle upon Tyne (07 December 2015)

As mentioned earlier, the YHN management team was reviewing the telecare service – formulating its strategic objectives and directions the organisation should take to keep the service sustainable and effective. In NCC’s 2016-17 budget plan, the Council proposed to exclude certain groups of service users for whom the Council bore the cost of telecare services in the past. In other words, all service users were expected to pay the service fees in full. YHN management was concerned that many non-paying customers (who now need to pay) would decline the service, hitting the revenue earnings for the organisation. Therefore, the financial viability (or break-even) of the CCAS service will largely depend on the number of customers retained and also on restructuring the organisation in order to achieve cost efficiency. Under such a challenging business environment and as part of an organisational transformation agenda, the management desired to elicit perceptions and views of the concerned staff members, primarily on the future of the service and on the prospective directions of the organisation. YHN agreed that the interviews could be conducted as part of the data collection exercise for the researcher’s PhD study. Accordingly, the researcher conducted semi-structured interviews for eight staff members from YHN Support and Care division during May and June 2016. Participants’ consents for the interviews were duly collected,

and all data collection and analysis procedures were followed, in adherence to the author's university ethics policy guidelines and approvals. Subsequently, a report summarising the key findings from these interviews was presented to YHN senior and middle management in September 2016. A timeline of the pilot study at YHN is shown in Figure 6.3.

The primary objective of the engagement with YHN concerned a collaborative research project mentioned earlier. As a follow-up action of presenting the field study report to the YHN management, it was expected that the engagement would continue, and a project plan would be discussed. Unfortunately, the circumstances continued to turn somewhat political in terms of governance from NCC, with attempts to shift YHN's organisational structure and threatened redundancy of staff and/or services. Such an intensely political landscape and operational uncertainties due to potential re-organisations (and downsizing) forced YHN management to rethink their strategic priorities. It was perceived that continuing with the collaborative research project and committing organisational resources under such uncertain and challenging business climate would be difficult, and accordingly, the project was put on hold.

Figure 6.3 Timeline of the field study engagement with YHN



6.6. Study Design and Methods Employed

This exploratory field study employs a single case-based design. Case studies allow investigation and analysis of the complex sociotechnical phenomenon, such as telehealthcare services within their natural settings (Lincoln and Guba, 1985) and real-world context (Yin, 1994). In health and care studies, case studies are suitable for improved understanding of the role of organisational and microsystem contexts (Baker, 2011). An interpretive focus in the case study (Stake, 1995; Walsham, 1995; Walsham, 2006) is adopted to investigate and analyse the delivery and adoption of telehealthcare services. Interpretive approaches in Information Systems (IS) are 'aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context' (Walsham, 1993). Following Klein and Myers (1999), it can be argued that field studies using the interpretive approach have the potential to generate deep insights into IS phenomena such as telehealthcare in their sociotechnical and organisational contexts and elicit complexity of human sense-making as the situations emerge (Kaplan and Maxwell, 1994).

6.6.1. Data Collection

For this case study, several methods were employed for the collection of data (see Table 6.1 below). While the primary source for data had been in-depth, face-to-face interviews conducted with YHN staff members, other data sources such as field observation notes, and secondary data from organisations' internal as well as publicly available documents, supplemented the volume of data collected. A research collaboration agreement with YHN allowed the researcher privileged access to observe its employees performing various service delivery activities.

This opportunity facilitated in gaining a deeper understanding of the business processes involved in the design and implementation of the CCAS.

Table 6.1 List of Interviewees for the Pilot

Id	Interviewee Id	Identifier Code	Organisational Role
1	P1	CCAS-P1	Service Manager
2	P2	CCAS-P2	Head of Service
3	P3	CCAS-P3	Telecare Lead
4	P4	CCAS-P4	Business Support Officer
5	P5	CCAS-P5	Mobile Warden
6	P6	CCAS-P6	Mobile Warden
7	P7	CCAS-P7	IT Services Partner
8	P8	CCAS-P8	Coordinator

Participants' consents for the interviews were duly collected, and all data collection and analysis were performed in adherence to the researcher's university ethics policy guidelines and approvals. Table 6.2 below provides a summary of the data sources and the methods employed for the collection of the data.

Table 6.2 Sources and Methods for Data Collection

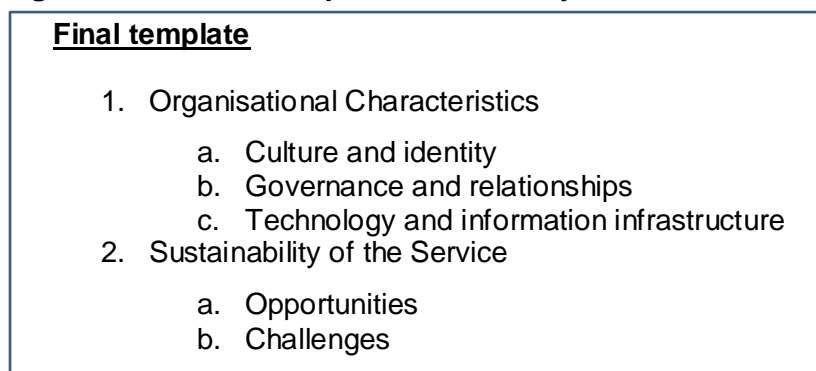
Source of data	Method (s) applied
Interviews	<p>Eight face-to-face, semi-structured interviews were conducted with YHN staff over one and a half months. The participants were chosen to include both service managers and the front-line delivery staff to draw a wide range of perspectives. An interview topic guide was developed for this pilot case study to frame the questions or topics loosely. The guide was prepared based on the based on insights gained by the researcher through the study of secondary documents related to YHN and CCAS, informal conversations with the staff of YHN and also, was informed by an early review of the relevant literature for telehealthcare services (the interview guide can be found in Appendix 5.1).</p> <p>A list of the interviewees, together with their organisational roles, can be found in Appendix 6.3. Each interview lasted between forty-five and seventy-five minutes and was audio-recorded after securing participants' consent.</p>
Secondary data	Available Annual Reports, Business Plan documents, Minutes of the Meetings, CCAS Service Manuals, and Promotional materials were read by the researcher to collect relevant information and to draw useful insights from those documents.
Field observations	Field notes were taken to capture the information gathered through informal conversations with selected staff members. The researcher also attended two service review meetings conducted by the YHN management team and a meeting between YHN and GP Cluster. Participation in an interactive service design workshop organised by YHN also aided in collecting useful information related to this field study.

6.6.2. Data Analysis

Transcriptions of eight interviews with YHN staff members generated a large volume of data (approximately 200 pages of transcript). Coding for the interview data was conducted following a template analysis (King, 1998; Crabtree and Miller, 1999) approach, which has been described in detail in Chapter 5 (see section 5.7.1).

Because of the exploratory nature of this field study, without any predefined theoretical perspective, the interview guide document developed by the researcher for this pilot study (can be found in Appendix 5.1) was used as a starting point to develop the initial template with a few top-level *a priori* codes (King, 2004, p. 280). A recursive exercise of reviewing the transcript data was followed in refining the initial template, with frequent additions and/or modifications of codes. It is recommended in the literature (King, 2004, p. 284) that collaborating peer reflexivity supplements the researcher's judgement to ensure that the final template is sufficiently clear and 'good enough' for analysis purpose. Accordingly, a colleague of the researcher was approached and engaged for peer review/suggestions in developing the final template (see Figure 6.4).

Figure 6.4 Final template for the analysis



6.7. Key Findings from the Pilot Study

This section presents the key findings from the study structured around the two key themes identified through the analysis of data. While the identification of themes is primarily based on analysis of interview transcripts, thematic discussions have been enriched with findings from other data sources, such as secondary data and field observations. Analysis of data suggests the vital role of factors related to the organisational context in which the CCAS service is embedded. Contextual issues such as identity and culture, how YHN is governed, and its relationship with NCC shape the management decisions around provisioning and delivery of CCAS service. The challenges to the financial viability of the service emerge as another central theme in the analysis. It is also interesting to note how YHN's organisational dynamics affect the opportunities for growth and sustainability in the CCAS.

6.7.1. Organisational Characteristics

CCAS service was put into operation in 2008 as YHN management decided to create a separate support and care division within the organisation. Since then, that division has developed its own identity, as the Head of CCAS [CCAS-P2] stated:

“We’ve got a management agreement with the council...but we’re kind of independently managed. YHN has developed over the last twelve years we’ve created back in 2008 a support and care division within YHN. Some of the ALMOs have finished and gone back into councils, we’ve remained one of the thirty or so left and we’ve developed our own identity and I think we’re the only ALMO that’s got such a big support and care division.”

Field study findings suggest that YHN staffs are generally well-engaged and regard the CCAS service quite valuable and essential for their customers. All the interviewed staff opined the value of the service as below:

“...in terms of value to customers themselves, but also to their friends and family, there is no doubt in my mind it's massive” [CCAS-P4]

“They (front-line staff) understand the importance of having a service but they also believe in the service”

In pursuit of the financial sustainability of service, as YHN sought to acquire more self-funded, private customers, some of the front-line service professionals appeared to be a bit uncomfortable with the idea of ‘selling’ the service and making money out it. As one of the participants [CCAS-P5] has questioned:

“Why have we got to make lots of money when we are not a profit organisation?”

There was also a sense of frustration among the staff members that any discontinuation or downgrade of the service will severely impact the well-being and independent living aspirations of vulnerable people. Another mobile warden [CCAS-P6] interviewed in the study sombrely mentioned:

“...you’re driving away and you know that person needs that alarm. But my hands are tied. I can’t turn round and say ‘oh well, don’t say anything, you can just keep it”

Two YHN managers interviewed for this field study acknowledged this **tension between the commercial and the social objectives of the organisation**. They noted such tussle as **one of the cultural issues that challenge the management agenda of more commercial orientation for the service**.

“...we are trying to become more commercial focused which I think is the whole point of branding as Ostara. **It’s hard to change people’s mind-set that we need the business.**” [CCAS-P3]

“It’s a not-for-profit organisation but it has an element of social enterprise because of the business really....**for some of our staff, they believe selling is wrong, it’s not within the values they have as people, because they’ve subscribed to a more caring profession.**” [CCAS-P1]

The staff interviewed for this study are generally found to be positive about this relationship as one of them mentioned how the organisation’s affiliation with the Council helps the service from a business perspective by making it more acceptable to people.

“...**you wouldn’t get the same buy-in from health and social care if you were a true commercial organisation**” [CCAS-P1]

Such argument is understandable, given YHN's reliance on NCC for the majority of the referrals to CCAS. It is also plausible that critical views were not expressed by the staff members given the sensitive nature of this relationship, especially in an uncertain business environment that threatens downsizing and reorganisations. However, data from the interviews reveal a **somewhat difficult relationship between YHN and the Council**. An interview with the Head of the CCAS service [CCAS-P2] exposed several gaps in this relationship. A sense of frustration is palpable in the executive's account as CCAS management is not involved in strategic issues and discussions by NCC.

"YHN aren't involved enough with the social care and health talks. We're not on the health and wellbeing board and we said look YHN should be [...] but we're not on the health and wellbeing board which is where all this is being you know discussed and you just get the impression that they don't want us there you know so the Better Care Fund, this is a perfect thing that should be funded but the councils keeping it over here away from YHN, you think well you should be using that to... all this prevention work, I don't know why we're not involved in it but it's really frustrating."

While answering to a question on the opportunity for YHN's support and care division to become a separate company and to deliver care services, the aspirations, as well as the challenges, were pointed out by the Head of the telecare service [CCAS-P2].

"...one of the things we did look at early on and consider in our care services business plan was around do we set up our own company to run care services element, so telecare...and all that kind of stuff..."

"I think in some other areas ...some have created care cooperatives and have created like a separate business just to do telecare and they become independent companies, YHN could do that for the city council but the city council have been talking about a care cooperative or they were a couple of years ago but they weren't involved in YHN. It's still an option for them but it seems to have gone quiet but they're certainly not involving YHN in discussions on it to my knowledge and I'm the head of service...I've got no knowledge of it happening and if there was I'm sure I'd be told you know so it's very frustrating that...we're not involved...it's kind of a relationship issue I think that's maybe there."

Technology and information infrastructure remains another area where YHN's dependency on NCC became evident. An YHN staff responsible for IT operations

[CCAS-P7] explained this dependency and regretted how continuous cuts in IT investments made by the Council had resulted in a shortage in skills within the organisation, and impacted its capabilities.

“I think you know, **the relationship that we have with Newcastle City Council is an extremely challenging one**....One of the challenges that we face is that relationship with Newcastle City Council when we talk about these systems, you know, **we don't manage the infrastructure.**”

“In terms of what the City Council have gone through over the last five, six years as well, with the amount of cuts. I think their IT department when I first started was down to two hundred plus, and I think they're down to seventy odd staff now. So **they've gone through radical cuts specifically with IT and across the Council.** I've noticed that that's had an impact because they've lost certain people who had key skills in certain areas. **So there're skill gaps in certain areas...It is certainly going to be extremely challenging.**”

The above narratives suggest that while YHN as an ALMO enjoys some level of independence, its Board is still governed by NCC and strategic decisions related to business and governance, which restricts YHN to adopt different service models. The perceived lack of independence for making strategic decisions about the business, as expressed by the Head of the service, suggests an organisational inertia for YHN that hinders pursuing innovative and risk-taking ventures. Such inertia could be felt from the account of the Business Support Manager for CCAS [CCAS-P4] when she observed that the organisation had been moving slowly in pursuing market opportunities.

“We talk a lot about moving into different areas like Telehealth and things like that but **we do things very, very, very slowly**”

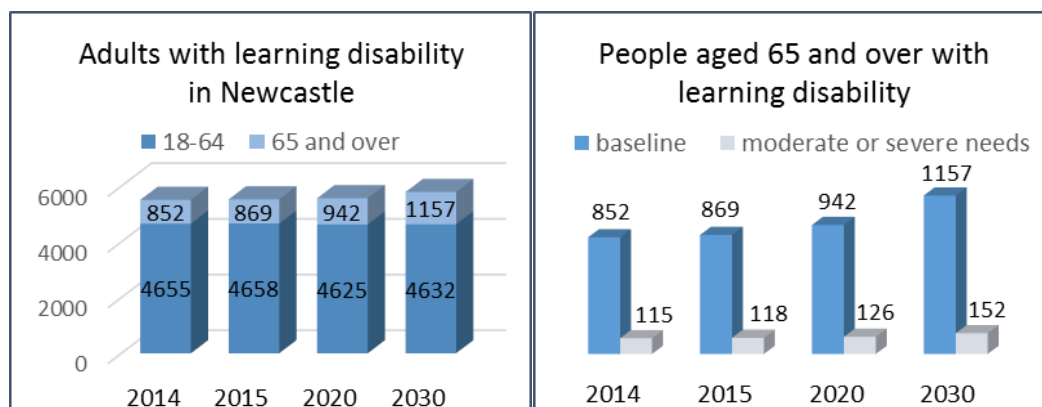
Field observations made by the researcher during the internal service review meetings echo a similar view as YHN management seemed to be busier on 'fire-fighting' to achieve short-term goals of retaining existing customers and keeping the service alive rather than strategic thinking in exploring new ideas on service redesigns.

6.7.2. Sustainability of the Service

As with the rest of England, the City of Newcastle has been experiencing an ageing population - with about 15.6% of its residents aged over 65; and the numbers are projected to rise by a third by 2030 (NCF, 2017). Data from the English deprivation report also suggests challenging socioeconomic conditions in Newcastle area, marked by relatively high levels of deprivation and inequalities compared to the England average (DCLG, 2015). Newcastle City Council's Adult Social Care market position statement projects that ***the number of people 85 years and over who cannot manage one activity will increase by 67% and people aged 85 years and over with a limiting long term illness will increase by 66% up to 2030*** (NCC, 2015, p. 5). These numbers suggest that a significant portion of people, in particular, older adults, will have assistive care needs in Newcastle city areas. Also, data available from the independent web based social care statistics POPPI system (www.poppi.org.uk) suggest an increasing number of older people in the Newcastle area will suffer from falls and related hospital admissions (details can be found in Appendix 6.4). Such projected increasing demand for assistive care services could be an opportunity for YHN's newly branded Ostara service.

Furthermore, YHN's present customer segment comprises mostly vulnerable and older people in Newcastle city localities. Figure 6.4 below suggests an increasing future trend in the numbers of adults with learning disabilities across groups of older people (aged 65 and over). These segments of older people with cognitive impairments, such as autism, learning disabilities, and dementia, will demand complex telehealthcare needs. Potentially, YHN's telecare service could offer more expansive specialist services to address those needs.

Figure 6.5 Predicted growth of population with learning disabilities in Newcastle (Source: NCC, 2016)



YHN staff interviewed for this study expressed several ideas on potential business opportunities. The opportunities cited by some of the study participants relate to new service offerings that would attract high-income customers who are interested in premium services related to lifestyle and well-being.

“We are trying to get into the areas of Newcastle where there are high earners...we are trying to sell our services there. If we can do that then we might be able to make a sizeable profit ...to subsidise the people who can't really pay for telecare” [CCAS-P2]

“...often people want to pay for that incorporates wider services than 'if you fall, we'll pick you up'. There are certain things to trial at the moment where you can install another bit of kit and then people, family members could send pictures of the grandkids to the person's television, which works well for people who aren't online” [CCAS-P1]

Some participants of this study noted unmet demand for care needs and mentioned that YHN should diversify its business into the care market through designs of new service models around homecare, utilising 'economies of scale' of its resources.

“...all services are delivering bits and pieces, but not the whole package...” [CCAS-P5]

“...a gap in the care market with overnight care for individuals who are living at home, in your (Council's) residential setting but in their own home....we thought if we got the extra care schemes within Newcastle and our staff then ... **economies of scale you could have the carers and you could have them going from site to site**” [CCAS-P2]

“We’re a twenty four hour service, we are unique, care agencies don’t work through the night. We do. We’re already here. So what can be done to utilise your time through the night?” [CCAS-P5]

At the time of conducting this field study, YHN management had been considering a range of future options for the service, including reducing the service offered to a ‘monitoring only’ service and stabilising the service with strategic planning and actions (personal communication, May 5, 2017). The response element of the service provided by CCAS mobile wardens was found to be valued among existing customers and their families. Hence, the option of reducing the scope of the service is very likely to attract strong opposition from CCAS customers and possibly, for YHN’s partners, including NCC. As part of this study, the researcher had the opportunity to attend two monthly service review meetings conducted by the YHN management and listen to the strategic issues discussed therein (see section 4.5 for details).

The discussions and proceedings of these meetings suggested a few initiatives taken by the YHN management to stabilise the service and to maintain its viability, primarily through increased earnings (adding fee-paying customers) and cost efficiency (reducing operating costs). One of these initiatives was around proactive marketing (promotional) campaigns for the newly branded Ostara service - directed at YHN’s existing customers, their families, and strategic partners. Two interviewees with managerial responsibilities talked about this strategic initiative.

“Now we are more proactively marketing whereas previously we weren’t” [CCAS-P3]

“...part of the **marketing strategy is to contact trusted referrers**, rather than people themselves” [CCAS-P1]

There were efforts to reach out to a broader base of prospective users through the promotional campaign, using multiple contact channels, including online social

media. However, the lack of investment in IT infrastructure and technology skills for the employees was found to be a significant barrier for such promotional initiatives.

One of the critical challenges of increasing the number of customers was cited as a weak working relationship with health organisations. There was a feeling that the adoption of telecare technologies could have been higher if the service got promoted by GPs as a preventive measure for the patients.

One of the key challenges of increasing the number of customers had been cited as the weak working relationship with the Health Bodies. There was a feeling that adoption of telecare technologies could have been higher if the service got promoted by GPs as preventive measure for the patients.

“People probably wouldn't pay for health services because of NHS, the culture of you don't pay for health services in this country. Something I imagine we may have to trial through the NHS...**if it's coming through a health route** where someone say's 'here you go, it's free'... **it's quite difficult to promote that as a consumer.**” [CCAS-P1]

However, referrals or signposting from the NHS stakeholders (Newcastle and Gateshead CCG and concerned GPs) were found to be nominal, as the CCAS Manager [CCAS-P1] mentioned.

“**I don't think we get any GP referrals** but we maybe get the odd district nurse referral”

The challenges of collaborations or partnerships with other public service agencies, such as North-east Ambulance Services or NEAS (<https://www.neas.nhs.uk/>), were captured in the account of the service manager. He felt that CCAS service was making significant financial contributions to NEAS, through response interventions by mobile wardens on many occasions, thereby reducing the number of expensive ambulance dispatches. However, recognition of such contribution or willingness for any collaboration by NEAS had been missing.

“it will be until there’s a crisis and even then the ambulance service wouldn’t engage with us, that’s what’s difficult....what one of the things that came back from the ambulance services is if they’ve never seen the cost...if our service wasn’t there then they would see the cost but because they’ve never seen it, it doesn’t make any difference to them”

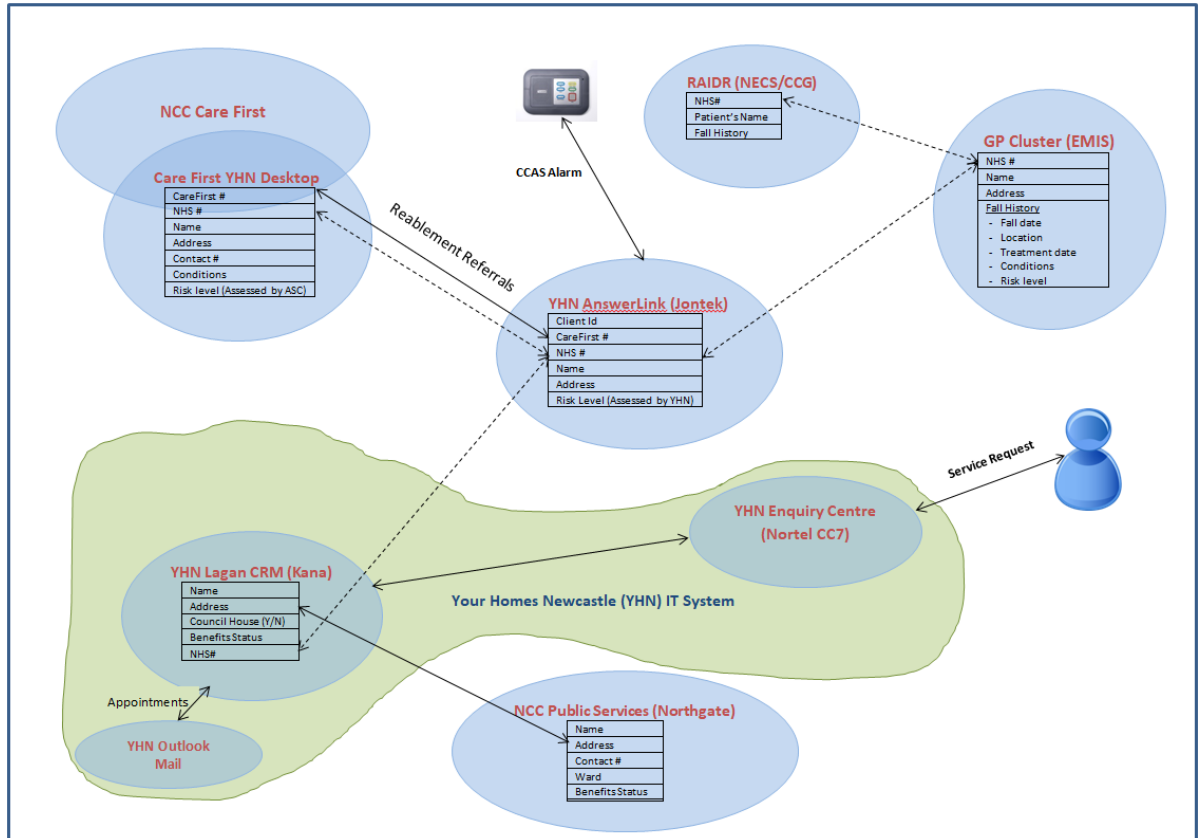
In order to achieve greater cost efficiency through higher productivity in the service, accounts of several staff members voiced a perceived need for more investment in IT infrastructure – both hardware, such as handheld tablet devices for the field staff and software upgrades or additions – to drive better and faster information flows across the organisational network. An illustration of various IT systems used by the CCAS service, related information flows across these systems, together with the potential opportunities for integrations, is shown in Figure 6.6. The lack of integration among disjointed IT systems, as shown in the diagram, could yield significant challenges to the YHN management’s aim of enhancing productivity of its staff given the high volume of manual paperwork, effort spent in duplicating information on multiple IT systems, and also, owing to the difficulties in co-ordination of referral and assessment activities between the YHN staff and the social carers located within the Council.

Opportunities for possible integration among these disparate IT systems (shown by dotted arrows in the diagram) could drive the flow of vital information across YHN and facilitate in strategic and operational decision-making processes – leading to enhanced efficiency and productivity in the service. Furthermore, sharing of useful information on the service users (such as falls history) with the concerned GP (see Figure 6.6) could provide the relevant stakeholders from the Health system critical insights about the risk profiles for their patients, and enable the assessment and appropriate preventative and proactive actions. However, YHN’s heavy reliance on NCC for the technology infrastructure, IT system

upgrades, and skill development functions presented a significant challenge amidst the Council's continuous budget cuts on ICT infrastructure.

Figure 6.6 YHN IT Systems Landscape and Integration Scenarios

(Source: own illustration)

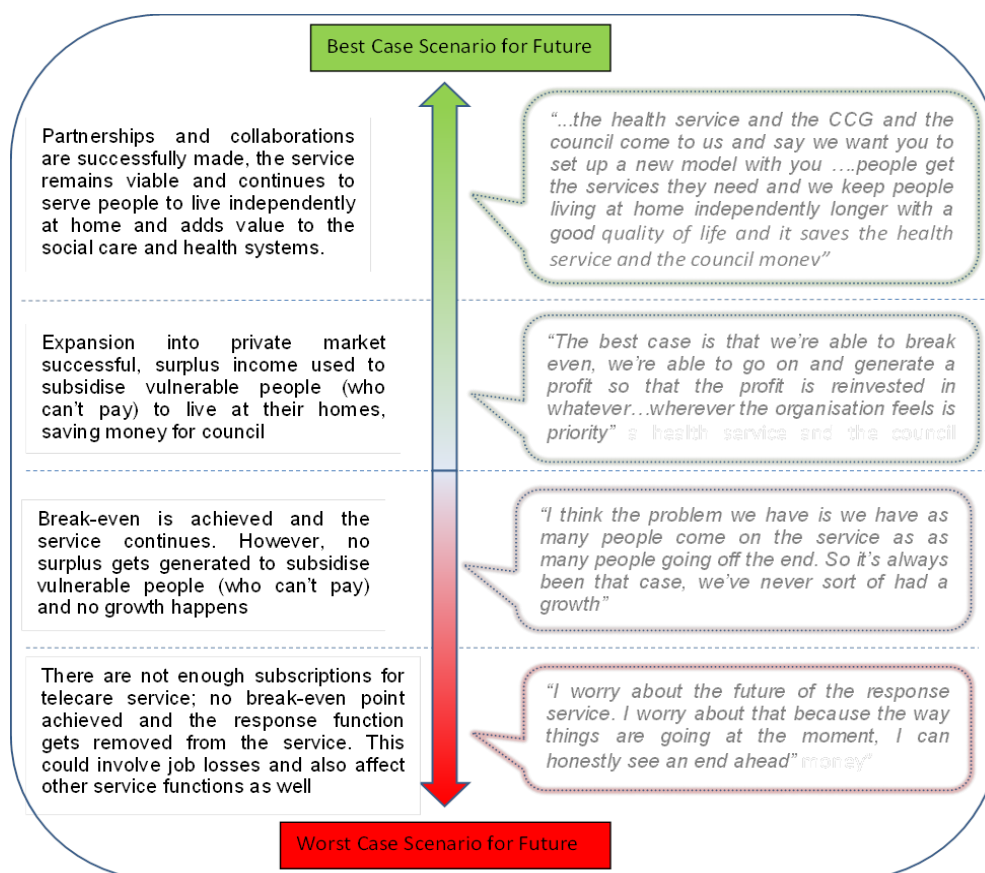


6.8. Discussion

In this section, the underlying dynamics of interactions between the organisational characteristics described earlier and a potential future service model that could ensure the sustainability of YHN's CCAS service is discussed. It was found that CCAS delivers valuable assisted living support to about 4,000 elderly and vulnerable residents in Newcastle, 24 hours a day, 365 days of the year. At the time of conducting this pilot study, the service was heavily subsidised by the Council, but its approaching budget proposal (2016-17) planned to withdraw the funding support to a great extent, threatening the sustainability of the service. The

leading priority for the YHN management had been to keep the service viable by putting in place some short-term measures targeted at retaining its existing customers, acquiring new customers through promotions of the Ostara brand, and also reducing operational costs through efficiency gains. The challenges facing the service were multifaceted, and so were the potential solutions to achieve future sustainability for the service. Analysis of findings from this pilot study suggests a few possibilities across a continuum of 'best-case' and 'worst-case' future scenarios for CCAS (see Figure 6.5). As Figure 6.5 illustrates, in order to ensure future sustainability for this service, the current service model needs to be developed to offer service packages that attract more private (self-funded) customers. Discussions made under organisational characteristics reveal that such transformation of the CCAS service model would demand to address several issues, especially in the areas of investment in upgraded technology and information infrastructure; forging strategic collaborations and partnerships; and finally, a cultural change within the organisation to embrace a more commercial outlook. All these conditions require planning for scenarios and making strategic decisions about the business, although analysis of data suggests a perceived lack of independence and control for the YHN's management. Therefore, the prospects of a transformation for the service could be considered low, given the prevailing complicated relationship between YHN and NCC and the harsh political landscape in which CCAS has been in operation.

Figure 6.7 Potential future scenarios for CCAS (Source: own illustration)



6.9. Lessons Learnt from the Pilot and Implications for the Research

Opportunity for conducting a field study arose during the initial months of this PhD project, as part of a collaborative research project between the Faculty that funded this PhD studentship, and a local telecare service provider organisation. It is essential to mention two crucial implications of this pilot study for the overall PhD research project. First, the field study of a telecare service within the organisational context of a local provider presented a valuable opportunity early in the research cycle, to explore a service on the ground and to gather useful perspectives from providers, including the challenges encountered and opportunities envisaged by them. The experience of interacting with and subsequently conducting the face-to-face interviews with eight YHN staff members contributed significantly to the training and development of the

researcher. Before conducting this pilot study, the researcher's interviewing skill was restricted to only a theoretical level. The opportunities for interviewing real-life organisational stakeholders imparted several practical and valuable lessons to the researcher and enriched his field research skills. One of the critical lessons learned by the researcher concerns the importance of reflexivity, which necessitates reflections on the part of the researcher, on his involvement and the assumptions brought into the research process.

Analysis of data collected for this field study highlights two significant issues pointing to a) the organisational and sociotechnical contexts in which the service operates, and b) the opportunities as well as challenges for growth and sustainability of the service in the future. Such vital insights gained from the practice of telecare, guided the primary research in exploring a suitable theoretical lens, to further investigate opportunities of new 'value-creating' service designs anchored around the providers.

Secondly, the pilot study exposed the need for a more in-depth examination of the underlying structures and their relationships in a telecare service ecosystem - embedded within the sociotechnical and organisational contexts of North East England - for designing value-creating and viable service business models. This requirement led the researcher to further develop the research methodology from the interpretive single case study approach, as applied in this pilot, into a Critical Realism informed multiple case design for further empirical investigation and analysis.

6.10. Chapter Summary

This chapter starts with a discussion on the background of the pilot study, including the organisational context, the service examined, and the engagement details. The design of the pilot study, methods employed for collection and

analysis of data are described next. The key findings from the pilot field study have been presented, followed by a discussion on the potential future scenarios for the YHN's CCAS service. Finally, the lesson learned from the pilot study, concerning the training of the researcher and development of a methodology for further empirical investigation, are discussed. The following chapter describes an empirical study of four cases involving telecare services in North East England and presents a comparative analysis of the findings from these cases.

Chapter 7: Findings from the Case Studies

7.1. Introduction

This chapter describes and presents findings from the analysis of four case studies conducted with selected telehealthcare service provider organisations located in North East England. The rationale for selecting these cases has already been explained in Chapter -5 (see section 5.5.3). This chapter begins with describing the background for each of the four telecare services that were examined through the case studies. The contexts surrounding the services mainly focused on the demographic challenges and socio-economic conditions of the case site are explained. Such an explanation helps to understand the operating environment for the service provider organisation and also, to situate the analysis of empirical findings from the case. Next, the organisational settings of the service providers are discussed, with emphasis on how the services have evolved over time and the specific arrangements related to funding, provisioning, and delivery for the services.

While the characteristics of the four services are perceived to be similar in many respects, there are noticeable differences in various aspects in terms of how these services are commissioned, provisioned, and delivered. Thus, it becomes essential to highlight the similarities as well as the differences out of these four case studies. Accordingly, Section 7.3 provides a comparative analysis concerning the service contexts to show how the changing settings shape the aspects influencing the funding and delivery of these services.

Next, the telecare services are described with an illustration of how various business processes are orchestrated within the services. A thematic analysis of findings from the empirical investigation at four case organisations leads to four central themes. Each of these four themes, together with the related sub-themes, is described next. These four themes, emerging from the empirical evidence, lay the foundation for further analysis involving

macro-level contexts influencing the telehealthcare service ecosystem, leading to the theoretical explanations in the following chapter.

7.2. Background

7.2.1. Case Study: *Sunderland Telecare Service*

7.2.1.1. Demographic and Socio-economic Contexts

The City of Sunderland is one of the five metropolitan districts of Tyne and Wear County in North East England. The city with a population of around 278,500 in 2017 (SCC, 2018, p.6) has a relatively high degree of deprivation (DCLG, 2015) as national data shows that 38% of the Sunderland population live in areas that are among the 20% most disadvantaged across England (SCC, 2016a, p.8). The high levels of socioeconomic disadvantage compared to the England average have also produced considerable health inequalities across the Sunderland population (SCC, 2016a, p. 8). The City of Sunderland is predicted to face significant demographic changes in the future, in terms of its ageing population and limiting long-term illness. The population of people over 65 is predicted to increase by 35% between 2017 and 2035, with almost 40% of the population in that age bracket having a limiting long-term illness such as dementia (POPPI, 2019).

In the backdrop of the UK government's current financial austerity measures related to spending on public funds, as with most other local authorities in England, Sunderland City Council finds it difficult to match the growing demand for adult social care and complex support services. The impact of economic austerity, corresponding cuts in adult social care spending, and consequently, the critical need for transforming the way the Council operates in meeting the demand for these care services have been reflected in the two excerpts from the Council's corporate plan for 2016-20 (Sunderland City Council, 2016b, p. 8).

"We have seen unprecedented cuts and cost pressures over the last six years with £250m having to be saved. **We need to save at least £74m by 2019/2020 and at least £41m of that needs to be saved for 2017/2018.** [...] We will have less money to spend on local priorities and services, and **we face some hard choices particularly at a time when our population is ageing and demand for our services is continuing to rise**"

“We will also need to make sure we operate as commercially as possible in generating external income. We need to think of more innovative and collaborative ways to make sure the people in greatest need are supported.”

The council recognises a more prominent role of technology enabled care services in addressing needs for elderly and vulnerable people, and this puts the focus on prevention and early intervention to provide cost-effective service options (SCC, 2016b). As part of its housing, health and well-being strategy, Sunderland City Council works collaboratively with NHS Sunderland CCG and other regional health and care service providers on several strategic programmes such as NHS Multispecialty Community Provider (MCP) Vanguard, STP (Sustainability and Transformation Programme) and JSNA (Joint Strategic Needs Assessment) (SCC, 2016b).

7.2.1.2. Organisational Settings

With the introduction of personal budgets and direct payments for adult care services and subsequent increasing commercialisation of the care market, Sunderland Council found it challenging to meet greater choice and accountability for customers while maintaining the financial viability of being an in-house provider of adult social care services. Accordingly, in December 2013, Sunderland Council established a Local Authority Trading Company - Sunderland Care and Support Limited (SCSL). The rationale for creating a trading company by the Council has been to deliver adult care services as per the Council's strategic direction and objectives, managing financial issues and efficiency savings – as explained by a senior manager of SCSL [ST-P1] interviewed for this case study:

“At the time in 2013 the Council's leadership very much wanted to outsource delivery services. So, there were a few different services outsourced from the Council. Actually, when the leaders changed those plans to outsourced services ceased. We were kind of one of the ones that came out during that period of thinking. **I think the local authority trading company was just a little bit of a halfway house where the Council is still the main stakeholder in the company. They're our main shareholder, but we are a private limited company.** That was in December 2013, we came out as a trading company. **The thinking in coming into a company was that we could maximize the opportunities with personal budgets.”**

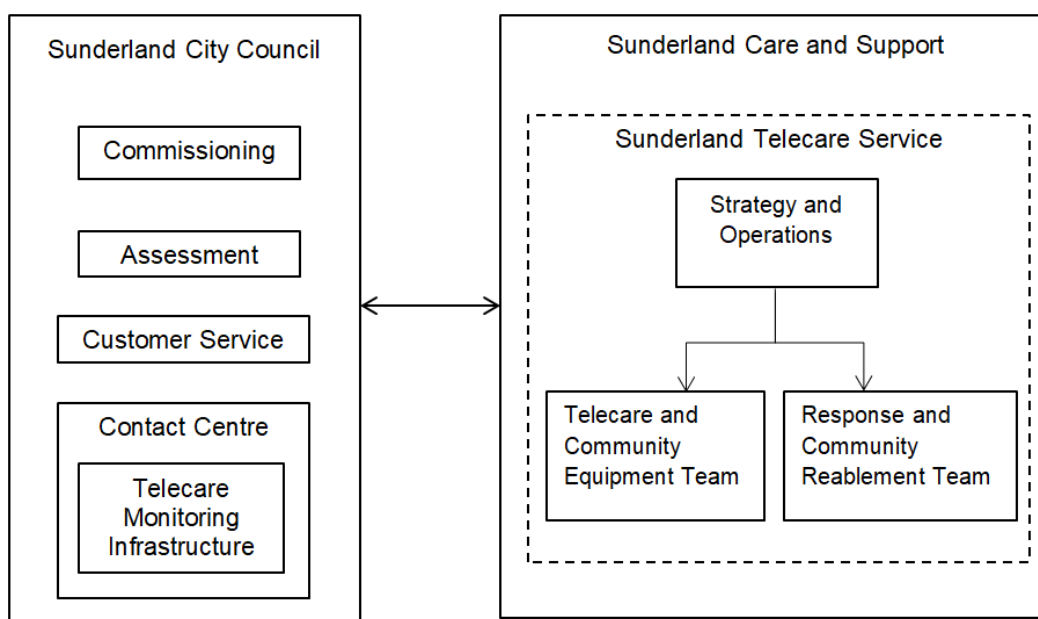
With a business turnover of about £38 million and gross profit of £0.44 million (SCSL, 2018) as of March 2018, SCSL employs approximately 1200 employees with company headquarter based in Leechmere Centre, Sunderland and provides adult social care

services and support to about 7000 people with care needs in the Sunderland area. As the company's mission statement reflects, SCSL aspires to become a trusted provider of social and health care services that improve people's lives by delivering high quality, innovative, and customer-centred services and contribute to the broader well-being of the communities in which it serves. The company depends on Sunderland City Council and Sunderland Clinical Commissioning Group (CCG) for a majority of its income. SCSL maintains the three organisational divisions, namely Equipment and Prevention, Supported Living, and Reablement and Intermediate Care, to provide a range of adult social care services.

The *Equipment and Prevention* division is responsible for delivering assistive technology solutions through the *Sunderland Telecare Service*. Additionally, this division provides community equipment and home improvement services to support health, well-being, and independent living for the users – as part of the Community Equipment Service, which is a jointly funded partnership between Sunderland City Council and the NHS Sunderland Clinical Commissioning Group. Responsibilities for this division as well as the rationale of having a single team installing both telecare and other community equipment have been clarified by one of the SCSL interviewees [ST-P2]:

“We install all of the telecare equipment but we also provide, deliver and install all of the community equipment like grub rails, commodes, wheelchairs etc. as well. [...] The idea is that somebody coming out of hospital at one time would have had two separate people arranging to visit, install equipment and then install telecare. We do all of that in one go. It's easier for families or easy for the person, and it means we only have one delivery to make to save on fuel.”

Figure 7.1 below depicts a view of the service organisation within SCSL, which is responsible for the delivery of *Sunderland Telecare* service under a block commissioning contract with the Sunderland City Council. The Council's social care function performs care need assessments and financial eligibility checks for the residents, before referring them to SCSL for appropriate care packages, including telecare provisions. The Council further manages the call handling for customers related to *Sunderland Telecare* service as the telecare monitoring control centre is housed within the Council's premises and managed by the Council's employees.

Figure 7.1 Sunderland Telecare Service Organisation (Source: Own illustration)

Sunderland Telecare service broadly involves two teams involving about 70 employees. One team is responsible for provisioning, installation, and maintenance of the telecare and other community equipment, while the other group comprises telecare responders who also provide *Reablement and Intermediate Care* services for customers of SCSL. The functions of these groups within the *Sunderland Telecare* service organisation are elaborated later in this chapter (section 7.3.2) in relation to the service processes.

7.2.1.3. Sunderland Telecare Service

Sunderland Telecare service is a 24 x 7 community alarm and telecare service which provides both alarm monitoring and warden response elements in order to support about 5,000 residents in the Sunderland area. The service, which is typically delivered as part of a care package provision, assessed and referred by the Council, offers of a pendant-based basic community alarm system, and one or more peripheral telecare devices such as falls detectors, smoke detectors, etcetera. There is no exemption allowed in the service fee payment as every service user needs to pay the same contribution - a flat rate of £5 a week (plus VAT, if applicable), irrespective of the number of telecare devices provisioned. STS offers only a basic community alarm package to the private customers (who do not go

through the social care need assessment by the Council) charged at the same rate of £5 per week. As the lead manager [ST-P1] for *Sunderland Telecare* explains:

“Because of **the way telecare is funded in Sunderland**, as a peripheral device, so if anything other than a pendant and a box was going to be recommended, that has to be recommended by a social worker or an OT (Occupational Therapist).”

7.2.2. Case Study: *HomeCall Service*

7.2.2.1. Demographic and Socio-economic Contexts

Redcar and Cleveland Borough Council is the local authority of the Redcar and Cleveland area of North Yorkshire County in North East England. As the largest Borough in the Tees valley, the Borough Council has a population of around 135,100 with a relatively high level of deprivation (ranked the 48th most deprived Borough in England) and health inequalities across the Borough (R&C Borough Council, 2016a, p. 5). With a predicted rise in the significant number of older people over 80 years of age (36%) between 2016 and 2025, the demand for health and adult social care will continue to increase in the Borough Council (see Table 7.1).

Table 7.1 Demographic projections for population in Redcar & Cleveland Borough Council

(Source: www.poppy.org.uk and www.pancy.org.uk)

	2016	2020	2025	% change (2016 – 2025)
Working age adults (18 to 64 years)	78,300	76,400	73,800	(-) 5.7%
Older people (65+ years)	29,600	31,300	33,900	15%
Older people (80+ years)	7,600	8,800	10,300	36%
Older people with 1 or more long-term conditions	13,848	15,032	16,811	21.3%
Older people (65+ years) with dementia	1,998	2,252	2,592	30%

The rise of the number of older people (21.3%) with and with one or more long-term conditions, especially with dementia (30%), demands complex care needs for the ageing population. The Projected shrinkage in the number of working-age adults adds a further challenge as fewer local family members will be available to undertake carer’s roles in supporting older people to live at their homes. National statistical data on health and social care services suggests that the Redcar and Cleveland area has a relatively higher percentage of admissions into residential care (care homes) for older people – 24% higher

than the peer local authorities and 59% higher than the national average (R&C Borough Council, 2016a, p.6). The area also falls in the highest quintile for admission rates of people aged over 74 to hospitals from private residential and nursing homes. The Borough Council's 'Market Position Statement 2016/17' for Adult Social Care services highlight poor socioeconomic conditions such as a higher rate of unemployment and a higher proportion of working-age adults receiving welfare benefits, in comparison to the national averages (Coast & Country, 2016a, p.8). It highlights the challenging operating environment for the businesses in the region, in terms of affordability of housing, health, and care provisions.

The Council recognises that the existing service provisions comprising of traditional nursing, residential, care at home, and day services will need to adapt to meet changing needs (R&C Borough Council, 2016b, p.40). The Council's focus on early prevention and supporting independent living for adults is reflected in its vision statement (Redcar and Cleveland Borough Council, 2016b).

"We want to provide a sustainable offer which supports adults to remain healthy, maximise their independence and be part of their community for as long as possible. **We will shift the emphasis across all our service areas towards early help and prevention – promoting independence rather than creating dependence and promoting wellbeing through innovative commissioning** and providing services that are person-centred, joined-up and safe."

7.2.2.2. Organisational Settings

Coast and Country Housing (CCH) was established in 2002 as part of a large-scale voluntary stock transfer from Redcar and Cleveland Borough Council when CCH took over the ownership and management of homes from the Council. Following a corporate restructuring in 2015, CCH converted from a public limited company by guarantee to a Community Benefit Society (CBS) and, accordingly, the organisation is now required to comply with the Charities Act and directors of the company are trustees of the Society. The conversion also resulted in the incorporation of two new subsidiary companies - Coast and Country Sales (CCS) and Coast and Country Development (CCD) to facilitate commercial transactions. As part of this restructure, the *HomeCall* Independent Living Service (ILS) was set up and then pursued a commercial business plan following a debate on

whether *HomeCall* should be a part of the parent organisation CCH, which is a Community Benefit Society with a charitable mission and objectives. A decision was made that *HomeCall* would continue to operate within the CCH organisational structure, on the basis that the service could fairly trade and be commercial in its outlook. As the head of the *HomeCall* service [HC-P1] explains,

“We moved from being a public limited company by guarantee at that time to a CBS. There are a number of reasons and drivers for that. [...] There was discussion at the time about whether that organisational structure would enable HomeCall to continue to trade against the back drop of the company being a CBS, but the decisions that were taken and conversations that were had, led us to conclude that HomeCall could continue to be part of the parent company. We continued to operate within the Coast & Country Housing structure, on the basis that it could fairly trade and be commercial in its outlook. In that it fits in comfortably with the charitable objectives and obviously, the CBS conforms to the charitable objectives.”

Unlike other three services examined in this chapter, in which telehealthcare services are delivered either by the Council or a subsidiary/trading arm of the Council, in Redcar & Cleveland these services are primarily provided by the largest housing provider in the area - Coast and Country Housing (CCH)¹⁸. Redcar and Cleveland Councils commissioning strategy highlights the pivotal role of the housing sector in supporting adult care needs - primarily through the provision of supported accommodation that promotes independent living and preventative care. In adherence to the National Housing Federation's Code of Governance, CCH either owns or manages over 10,500 homes across a range of housing products, locations, and rental options. Post its restructure in 2015, CCH changed its vision statement from 'providing homes that people choose to live in' to include a purpose of 'working together to make a difference' and aims of greater experience for people, superior homes and places, and better business delivery. The renewed purpose and aims reflect the organisation's commitment to 'sustained tenancy' that contributes beyond mere provisioning of housing products and offers wider community and well-being services. In alignment with such organisational vision, the primary purpose of the *HomeCall* service has been to serve the tenants of CCH, particularly the vulnerable ones who needed independent living support.

¹⁸ This is comparable to the arrangement found in the pilot case study (see Chapter 6) in which the YHN, the leading housing provider in Newcastle, delivers the CCAS telecare service.

The operating model for *HomeCall* went through a significant change in 2012-2013. Before this period, around 75% of *HomeCall*'s income was through the Council administered 'Supporting People Grant' (House of Commons, 2012), and the majority of the service users meeting the eligibility criteria for the grant were subsidised. The removal of a ring-fenced grant to local authorities under the Supporting People programme, and subsequent austerity measures, forced Redcar and Cleveland local authority, like many other local authorities, to rethink their "non-statutory" responsibilities like providing housing support. In 2012-2013, the Council stopped such funding, and CCH faced a considerable challenge to keep the service viable without the grant from the Council. As the head of *HomeCall* [HC-P1] recalled the situation:

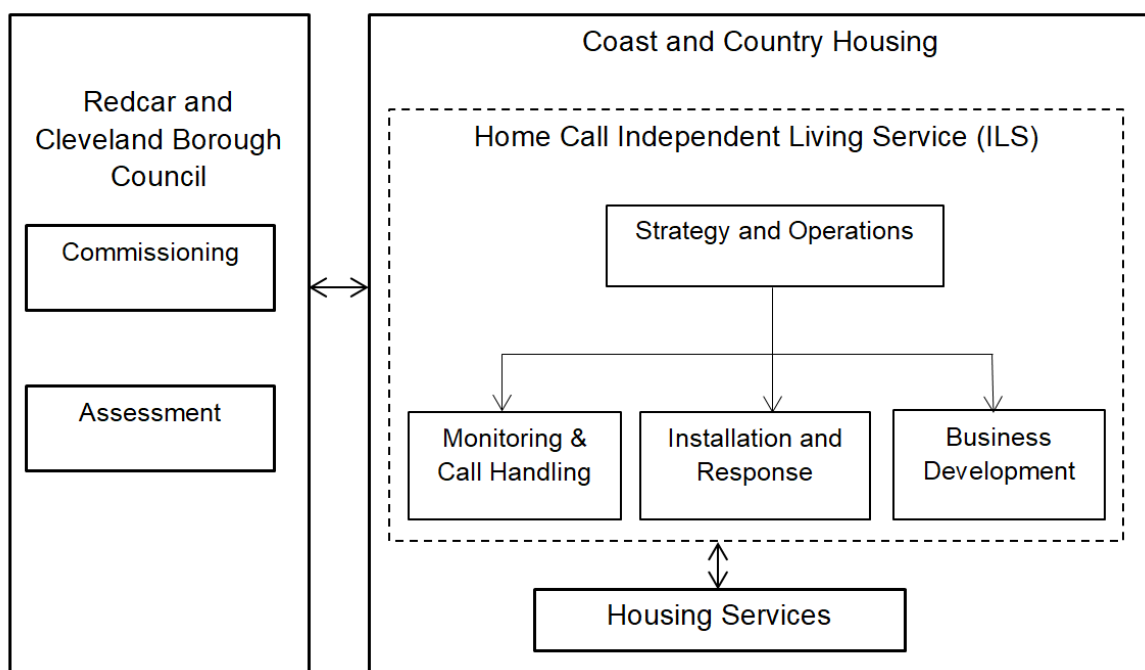
"I was faced with the challenge there turning around the service which was supported by 75% of the cost of through grant, to turning that round to still deliver the service but to collect that income as a charge... Those customers that were being subsidised were then in a situation where in some cases had to start paying for it because it was delivered through a tenancy agreement. For non-tenants of ours, all of our private paying customers, they were then invited to continue with the service but they would have to pay for it."

At the time of conducting the case study (in early 2018), CCH has been facing a harsh operating environment for its business due to the deprived socio-economic conditions of the area, policy challenges of rent reduction for the housing companies, and structural changes in the public welfare system. Furthermore, a management level talk was going on between CCH and Yorkshire Coast Homes (YCH) for a possible merger. The other organisation involved in the merger (YCH) has a similar service, named *CoastCall*. While the purpose of the proposed merger is to benefit from the 'economies of scale' of a bigger organisation, some palpable uncertainty and concern among the CCH staff could be perceived by the researcher during his interviews with the *HomeCall* staffs.

Figure 7.2 illustrates the organisational set-up of *HomeCall* service within the CCH organisation and also shows the links between the concerned Council and the service. The Council's Adult Social Care function is responsible for carrying out assessments of social care needs, providing information and advice on available care and support choices within the community. Based on the outcome of the care need and a financial assessment based

on pre-set eligibility criteria, the Council makes referrals to *HomeCall* for provisioning of telecare services under a commissioned contract with CCH. *HomeCall* service delivery team comprises three units. In addition to the telecare call handling /monitoring and installation/ response groups, it is worthwhile to note a dedicated business development professional within the service organisation. The groups within the *HomeCall* service organisation are elaborated later in this chapter (section 7.3.2) in relation to the service processes.

Figure 7.2 HomeCall Service Organisation (Source: Own illustration)



7.2.2.3. HomeCall Service

HomeCall Independent Living Service (ILS) is a 24 x 7 telecare service that currently supports over 5,000 people in the Redcar and Cleveland area, helping them to live independently at home through a range of assistive technology solutions. *HomeCall* is accredited by TSA, and it offers the following three package options for its customers to choose from:

- ***HomeCall Monitor*** – a basic community alarm service package that offers only monitoring for telecare alarms (24 x 7 x 365 days) by the HomeCall control centre. The package provides a service user a base alarm unit and a pendant (or wristband).

With extended coverage, this level of service is available to users beyond Redcar and Cleveland including Darlington, Teesdale, and North Yorkshire moors areas. The package costs £3.85 per week (excluding VAT).

- **HomeCall Response** – In addition to the services available in the *HomeCall Monitor* package, this offering provides additional reassurance through visits from *HomeCall's* responders directly to service user's homes – to assist in emergencies. Since this service level involves the dispatch of wardens to users' homes, this package is only available to users in the Redcar and Cleveland area, including Middlesbrough and Stockton-On-Tees. The package costs £5.05 per week (excluding VAT).
- **HomeCall Telecare** – This service package provides the provision of telecare sensors (wearable by users or installed in their homes) such as Falls Detectors, Bed Occupancy Sensors, Carbon Monoxide Detectors, Smoke Detectors, and Flood Detectors among others. Similar to *HomeCall Response*, this package includes both monitoring and response elements and, accordingly, is available only to the users living in the Redcar and Cleveland area. Weekly charges for HomeCall telecare varies based on the number and types of telecare sensors selected.

HomeCall has a commissioned contract with Redcar and Cleveland Council with Redcar and Cleveland Council for delivering telecare services to the users who have gone through care need assessment by the Council. HomeCall won this large contract through a competitive public tender process, and currently, this contract supports about a thousand customers. Under this contract, the Council pays *HomeCall* for telecare provisions for people who get assessed by the Council and, subsequently, referred to *HomeCall*, and these assessed users are not charged anything for telecare service by the Council.

HomeCall also offers its telecare service to private (self-funded) customers, which is very similar to the one that is offered through the Council's commissioned contract, with the exceptions of two key differences. One difference is understandable because, unlike service users assessed by the Council, private customers for *HomeCall Telecare* need to pay for the

service. The other difference relates to the provisioning of personal care services as part of the telecare contract. Since *HomeCall* is not a Care Quality Commission (CQC) certified care provider, *HomeCall* partners with a CQC certified care provider, *Heritage Healthcare*, in providing the personal care services its telecare customers. However, the scope of this sub-contracting arrangement with Heritage is limited to the telecare users under the Council's commissioning contract, and accordingly, personal care services cannot be offered to private *HomeCall* customers.

7.2.3. Case Study: Care Call service

7.2.3.1. Demographic and Socio-economic Contexts

Gateshead is one of the five metropolitan district boroughs of Tyne and Wear County in North East England. As per the 2011 Census data, the resident population in Gateshead is about 200,000. Compared to England, the population of Gateshead has a higher proportion of older people - 17.6% of the population is currently aged 65 years or over compared with 16.3% across England and 17.3% across the North East (Gateshead Council, 2014b, p. 3). While the population of Gateshead is predicted to increase moderately by 3.1% by 2021, the highest increase is expected in the population aged 65 years and above and the number of people over 85 years is projected to increase by 30% over the same period (Gateshead Council, 2014a, p. 7). The most significant proportion of people receiving adult social care services is that of older people 65 and over, who, on average, represent 74% of all service users in 2013/14. Older People (aged 65 and over) have the highest proportion of people within residential or nursing settings (30%). This percentage is higher than the average rate (20%) between the periods of 2005/06 to 2013/14 (Gateshead Council, 2014b, p. 21).

Table 7.2 Demographic projections for people aged 65+ in Gateshead

(Source: POPPI, 2019)

Table	2012 Figures	2015 Figures and % increase	2020 Figures and % Increase
People 65+ living with dementia	2,431	2,555 5.1%	16.66% 2,836
People with a limiting long-term illness	20,152	21,141 4.91%	22,191 10.12%
People unable to manage at least one personal care task	12,033	12,600 4.71%	13,490 12.11%
People unable to manage at least one domestic care task	14,703	15,402 4.75%	16,523 12.38%

As Table 7.1 suggests, Gateshead is predicted to face significant challenges in providing adult social care services to a growing ageing population with limiting long-term illness such as dementia. Gateshead also has a relatively high level of deprivation - ranked 43rd out of 326 Local Authorities (where 1 denotes the most deprived) in England (Gateshead Council, 2014b, p. 11). A report published by Gateshead Public Health Service mentions prevailing health inequalities in Gateshead, which is higher than the national average (GDPH, 2017). Such demographic and socio-economic background highlights the challenging operating environment in the Borough, in terms of affordability of care provisions, and has important implications for planning and provisioning of social care services.

In the backdrop of the UK government's current financial austerity measures related to spending on public funds, **as with most other local authorities in England, Gateshead City Council finds it difficult to match the growing demand for adult social care and complex support services.** The Council's commissioning strategy (Gateshead Council, 2014a, p.14) emphasises community-based support and care services that promote independent living at residents' own homes.

"Our policy and commissioning priorities focus firstly on helping people to find the support they need within their communities and to avoid dependency on services in the long term...Where a needs assessment identifies that people need a longer-term service, the focus will remain on models that promote independence and ensure that people are able to make full use of community resources."

As a vital element of the community-based support, Gateshead Council recognises the opportunities for using assistive technologies such as telecare to address care needs for elderly and vulnerable people. The key driving factor for promoting assistive technology-based care solutions is potential cost savings through provisioning of alternative care pathways that could potentially substitute, in part, expensive residential and nursing care packages for the elderly and vulnerable people.

7.2.3.2. Organisational Settings

The Borough of Gateshead is split into 22 wards, each with three councilors elected by local people. Gateshead Council employs approximately 11,000 people to provide essential services to a population of around 200,000 (Gateshead Council, 2018). Adult Social Care remains one of the primary services provided by the Care, Well-being, and Learning division of the Council for the residents of Gateshead. Equipped with an overall strength of 750 staff, the scope of Adult Social Care service covers an assessment function and in-house provisioning of several services related to adult care needs and support. These include Enablement services, Community bases for people with learning disabilities, and supporting independent living for older and vulnerable people. An in-house assistive technology-enabled care (telecare) service, known as *Care Call* supports independent living at home. The Director of the Council's Adult Social Care [GCC-P3] explains the rationale for an in-house provisioning model for telecare service and justifies the effectiveness of the model in terms of better flexibility and autonomy in planning and delivering the service.

“There's obviously some places have taken a decision to move [telecare service] out as part of a different model. There is no desire or will to do that in Gateshead. **Our politicians are very keen on us doing things in-house where it makes sense for us to do so, and absolutely for Care Call is that it sits nicely with adult social care.** It supports the work that we're doing because adult social care is always going to be the biggest referrer into Care Call, so you've got much better synergy. We did not negotiate with anybody. **It's that kind of being in charge of your own destiny. I think is the bit that appeals about keeping it within adult social care...**From my perspective, it sits nicely with adult social care. It supports the work that we're doing”

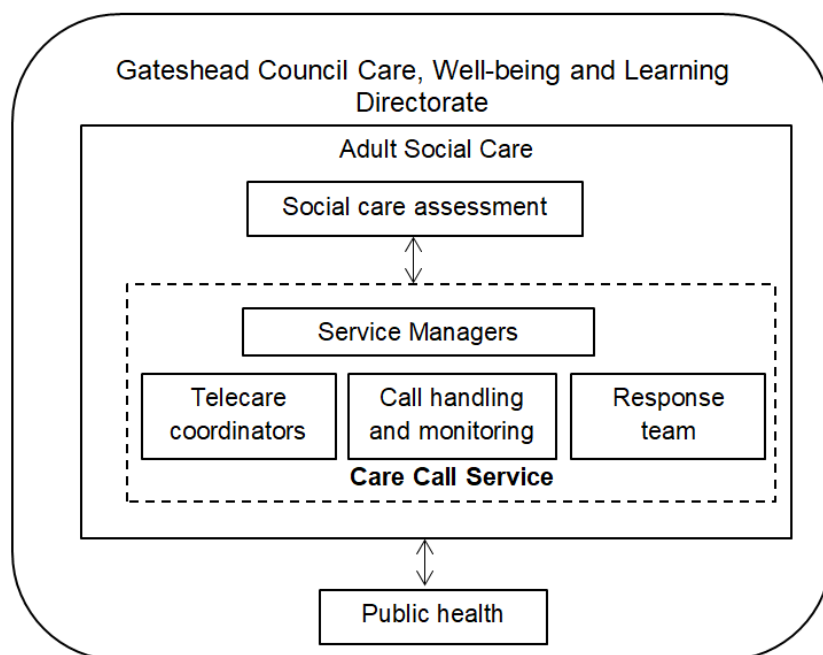
It might be worthwhile to note that *Care Call* is not an internally commissioned service, instead of an in-house provided service that does not have a clear commission-provider split. The Service Manager has a budget allocation within the overall £88 million budget for Adult

Social Care services¹⁹. Such a provisioning model allows more financial freedom for the Adult Social Care function, in terms of spending on the *Care Call* service, against the Council's budgeted allocation.

Further to the enactment of the Health and Social Care Act 2012 (UK Government, 2012), like many other local authorities, Gateshead Council took on new public health responsibilities to improve its residents' health and wellbeing and reduce health inequalities' at a local level. Two years back, the Public health division of the Council introduced a job position of Falls Coordinator through a funding arrangement with NHS Foundation Trust. While the broader responsibilities for this Falls coordinator role involve strategic partnership across health and social care, the position is also responsible for collaborating with *Care Call*, in the area of management of elderly falls through educating and training *Care Call* staff.

With a team size of about 40 employees, the *Care Call* service is provisioned both as part of a care package assessed and referred by the Council and also, on a private basis to self-funded customers. The *Care Call* service organisation (see Figure 7.3 below) comprises several functional teams dedicated to service management, business development, provisioning, and delivering telecare service to its customers. The functions of different teams within the *Care Call* service organisation are elaborated later in this chapter (section 7.3.2) in relation to the service processes.

¹⁹ Data on budget allocation specific to Care Call is not available

Figure 7.3 Care Call Service Organisation (Source: Own illustration)

7.2.3.3. Care Call Service

Care Call is a 24 x 7 community alarm and telecare service that includes both alarm monitoring and warden response elements - to support over 8,500 service users in the Gateshead Borough. With a team size of about 40 employees, *Care Call* service is provisioned both as part of a care package assessed and referred by the Council and also, on a private basis to customers. For a service user assessed by the Council's social care function, basic community alarm service and all telecare devices (as referred further to the care need assessment process) are charged at £4.39 a week (no VAT applied). However, private customers who are not assessed by the Council need to pay £4.39 a week plus VAT (overall £5.27 a week) for the basic community alarm service. Telecare packages for private customers are charged at separate rates.

The Council's current policy allows exemptions on service charges for specific user groups; for example, *Care Call* service is offered to people over 75 years free of charge for six months. These exemptions are, however, proposed to be withdrawn in a new policy introduced in 2018, when no one will receive a subsidy for the service and everybody will

need to pay for the *Care Call* service unless they meet financial eligibility criteria as per Care Act 2014, assessed by the Council's social care function.

Care Call is a TSA accredited service and currently offers only a single level (or package) of service at the time of conducting this case study. However, it has been mentioned by the service managers that a proposal for adopting a tiered approach with the introduction of various service levels²⁰ is under active consideration by the Council.

7.2.4. Case Study: *Care Connect Service*

7.2.4.1. Demographic and Socio-economic Contexts

Durham is a large county in North East England with a population of about 520,000 (ONS, 2017). Most of the County is rural with 12 major towns and over 300 other small towns and villages. Demographic projections (see Table 7.3) suggest that the demand for health and adult social care will continue to increase in County Durham as the number of people aged 65 and over will increase substantially (by 17.8%) between the years of 2016 and 2026. During this period, the 85 and over age group will increase by 26.8% whereas the number of working-age people aged 18 to 64 will fall by 1.8%. Projected shrinkage in the number of working-age adults adds further challenge to an ageing population as fewer local family members will be available to undertake carer's roles in supporting older people to live at their homes.

Table 7.3 Demographic projections for population in Durham County (Source: ONS, 2016)

	2016	2026	2041	% change (2016–2026)	% change (2016 – 2041)
Working age adults (18 to 64 years)	316,000	310,500	303,700	(-) 1.8%	(-) 3.9%
Older people (65+ years)	105,400	124,100	146,600	17.8%	39.1%
Older people (80+ years)	12,100	15,400	26,000	27.3%	114.8%
Older people with 1 or more long-term conditions	13,848	15,032	16,811	21.3%	21.3%
Older people (65+ years) with dementia	1,998	2,252	2,592	30%	30%

²⁰ Since middle of 2018, Care Call has started providing three levels of service packages - Bronze (basic), Silver (intermediate) and Gold (premium) that are differentiated in terms of scope.

Statistical data on population health also suggests a growing prevalence of limiting long-term illnesses in older people over the next 20 years (see Table 4). County Durham remains in the top 30% of most deprived authorities across England, which means that large numbers of County Durham residents live in areas that have significant issues (Durham City Council, 2015, p. 3). A high level of health deprivation reported for the County (DCC, 2015, p. 11) highlights the challenging operating environment for the businesses in the region, in terms of affordability of health and care provisions.

Table 7.4 Projections for older people (65+) with a limiting long term illness in Durham

(Source: POPPI, 2019)

	2017	2020	2025	2030	2035	% change (2017-2035)
With a limiting long term condition that makes performing day-to-day activities limited a little	29,328	30,873	33,903	37,342	39,766	35.6%
With a limiting long term condition that makes performing day-to-day activities limited a lot	33,134	35,140	39,360	43,851	47,953	44.7%
Total:	62,462	66,013	73,263	81,193	87,719	40.4%

Due to ongoing economic austerity measures, and like many other local authorities, Durham City Council has also been affected by the reduced spending on adult social care services. The pressure on the Care budget has forced the Council to prioritise its spending in terms of statutory obligations as per the Care Act, 2014. In the words of the Council's Commissioning and Policy Officer [DCC-P9]:

“There is, and obviously that's the thing that we have at the back of our minds **because we don't have an infinite array of funding to cover all of it. There is a finite part and we're trying to maximize the use of our resources. Also, maximize the outcome for individuals as well who come through our doors and make the best use of the services....**We've done a lot over perhaps the last three, four years in terms of transforming our care provision and being a bit tighter on eligibility and when you come with the financial pressures and the reductions we've had to make, we've had to make some really tough decisions around care.”

7.2.4.2. Organisational Settings

Historically, Durham had a two-tier local authority system with seven local authorities and a County Council sitting on top of these local authorities. With local government reorganisation in 2009, all the seven local authorities (or district councils) comprising, Chester le Street, City

of Durham, Derwentside, Easington, Sedgefield, Wear Valley, and Teesdale were devolved and replaced by the new Durham County Council (DCC, 2009, p.4). Durham County Council functions as a unitary local authority, having the powers of a non-metropolitan county and district council combined. The reorganisation affected two critical areas of local authority services – housing and adult social care. Housing stock was transferred to the seven former local authorities who have become registered social landlords. Therefore, Durham Council no longer maintains a stock of housing, and its role is now limited to providing housing solutions for homeless people.

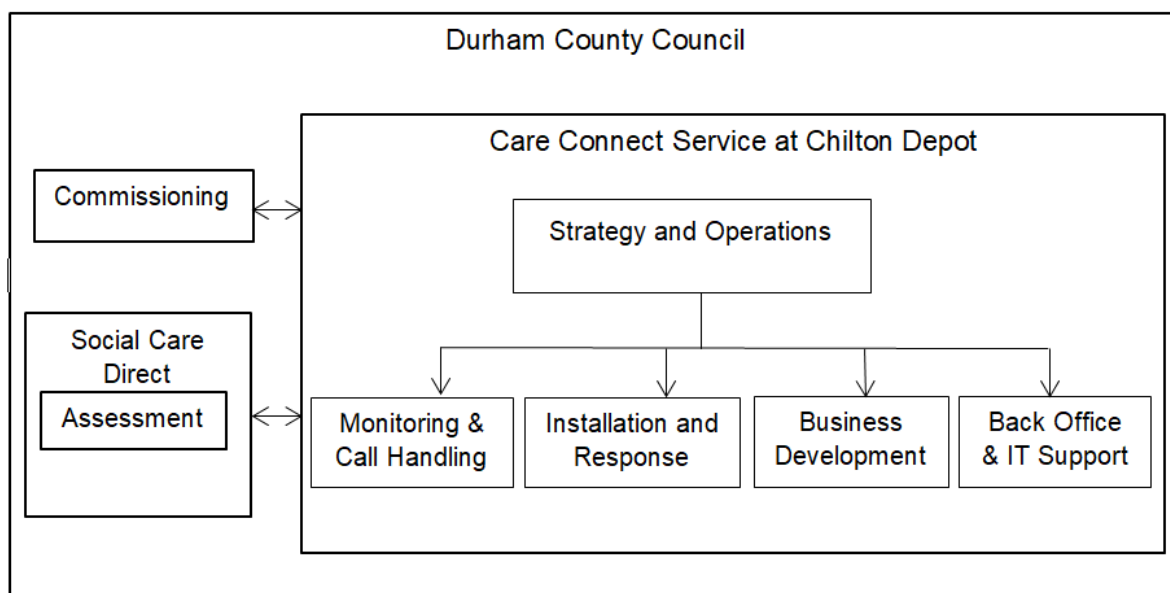
Before reorganisation every local authority had its community alarm service, and the majority of those services were based on hardwired analogue systems in facilities where people had to move in order to use the service. Such hardwired systems were supported at fixed locations by wardens funded through the government's Supporting People programme. The Supporting People programme, launched by the UK government in 2003 as a £1.8 billion ring-fenced grant to local authorities intended to fund services to help vulnerable people live independently, got withdrawn in 2009 (House of Commons, 2012). While the sustainability of the existing hardwired systems came under question, Durham Council also felt that the systems were too restrictive and always required people to move to get the advantage of the service (DCC, 2009).

There was a tender for delivering a community alarm service under this dispersed local authority model in 2009. *Care Connect*, a community alarm monitoring and warden response service commissioned by the Council won the contract. The Council's commissioning policy officer [DCC-P9] reflected on his experience of a recent market testing exercise that aimed to explore options for competent providers of assistive technology care services in Durham County. He explained how the small size of the market, comprising only a handful of providers with the right capabilities, poses a significant challenge from the commissioning perspective.

“When we set away and moved away from hard-wired systems...and went for the dispersed model, we tendered that out, and the winner of that was Care Connect... A market testing exercise took place with a view to who could undertake those roles? Who could undertake the provision of equipment? Who could undertake the monitoring of the equipment and the response and who could do both?...The market's quite small as to who could undertake that role....If we go back out, we'd have to look at how we get the best from the market and to get the best competition from the market, because we don't want to be in a position whereby one provider hold us over a barrel and we've got a cost issue. We've got to be careful with that.”

Care Connect is delivered by a dedicated service area within the Council working out of its Chilton Depot in the County Durham. The *Care Connect* organisation comprises several core functional areas dedicated to strategic planning, business development, and provisioning and delivering telecare service to its customers (see Figure 7.5 below). The functions of different groups within the *Care Connect* service organisation are elaborated later in this chapter (section 7.3.4) in relation to the service processes.

Figure 7.4 **Care Connect Service Organisation** (Source: Own illustration)



7.2.4.3. Care Connect Service

Care Connect service includes both 24 x 7 alarm monitoring and warden response elements - to support vulnerable and at-risk residents in the County to maintain independent living at their homes. The service is provisioned as part of care packages assessed and referred by the Council, and also, on a private basis to customers. The Chilton depot maintains a large control centre which apart from housing the telecare call handling and monitoring platform,

also houses infrastructure for other services such as a Lone Worker system and a CCTV monitoring service for the County.

Care Connect differentiates between community alarms (labelled by the Council as 'dispersed alarms') and telecare provisions. While the majority of the telecare service provisions share the same infrastructure with dispersed alarm units, the difference primarily stems from their purposes, and also on the basis of how these services are commissioned by the Council. The Council's Commissioning Policy Officer [DCC-P9] clarified how this distinction is made between these two systems:

"Telecare is more bespoke to the individual, the community alarm system as it is, or the dispersed unit is a way of monitoring."

A 'dispersed alarm' is charged as a "non-statutory service" at a flat rate of £4.91 per week (plus a one-off connection charge of £25) to all customers. A dispersed (or portable) alarm unit package comes with a basic pendant and base unit that is typically connected with a PSTN telephone line, and an electrical power socket. Given the rural nature of the County Durham, some service users do not have fixed telephones at their homes, and in such cases, a mobile sim-based 'Caresse' system is offered for installation at an additional charge of £3.07 per week.

Unlike the dispersed alarm service, provisioning of telecare is considered as a 'statutory service' funded by the Council's care budget as part of the care package for an individual. Assessment of telecare needs and subsequent referrals for telecare provisions are performed by the Council's social care staffs. Telecare devices such as a smoke detector, fall detector, or bed sensors are recommended as part of the assessment process to address specific individual care needs.

Depending on the financial assessment and the cost of the telecare package, a telecare user may need to pay nothing or a part of the cost. The commissioning contract between the Council and *Care Connect* stipulates a payment of £1.60 per week for each telecare device installed and monitored by the *Care Connect* service. However, private telecare customers

who are not assessed by the Council are charged fully for the costs of equipment, installation, and maintenance. For example, Care Connect charges £65.80 (one-time equipment cost) plus 63p per week (recurring) monitoring costs for provisioning of a Smoke detector device.

The difference between dispersed alarms (referred in the interviews as *Care Connect*) and telecare provisions becomes more apparent when one study respondent [DCC-P8] clarifies the mechanism through which the services are charged to the customers:

“For the Care Connect people have to pay for it, nobody gets it for free. It's one of those services, it's a non-statutory service. The council don't have to provide it so it has to pay for itself... Anyone can have it, they don't need an assessment... because they pay for it. All of the Telecare items have to be assessed for because it's a needs assessment.”

While for the dispersed alarm service customers pay directly to Care Connect Organisation, for the telecare service provisioned by Care Connect, further to the assessment of care needs and subsequent referral by the Council, service users do not pay anything to Care Connect. In the latter scenario, the Council pays Care Connect for the telecare provisioning as per the commissioning contract. As people's care needs change over time, provisioning of service level needs shift from the community alarm to telecare and vice versa, and thus the charging mechanism needs alteration.

Overall, Care Connect supports over 11,000 subscriptions for dispersed (community) alarms and about 2700 subscriptions for telecare²¹. Care Connect is accredited by the Telecare Service Association (TSA) at 'Platinum' level, which signifies the highest level of performance.

7.3. Comparative Analysis of the Case Settings

7.3.1. Demographic and Socio-economic Contexts

Table 7.5 illustrates a comparison of demographic projections across the four case study sites, highlighting the numbers as well the percentages of elderly population (aged 65 and

²¹ While the number of telecare subscriptions indicates a unique number of users, for dispersed alarm subscriptions, this could be shared between two or more people.

over) with regard to the total population for the respective localities. Additionally, data corresponding to the North East England and England are also presented, in order to provide a comparison among the numbers at the local, regional and national levels. It may be worthwhile to note that **only minor variations exist in the projected data for older people, in terms of percentage of total population, across the four case sites.** These metrics are also comparable with the ones for North East England. However, **comparisons with the national level metrics reveal the presence of a relatively higher percentage of an elderly population in the North East localities.** Percentages of elderly population (aged 65 and over) with limiting long-term conditions in all the case sites are also higher (by about 2%) compared to the same for England as a whole. These findings suggest relatively higher demand is prevalent for care services in the case sites.

Socio-economic indicators highlight how challenging the environment is in the locality, in terms of affordability of care provisions. This has important implications for planning and provisioning of social care services. The Index of deprivation on the 'Health Deprivation and Disability domain' measures the risk of premature death and the impairment of quality of life through poor physical or mental health. **Data from the English deprivation report suggests relatively high indices for North East districts** (DCLG, 2015 p.19).

Table 7.5 Comparison of demographic projections for 2019 across four case sites

(Source: <https://www.poppi.org.uk> and <https://www.pansi.org.uk>)

Metric	City of Sunderland	Redcar and Cleveland	Gateshead Borough	Durham County	North East England	England
Population aged 65 and over (% of total population)	54,500 (19.6%)	30,800 (22.7%)	39,600 (19.4%)	110,200 (20.9%)	530,000 (20%)	10,366,000 (18.39%)
Population aged 85 and over (% of total population)	6,200 (2.2%)	3,700 (2.7%)	5,200 (2.4%)	12,700 (2.4%)	65,500 (2.5%)	1,390,400 (2.47%)
Total population aged 65 and over with a limiting long term illness whose day-to-day activities are limited a lot (% of total population)	18,389 (6.6%)	8,776 (6.5%)	12,003 (5.9%)	34,190 (6.5%)	152,092 (5.7%)	2,456,207 (4.3%)
Baseline estimate of population aged 18-64 predicted to have a learning disability (% of total population)	4,108 (1.5%)	1,879 (1.4%)	3,025 (1.5%)	7,678 (1.5%)	38,860 (1.5%)	826,834 (1.5%)

7.3.2. Organisational Settings

The four telehealthcare services investigated in this chapter are provided by organisations that differ in many ways, with respect to their structure, and goals. As in the cases of *Care Call* and *Care Connect*, the services are commissioned and provisioned by separate organisational divisions within the Local Authority (Council). For *Sunderland Telecare*, the provider organisation is a local authority trading company that delivers the service under a block commissioning contract with the Sunderland City Council. For *HomeCall* service, the provider organisation is Coast and Country Housing, a housing company having no affiliation with the concerned local authority. Such variations in service providers' organisational settings exert sizeable influences on the ways for how these four services got commissioned and delivered.

Table 7.6 illustrates a comparison between the four service organisations, primarily concerning their core functions and also relating to the arrangements for commissioning and provisioning of the services. These arrangements provide useful insights on the operating environments for the services at a broad level. For a more in-depth comparison of the organisational settings under which these four services are delivered, the following two key characteristics are identified as a basis for drawing similarities and differences.

1. Autonomy in Governance and Decision making
2. Organisational Identity and Focus

- **Autonomy in Governance and Decision Making**

This dimension signifies the level of formal autonomy that exists in the service organisation, with regards to freedom in making policy and strategic decisions related to the service. Except for *HomeCall*, the other three services are delivered either by the concerned local authorities, as are the case with *Care Call* and *Care Connect* or by an organisation (SCSL) that is owned by a local authority. It can be argued that such associations make these service organisations tied to the Council's policies and processes to a considerable extent

Table 7.6 Comparison of four service organisations [Source: own illustration]

Service Dimension	<i>Sunderland Telecare</i>	<i>HomeCall</i>	<i>Care Call</i>	<i>Care Connect</i>
Provider organisation	Sunderland Care and Support Limited (SCSL)	Coast and Country Housing (CCH) ²²	Gateshead Council	Durham County Council
Organisation profile (Core function)	Local Authority Trading Company for Sunderland City Council (wholly owned)	Primary provider of Housing services in Redcar and Cleveland area, registered as a Community Benefit Society since 2015	Local Authority for Gateshead Borough	Unitary Local Authority for the Durham County since 2009.
Service commissioned by	Adult Social Care function of Sunderland City Council	Adult Social Care function of Redcar and Cleveland Borough Council ²³	Adult Social Care function of Gateshead Council	Adult Social Care function of Durham County Council
Service provided by	'Equipment and Prevention Division' within SCSL	Independent and Supported Living (ILS) division within CCH	A service delivery team which is collocated with and part of Council's Adult Social Care function	A dedicated service delivery team which is part of County Council but operates as a separate service area
Nature of contract / arrangement for service provisioning	Under a three-year block contract with the Council , SCSL provides a wide range of care and support services, including Sunderland Telecare service	A commissioned contract exists for providing telecare and personal care services for the people who are assessed and referred by the Council	In-house provisioning ; service provisioned based on a specific budget allocation made by the Council	Commissioned service is based on a specific budget allocation made by the Council

influencing how the business decisions are made and executed. Data from the case studies suggest that both the *Care Call* and *HomeCall* service organisations enjoy a relatively higher level of autonomy. *Care Call* is an in-house provisioned service where the service delivery team remains part of the Council's adult social care function. Such organisational arrangement permits higher freedom in terms of service governance, as evident from the account of a senior manager from *Care Call* service [GCC-P3]

²² Coast and Country Housing has been merged with Yorkshire Coast Homes since October 2018 and the merged organisation is now known as Beyond Housing

²³ Commissioning contract exists only for provisioning of telecare service

“Care Call is an in-house provided service, it's not really commissioned...**I've got a financial envelope, and if I want to say we'll spend more money on Care Call** but we'll reduced costs over here, I can make that investor-save argument almost to myself. **I don't have to go to a commissioner, because it's my money I'm spending.**”

In the case of *HomeCall*, the service organisation is managed without much influence from the concerned local authority since the parent company, Coast and Country Housing has no formal affiliation with the Redcar and Cleveland Council. In the words of the head of the *HomeCall* service [HC-P03], the service organisation is free to formulate its strategy and business plan.

“There's no influence externally in how we deliver our service or how we set ourselves up.”

On the other side of the spectrum, *Sunderland Telecare* is highly reliant on Sunderland City Council, in terms of policies and processes linked to its service delivery model. The complex and difficult relationship between the Council and SCSL is captured in the words of a senior manager for the service [ST-P2].

“I think at the minute it is not a council dependency that becomes part of the problem because we're still owned by the council, so they've still got a big say over what we do and how we do it. I think we need to break that tie to a great extent, maybe not completely but we need to be able to move away independently.”

Care Connect service is commissioned by the Durham County Council and gets delivered by a dedicated service area within the Council. Unlike *Care Call*, the service is not an in-house provision and the service model remains closely tied up with the Council's policy frameworks and operating guidelines, as observed by one service manager [DCC-P7].

“There are so many other things out there, **but because we're a local authority and we're not running a business, we're part of an organisation, it's very difficult to limit yourself to be able to promote,** to use that technology to help that independence more **because of you being part of the council.**”

- **Organisational Identity and Focus**

This dimension indicates how the organisational members perceive the identity and mission of the service. All the four service organisations are not-for-profit either by virtue of their nature or their affiliations to public institutions. While all four organisations espouse social purpose in their mission statements, a variation on organisational focus to pursue commercial business agenda can be understood. The three services that are closely tied to

their respective local authorities – *Care Call*, *Care Connect*, and *Sunderland Telecare* rely heavily on the budget allocations made by the Councils for delivering the services – either through in-house provisioning or through commissioned contracts. As the Business Development Manager from *Care Connect* [DCC-P2] reflects, a tension between organisational identity and commercial focus can be perceived.

“Top challenge is constantly being told you’ve got to be more commercial and every time you try to, they come down and say, you can’t make a profit, you can’t do that you’re a local authority...So it’s quite frustrating.”

On the other hand, the importance of adopting a commercial outlook, in order to maximise the business opportunities and earnings, is emphasised by the head of *HomeCall* service [HC-P1].

“It’s housing associations just having, as *Coast & Country* does, the awareness that profit is not a dirty word. We are in a situation where a profit doesn't get issued as a dividend; it doesn't get issued as a performance related benefit. Profits, surplus, the bottom line, it's about maximizing that so it can get reinvested back into the business. *HomeCall*, as a trading function within *Coast & Country*, is very much driven by social purpose, but it's striven by organisational logic.”

It is expected that *Sunderland Telecare*, the service offered by a Local Authority Trading Company on behalf of *Sunderland City Council*, will pursue more commercial opportunities. However, on a contrary, under the block commissioning contract with the Council, *Sunderland Telecare* service offerings are rather limited for private and/or self-funded customers.

7.4. Exploring the Services

7.4.1. Service Value Proposition

Table 7.7 presents a summarised view of the four telecare services investigated in this chapter by presenting the main characteristics of these services relating to the scope of the service, packages offered, fees charged to the customers, and service quality accreditations. Such a consolidated view allows a comparative analysis of the value proposed by the services to their customers and also to the other stakeholders within the telehealthcare service ecosystem, primarily the local authority commissioners of these services.

7.4.1.1. Value Proposition to the Customers / Service Users

- **Choices on Service Tiers and Subscription Plans**

It can be seen that all four services offer a basic pendant based community alarm facility and also peripheral telecare devices (sensors) for their customers (see Table 7.7). Except for *HomeCall*, the rest of the services include both alarm monitoring and warden response as part of the service package. *HomeCall* offers a tiered approach in its offering that allows users to choose from either of the two service packages - a cheaper package with monitoring only function and another with both monitoring and response provisions. Such differentiated levels of service provide more choices to *HomeCall* customers, depending on their needs and affordability, as one service manager [HC-P4] explains the logic:

“Because some people weren't for one size doesn't it fit all, some people don't need us to respond, some people don't want us to respond, some people have got that stronger network of family around them. Why should they be paying for something that they don't actually need and they're quite happy just for us to take their call then alert somebody to the fact that that person needs.”

Telecare services are charged in a way that is contingent on whether the customers' telecare needs got assessed by the Adult Social Care function of the concerned Council or not. In the case of *Sunderland Telecare* and *Care Call* services, customers with assessed needs are required to pay only the subscription fee for community alarm as no separate charge applies for telecare provisions (irrespective of the number of telecare devices connected). For *Care Connect*, however, telecare provisions for assessed needs require discontinuation of existing paid community alarm service subscription (if any). A separate monitoring and response fee applies for each peripheral telecare device provisioned (see Table 7.6), and depending on the financial eligibility of the user; telecare service could come free or with a nominal charge. For *HomeCall* telecare package, customers who got assessed for their care needs and referred by the Council are fully exempted from paying any fee for the service. Barring *Sunderland Telecare*, all other services offer telecare service to their private customers (who do not get assessed and referred by the concerned local authority). However, private telecare customers are typically charged higher fees compared to the

customers who are assessed and referred to the service by the Council. To illustrate this point, Care Connect charges £65.80 (one-time equipment cost) plus 63p per week (recurring) monitoring costs to a private customer, for provisioning of a *Smoke Detector* device.

It is perceived from the interviewees' accounts that there are people who are unable or unwilling to avail themselves of the Council's social care assessment, and subsequent referrals for telecare service. Therefore, in addition to choices for differentiated service tiers and/or packages, it is also important that the service remains accessible to self-funded (private) customers who do not get assessed. As one study participant [HC-P4] mentions:

"It's about knowing the marketplace and that **there will be people out there who don't always want to go for an assessment with social services**. It's about you've got a customer who needs this. As long as you're pointing out the fact that if they did get an assessment it might not cost them anything. They say, "Well, oh no, we don't want to bother with Social Services. It's fine." **It's about just giving them the choices really, isn't it?"**

Table 7.7 A summary view of the four services

Service Attribute	<i>HomeCall</i>	<i>Care Connect</i>	<i>Care Call</i>	<i>Sunderland Telecare</i>
Packages	Three service packages: <ul style="list-style-type: none"> • <i>HomeCall</i> Monitor • <i>HomeCall</i> Response • <i>HomeCall</i> Telecare 	<ul style="list-style-type: none"> • Community Alarm service with monitoring and response • Telecare for users with assessed needs • Telecare for private customers 	<ul style="list-style-type: none"> • Community Alarm service with monitoring and response • Telecare for users with assessed needs • Telecare for private customers 	<ul style="list-style-type: none"> • Community Alarm service with monitoring and response • Telecare for users with assessed needs
Weekly fees for basic Community Alarm service	Monitor- £ 3.85 Response- £ 5.05	£ 4.91 per week	£5 per week	£5 per week
Subscription fee for telecare users with Council assessed need	Home is paid for the service by the Council under its commissioning contract. Free to the service user	Each peripheral telecare device is charged at £1.60 per week (for monitoring and response)	Included in the basic Community Alarm package, no separate fee applies	Included in the basic Community Alarm package, no separate fee applies
Subscription fee for private telecare	varies based on number and types of telecare sensors	varies based on number and types of telecare sensors	varies based on number and types of telecare sensors	Private telecare service is not offered
Number of customers	5000 (including 1000 on Council's Telecare contract)	11,000 for community alarms, 2700+ for telecare	8,500	5,000
TSA Accreditation	Yes	Yes	Yes	No

- **Perceived Value of the Service Quality**

Except for *HomeCall*, the other four services are delivered by the organisations that are either part of, or closely affiliated to a local authority. While several private providers offer telecare services comparable to the four services investigated, two service managers highlight that association with a local authority helps in boosting credentials of the service to their customers.

“The council's like a safe haven, that's the way they look at it. It's a public service, **that's the way that people look at it.**” [DCC-P1]

“I think people have a lot of respect for them, that is the local authority, the services that it provides and I think it's around those show the outcomes that we create for the individual, and we are pretty good value for money” [GCC-P1]

Excepting *Sunderland Telecare*, the other three services are accredited to *the TSA Code of Practice*. While the service brochures and documents highlight this accreditation to promote the perception of high performance and service quality, the findings from the case studies reveal that the TSA accreditation primarily aids the service providers to adhere to pre-set quality standards and to achieve key performance indicators as defined in the framework. In the words of an interviewee [DCC-P6]:

“It's a benchmark, and it gives you a bit of a comfort blanket I think. That you know what you need to strive to achieve. **Because we've got assistance in place with key performance indicators to prove we're achieving that**, it gives you that drive to be able to make sure that we're doing as much as we possibly can with what we've got available.”

Additionally, the service providers are found to collect feedback from their customers on various aspects of the service, including installation, equipment reliability, experience with response actions and the value for money. The feedback is typically gathered through annual customer satisfaction surveys, and these survey reports highlight the high level of user satisfaction with their service (Durham County Council, 2018; Gateshead Council, 2017). Press releases bearing testimonials of service excellence (Coast and Country, 2017) are also published to promote the value of the service.

- **Affordability**

It can be seen that all the four services offer a basic telecare alarm service with a subscription fee of around £5 per week (see Table 7.7). At this price point, telecare services with unrestricted use of alarms / calls and warden visits, arguably offer affordable choices to their customers, as suggested by two study participants:

“I think service users would say it's a fantastic service because we'll do anything they want really, and we respond...I know there are other parts of the country that only offer the control room contact only, and they'll ring the family or the police or whatever. They don't actually have any responders. Sunderland's customers are very, very lucky.” [ST-P3]

“Because it is quite a low cost service, when you think about other things that people pay for to help them maintain their independence. Four to five pounds for somebody being on the end of the phone, somebody being able to come out...” [HC-P3]

As earlier discussions suggest, telecare provisions for private customers are charged substantially higher in compared to the customers with their care needs assessed and referred by the respective Councils. As the service providers aim for more fee-paying private customers, there is an obvious concern about people's willingness to pay for telecare services, as one of the study participants observes [HC-P2]:

“People aren't ready to pay; you have to have buy-in from the council. The council have to be pushing their social workers to see there's an additional level of service that you can get here which we want to put you on by and from general practitioners it's very difficult because they will seldom refer to something that you may potentially have to pay for.”

7.4.1.2. Value Proposition to the Commissioners of the Services

The value proposition for the services to the broader context, especially to local authorities, is acknowledged by the Commissioning Policy Officers interviewed for the case studies. The financial contributions of telecare services in saving a substantial amount of money for the Councils, through supporting independent living for vulnerable people at their homes and thus, avoiding expensive residential care packages, are cited by one local authority commissioner [GCC-P5]

“I think it's extremely important because if we don't have Care Call and we don't have the assistive technology, I know for a fact we would have more older people moving into residential 24-hour care. **Money is a very big driver and our budgets are being cut,** and I think we've got to save about 17 million over the next two years...We really have got to meet the needs of the most needy (sic), **things like assistive technology and reablement is the way forward for us.**”

Such 'cost-saving' objective for promoting telecare services is further reflected in the account of one manager from Home Call [HC-P3]:

"The reason they (the Council) offer it free of charge to the customer is because they appreciate how much money Telecare is saving, in terms of people who end up in hospital for long time after a fall or become a lot ill after a fall. Redcar and Cleveland Council recognise very much its preventative value."

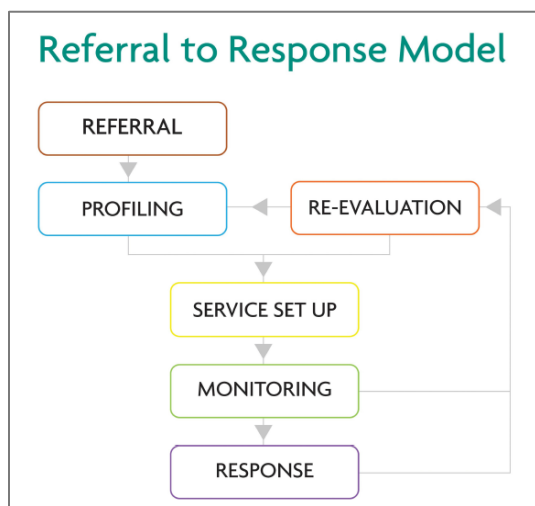
HomeCall telecare service is provided by Coast and Country Housing (CCH), which is a primary housing provider in Redcar and Cleveland locality. The head of *HomeCall* service [HC-P1] mentions that the wider value propositions for the assisted living services are anchored on the strategic objectives of creating durable relationships with the tenants and addressing their care and well-being needs, in order to develop 'sustained tenancies' for the housing organisations.

"There's a very fundamental relationship that we have with our customers, and that **we want to attract customers to create tenancies. If we've achieved that, we want to sustain that tenant relationship for as long as possible...**That long-term relationship, we try to set out strategically in a very, very clear way and behind that have services which have product accommodation and services which can support that journey."

7.4.2. Examining Key Processes related to the Services

Analysis of the business processes for the telecare services examined in this chapter reveals that these services involve the following four key process areas related to provisioning and delivery.

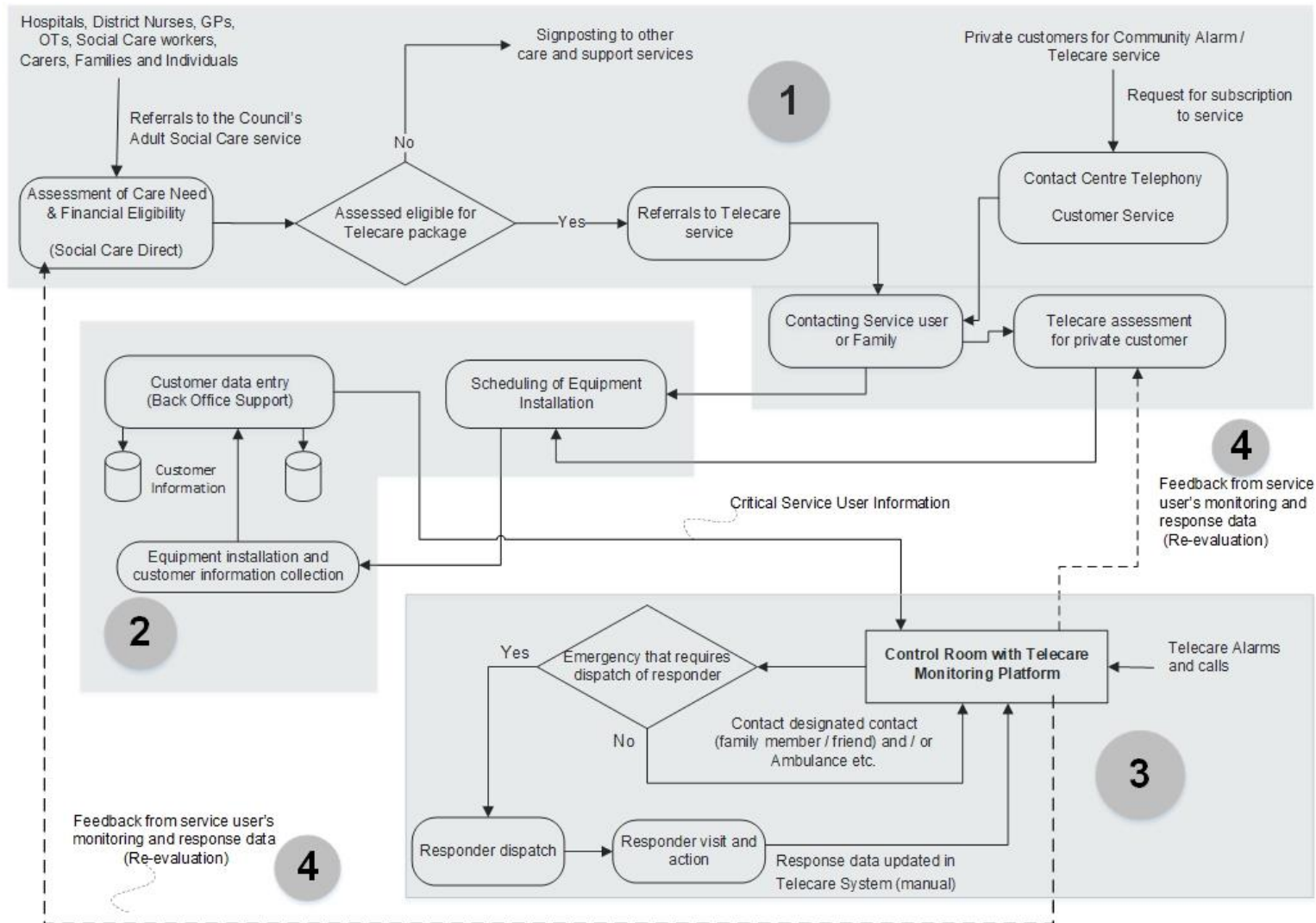
1. Referrals and Assessment
2. Installation and Set-up
3. Monitoring and Response
4. Re-evaluation

Figure 7.5 TSA Referral to Response (R2R) model (Source: TSA, 2013)

It can be seen that the above process areas broadly align with the TSA prescribed 'Reference to Response' service model (see Figure 7.5) for telecare service providers (TSA, 2013).

While the four services share many activities that are quite similar, it is important to highlight the key differences that could elicit useful insights on the use of technology platforms and tools, flow of information, and the interactions among the stakeholders within a service. Such insights can inform this research about the key challenges and opportunities related to each of these process areas. In order to draw meaningful comparisons between the five services, a generic service process flow diagram is developed (see Figure 7.6). The shaded zones, marked with numerical digits ('1' through '4'), represent the four process areas within the illustration.

Figure 7.6 A Generic Telecare Service process Flow Diagram (Source: own illustration)



7.4.2.1. Process Area 1: Referrals and Assessment

Referrals for adult social care needs come from various sources to the Council's *Social Care Direct* department (see Figure 7.6, zone marked '1'), where social workers conduct detailed care need assessment for an individual, including financial assessment based on pre-set eligibility criteria. During the assessment process, the eligibility for a telecare package is ascertained, and subsequently, the person is referred to the respective service providers for telecare service with the recommendations for appropriate peripheral devices. It is important to highlight two aspects related to this process area; one concerns the care assessments done by the social care workers, and the other relates to how the referrals are communicated and managed between the Council and the respective service provider.

Gateshead Council's Adult Social Care function follows a coordinated approach, which is referred as a 'front door model' and follows a holistic care need assessment before signposting to *Care Call* service. Elaborating on this model, a senior manager of *Care Call* explains how an integrated assessment process maximises the provisioning of assistive technology services through well-designed assessment protocols and evidence-based cases for care plans. As the telecare manager for Care Call [GCC-P1] explains:

"The whole idea of that front door model is to try and devote 80% outcomes through that front door and sign post it to other services, one of them being telecare really. The 20% of people who hit that should really be people who do need packages of care and support."

It has been found that the services follow different approaches in terms of handling and managing the referrals for service provisioning. Care Call service uses the Council's *CareFirst* system for referral management, whereas, for *Care Connect* and *HomeCall*, communications happen through emails and faxes between the Council's assessment function and the service

provider. *Sunderland Telecare* uses an innovative approach that employs the *TCES Pro-Cloud* system, a web-based asset management platform, to run its community equipment store. *TCES* system provides necessary asset management functions such as maintaining inventory levels and providing low stock alerts; maintains a catalogue of community support and assistive technology equipment, and allows registered users to place an order online for community and telecare equipment. Once the user places an order, it goes through a predefined workflow within the *Sunderland Telecare* organisation before the order gets processed for requisition.

For self-paying, private customers of telecare services, all the service providers except *Sunderland Telecare* conduct their internal assessment of customers' needs, in order to ensure that telecare package effectively serves the requirement. As part of the referral management process, the service users or their families are contacted to capture and verify vital information necessary for scheduling installation and subsequent setting up of the service.

7.4.2.2. Process Area 2: Installation and Set-up

This process area (see Figure 7.6, zone marked '2') refers to the processes relating to installation and setting up of the service. Installation of telecare equipment at a service user's home is performed by either a dedicated team for installation, as is the case with *Sunderland Telecare*, or the mobile wardens (responders). In some cases, depending on the nature and complexity of the installation, for example, installation of sophisticated and complex devices such as *Property Exit Sensors*, *Bed Sensors*, or *Medication Dispensers* are performed by trained technicians with specialised skills.

During the installation of equipment at a user's home, detailed information of the customer is captured *in situ* using paper forms. Such detailed records of customer

information are subsequently entered manually in computerised databases by back-office support teams. The processes related to the collection, storage of customer information, and further reconciliation with supplementary records for the customer available in other systems, for example, Council's *CareFirst* system, generally involve a high volume of manual entries and duplication of efforts. In comparison to other services, Care Connect has been found to have a more mature IT infrastructure that allows integration of its 'Care Connect Customer Database' (Microsoft Access software) with the Council's central financial support system (Oracle Financial software), in order to facilitate financial transactional processes such as generation of service invoices. Finally, some essential elements of the customer record are entered manually in the relevant telecare monitoring platform used by the service – either the Tunstall PLC system (*Care Connect, HomeCall, and Care Call*) or the Jontek AnswerLink system (*Sunderland Telecare*).

7.4.2.3. Process Area 3: Monitoring and Response

In the control centre that houses the telecare monitoring platform, the call handlers receive calls activated by either the users or by alarms triggered through the telecare devices installed in service users' homes. Depending on the nature of the alarm call, the call handler assesses the service user's situation with regards to the level of risk and further takes appropriate action remotely (see Figure 7.6, zone marked '3'). In many cases, these actions could involve communicating with predesignated contacts or calling ambulance services. However, emergencies such as falls warrant service responder's visit to the user's home.

With the exceptions of *Sunderland Telecare* and *Care Connect*, all the services rely on mobile phone-based communication for scheduling and dispatch of the responders (wardens). *Care Connect* employs *Telematics* tracking software to

locate the nearest available responder vehicle with a warden who then visits the user's home. Following a similar approach, *Sunderland Telecare* utilises *Oysta* tracking system to locate the nearest available responder vehicle and then, to communicate to smartphones (using *Oysta mobile app*) carried by the responders. On completion of the responder's visit to the user's home and subsequent response action, a record containing the details of the response activity and outcome is manually registered in the relevant telecare platform.

7.4.2.4. Process Area 4: Re-evaluation

This stage of the service delivery concerns periodic sharing of crucial information related to installation, critical incidents related to telecare monitoring, and response, among the stakeholders, particularly with the Council's social care assessment teams. The purpose of making the feedback available to the assessment team is to provide insights on how far the telecare provision has been addressing the user's previously assessed needs so that future re-evaluation of needs can accommodate and adjust the provisions.

7.5. Key Themes emerging from the Analysis of Data

The data from the case studies have been analysed using a template analysis approach which has been described in Chapter 5 (section 5.7). After several iterations of coding of the data (using both NVivo tool based and manual), the following four top-level themes emerged from the analysis.

- a. Nature of the Service
- b. Advocacy and Collaborations
- c. Organisational Characteristics
- d. Technology and Information Systems

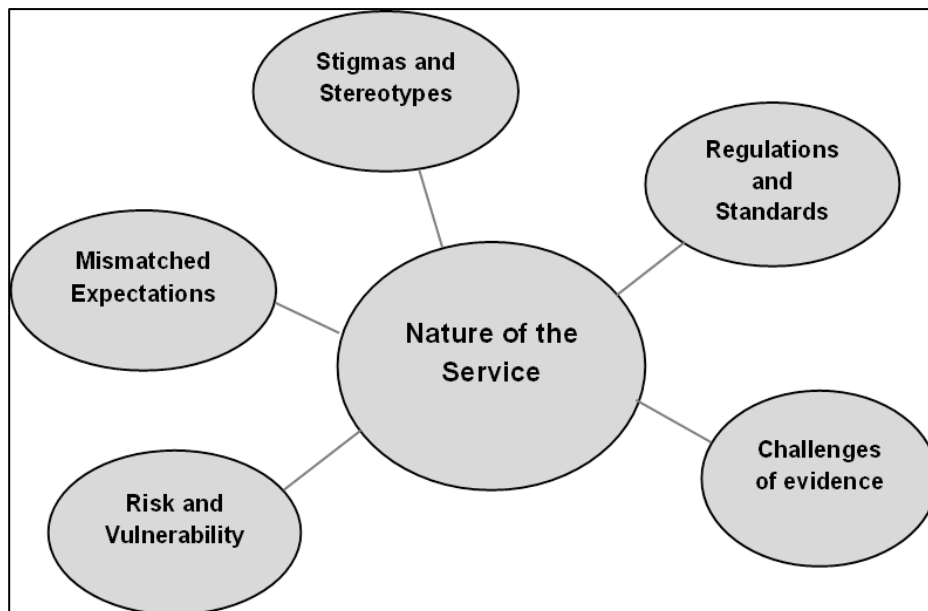
Analysis of data leading to the four themes reveals that each of these themes comprises of several related concepts or sub-themes. Accordingly, at the

beginning of discussion for a theme, a thematic map comprising the sub-themes is illustrated and subsequently, each sub-theme is discussed in detail.

7.5.1. Theme 1: Nature of the Service

Findings from the case studies reveal some important characteristics of a telehealthcare service (see Figure 7.7). One of these features relates to the perception of inherent risk involved with a service of this nature that deals with primarily older and vulnerable customers. Such usage of technologies is found to produce some perceived stigmas and stereotypes about the users. It has been also felt by the some of the case study participants that there are often unrealistic expectations from stakeholders with regard to application of telecare services in addressing other unmet care needs. The risk-laden nature of such applications calls for examining the issue of regulations and quality standards for the service. Furthermore, the challenges of collecting and demonstrating evidence for cost effectiveness emerge as a distinctive characteristic for a telehealthcare service.

Figure 7.7 Nature of the Service



7.5.1.1. Risk and Vulnerability

Several study participants have voiced the challenging nature of the service in terms of risk and vulnerability of service users.

“I still think there's **a place for telecare in the future, traditional telecare** because you're always going to need a human being **dealing with some of the most vulnerable people** no matter what technology you've got.” [ST-P1]

“You've got those service users who have a capacity and can talk and make decisions for themselves, but you do also **have those service users who don't have capacity** whether they've got dementia, whatever.” [GCC-P5]

In addition to the technologies, the importance of monitoring and response elements that involve human aspects in a telehealthcare service have been highlighted by an interviewee representing the TECS industry.

“The Telecare elements, I think, are probably less important than some of the other elements, because in a service, which is the benefit to the society, the service element is both the equipment but also the **elements around the response and the monitoring**, because without those two, whatever technology you put in won't work because even if it's a great piece of equipment it still needs an appropriate monitoring and response as result **because the risk is identified, but then you've got to manage it.**” [TES-P1]

Several interviewees from the provider organisations have perceived that due to the nature of the service and associated risks, they have a big responsibility for the service users' well-being and on many occasions, they are 'closing the gap' between their service and other care services, for example, ambulance services, in order to ensure well-being of the users within the care pathway.

“it's **quite a challenging environment** to work in because obviously you've got **the responsibility of people's well-being** and I think for me it's also keeping your team up to speed with everything and having confidence in people's ability that they're doing the job well, because we make a mistake in our environment and **somebody could lose their life** because we haven't responded quick enough or we haven't got medical attention when maybe we should have done. **It's a big responsibility** on them when they're out there making these judgment calls....**the nature of what we do.**” [HC-P4]

“We are more and more now waiting four, five hours for an ambulance to arrive. We've got a member of staff tied up for four, five hours with that person if medically, they don't think they can leave them. If it's somebody on the floor and hurt and if we've made them comfortable and everything and they're not **at risk** of deteriorating, do we walk away? **How do the families react that you've walked away and they've been left there for four hours waiting for an ambulance? We are more closing the gap, aren't we?**” [DCC-P6]

There is also an acknowledgement that such sense of responsibility and corresponding decisions create a 'fear factor' for the frontline service delivery staff, creating a tension between the business objectives and ethical values.

"I do think as a care provider, we all have **this fear factor of best interest of pulling out if anything to happen to that person**, because you feel so responsible once you provide a service of this nature, and I think it's about us not having that fear, and sometimes making decisions that unfortunate are more about business." [ST-P3]

7.5.1.2. Mismatched Expectations

Empirical data suggest that assessments of care needs and subsequent referrals to telecare services often fail to identify other requirements, including psychological or social needs of the service users, which telecare cannot expect to address. Several study participants' accounts suggest that the presence of such unmet needs such as social isolation often results in misuse of telecare service through making frequent calls by some customers without seemingly justifiable reasons.

"I think more and more, the idea is to keep people independent in their own homes, **but social isolation, I think, is a big issue**. And now that they're getting rid of the sheltered complex buildings, people are in individual homes. So it's recognising that isolation and how that affects them and the impact of how they put the calls onto us. So **signposting people to other services to help with that** ...because we're not picking up all these things that we're not trained to deal with." [DCC-P6]

"**At the end of the day social isolation is a big thing for older people**. In reality you've got lots of older people who have no family, no contact and the only contact they have to hear a voice is Care Call really. **It's a balancing act sometimes because it can become nuisance calls where classic cases, they don't respond**. When you get there, can you take the top off me, pop a bottle? But really that's just an excuse. It's seeing-- it's actually having a person in the home to speak to, to have an interaction with. It's social isolation." [GCC-P1]

"We've got a couple customers at the moment where we know that they need more than what telecare can provide because that's why they're ringing us all the time. We need the social work teams to re-evaluate that and look at the fact that actually **Telecare isn't really enough on its own and quite often it isn't and I think there's an expectation sometimes just because we're here, we can deal with anything and that's not really fair on our teams** because it's quite challenging" [HC-P4]

Such 'nuisance calls' are found to adversely affect the performance and productivity of service delivery since an increased call volume to the telecare monitoring centre keeps the call handlers busy and thus, causing a delay with answering other emergency calls. Also, occasionally mobile wardens need to make unnecessary visits in response to these calls. Another issue pointed out by one response supervisor interviewed for this study, concerns a *silo-ed* way of working between the teams delivering telecare service and the provider teams of other services, for example, personal or domiciliary care, in which other care teams set wrong expectations from the telecare service.

"I think **the expectations certainly from social workers and agencies and people** like that because we've always done it. **They just expect us to do everything for everybody** and I know of social workers who actually say to people, "Oh, you know. If you're cut short in between your carers, press your button and they'll come. Then they'll take you to the toilet." [ST-P4]

7.5.1.3. Stigmas and Stereotypes

Findings from the data suggest that predominantly, older people are the traditional users of telecare services. While assistive technology solutions hold could be beneficial for other segments of the population, for example, young people with learning disabilities, especially with the potential of early detections and mitigations of risk situations, the adoption of such services is found to be limited.

"The **majority of our customers on telecare are older people. That's the kind of market that's traditionally come into telecare.** We are doing some work at the minute to try and look at how we can use assistive technologies with people with learning disabilities." [ST-P1]

"So **traditionally, telecare's been aimed at older people.** Very few aimed at younger people, with say, a little disability, with epileptic seizures, or might be incontinent, or might be managed by the parents and need some mechanism of being monitored that way. With a younger person you can **identify an issue and mitigate against that risk a lot sooner.** You can show that's what you've been able to do." [TES-P1]

"I suppose **in terms of the scope of assistive technology, there are a lot more older people who I can honestly see use it.** We all provide more equipment for people with learning disabilities, but I still think there is a long way for us to go to keep promoting that." [GCC-P5]

Accordingly, the use of telecare service propagates a perception that 'it's something you get when something's happened that means you're not very well' and, such perceptions give rise to stigmas among people that prevents them to go through the Council's social care assessment or to use a telecare equipment such as a pendant, as it could be 'making them look vulnerable'.

"Whereas the problem at the moment is **it's something you get when something's happened that means you're not very well**. I think we've got to try and overcome that barrier in the sector somehow and we look towards the likes of TSA to assist with that. The message for me putting over there was you need to get out of the mind-set that we only deal with old people because we don't." [TES-P2]

"Some people don't want to go through the Council. They don't want to do that. **Sometimes it's a very big stigma attached to that** so that some people just don't feel comfortable and don't want any help. "I'd rather do it myself." [HC-P4]

"**Because they do think that a stigma of a sort**. And **even just having the pendant, like making them look vulnerable** whereas it's not." [GCC-P2]

7.5.1.4. Regulations and Standards

Unlike other care services such as personal and domiciliary care that are monitored and regulated by a governing body like Care Quality Commission (CQC), telecare services in England do not operate within a strictly regulated environment. Except for some specific telehealth products and/or systems, by and large, most telehealthcare equipment is considered to be at 'borderlines with medical devices' and accordingly, remains outside the remit of the regulations by the Medicines and Healthcare products Regulatory Agency (MHRA) (MHRA, 2014). While the Telecare Service Association (TSA) provides benchmarking and accreditation of telecare services to its member organisations based on the TSA *Code of Practice*²⁴, the memberships and also, adhering to the TSA prescribed standards are not obligatory for a telecare service provider.

²⁴ Since 2018, TSA Code of Practice has been replaced by a 'TEC (Technology Enabled Care) Quality Framework' for auditing and subsequent accreditation of telecare services

One service manager has perceived that the low barrier of entry to the telecare market, especially with 'monitoring only' service provisions, could be problematic in terms of assuring the customers of standardised and consistent service qualities, and also, could lead to 'misselling' of services by unscrupulous providers.

"It worries me that we are in an industry where it's easy for people to take advantage of people in a bad situation. Yet as I could walk out of here today selling you telecare service, sit with the phone at home and when it rings it wakes me up and whatever. That's not an appropriate service. We need to be, **we need to have the assurance that telecare services that operate are appropriate and are regulated** appropriately like the CQC sort of registration although not necessary CQC, just something **where there's an accreditation** and if you want to call yourself a telecare provider, you've got to have the accreditation." [ST-P2]

Issues pertaining to some telecare service providers having national contact centres and providing only monitoring services, as highlighted by another service manager, reflect how the unregulated use of such services potentially burden emergency services such as Ambulance and Fire services.

"We get lots of issues for the ambulance service and the fire brigade when people call national contact centres. Because all those contact centres don't necessarily have a response service in the area and they don't know the area, they don't know the client; they don't know the history; so in reality they'll just ring 999. **We have conversations sometimes with the ambulance service and the fire brigade because it's a big issue for them. The national contact centres and the pressures it puts on their services because they don't work the same way that we do.** They ring 999. We respond. We don't ring 999." [GCC-P1]

Acknowledging the fragmented market of technology solutions and services (further discussed in section 7.5.4.2), the participant from the TSA has lent support to the need of having appropriate quality and safety standards and accredited provider organisations, to promote trust and assurance among their customers.

"I guess the other **key challenge is that the technology is ever changing** over time. Again, if we open up the procurement tunnel and people can purchase from a much wider range of suppliers, what we don't end up doing is almost creating not just every local authority doing it differently but there are so many different solutions they could purchase, that they don't know which one to go with **and we're back to the realm of needing some kind of standard, quality standards**

to assure you know you're buying from a quality and a safety-driven company." [TSA-P1]

It has been perceived from the account of a few interviewees that there could be some gaps around standards and /or guidelines for provisioning of *Medication (or Pill) Dispensers*, since the application of these devices involve medical protocols associated with prescription medications and concern safety and legal issues.

"I think we've stayed away from it to be honest, having any responsibility related to people medication. That's probably why I just can't think of a time where we've really explored it a lot or had a reason to or felt like we've needed to. ...my initial reservations would be, "What responsibility does that put on us then. **If we're using the dispensers and I don't probably understand enough about that to know whether how much responsibility you have.**" [HC-P4]

7.5.1.5. Challenges of Evidence

This particular theme concerns the challenges for both collection and demonstration of quantifiable evidences around the cost effectiveness for telehealthcare services. Findings from the data reveal several challenges in generating evidence around the benefits of a telecare service, which could be convincing enough for other stakeholders, notably from the health sector, to endorse and to make investments into the service.

"With telecare and with telehealth, there isn't kind of the evidence base. **They want to actually see the study really produce quantitative and detailed analysis and information, which tells them that by doing that, we will benefit. It's not failing on the part of telecare and telehealth....**There's lots of operational evidence that shows that by pressing a pedant, something happens which if it didn't happen, Mrs. Smith would be in hospital at whatever an admission rate is. £1,000 and then 12 quid every week, to be lying on a ward. **I'm not so sure how we articulate those conversations in a way which actually starts to see health investing at scale in telecare and telehealth.**" [HC-P1]

*"We believe that we've got a fantastic improvement here, but our **difficulty is, and will be, to demonstrate that. It's about providing evidence that digital or equivalent innovations are going to be good for patients and staff, but in addition, we'll save money. Because otherwise, people won't adopt them**" [AHSN-P1]*

One care commissioner has cited the financial difficulties in measuring the effectiveness of telecare services in a rigorous way, as he felt it would be 'cost prohibitive'.

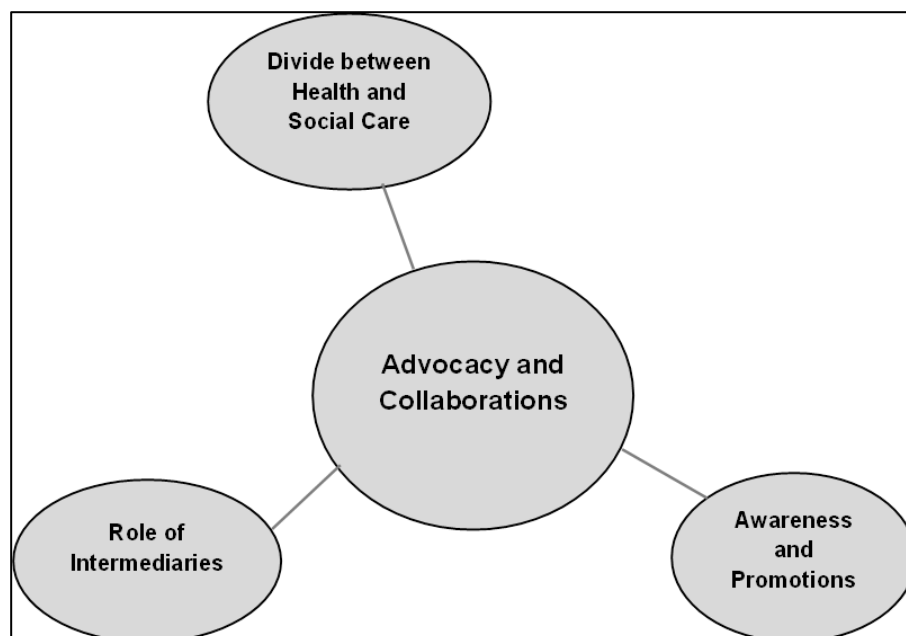
“But we don't measure that. To measure that is cost prohibitive in a way. Previously, I've spoken to Health about that but their funding is tied up as well. It's always been a phrase used, but it's freeing up what you're spending now which is having an impact to do something else which might not have an impact for 10, 15, 20 years. How do you square that one away? It's a difficult one.” [DCC-P9]

7.5.2. Theme 2: Advocacy and Collaborations

This theme concerns the 'value network' element within a telehealthcare service business model and reflects the aspects of collaborations and partnerships involving the services. Analysis of data from the case studies highlights some key issues concerning lack of advocacy and collaborative efforts in promoting higher adoption of the telecare services (see Figure 7.8). A deep divide between the health and the social care sectors that hinders support of key stakeholders towards value creation in the services has been revealed in the analysis. The potential role of champions and intermediaries, at both local/regional and national levels, emerges as one of the key success factors for the services.

Data further suggest that low levels of awareness on telehealthcare technologies among the general public and also, the negative perceptions associated with such technologies within lay people are significant barriers for 'mainstreaming' of these services. The vital role of promotional marketing in changing people's perceptions about the services and in making them attractive to customers is also reflected within this theme.

Figure 7.8 Advocacy and Collaborations



7.5.2.1. Divide between Health and Social Care

Business plan documents for the local authorities clearly articulate visions for collaborating and partnering with local health organisations as part of several strategic initiatives such as ‘Health and Wellbeing Strategy’, ‘Joint Strategic Needs Assessment (JSNA) and ‘Sustainability and Transformation Partnership (STP)’ (Sunderland City Council, 2018; Gateshead JSNA, 2018). However, the presence of such collaborative practices is not much reflected from the empirical findings.

While there is an recognition of this wedge between health and social care, with historic arrangements around funding being one of the possible reasons, a manger from NEAS has been found to be critical of this divide as ‘from a continuum of care point of view, it doesn't make any sense at all’.

“There are a lot of social determinants for why someone might be more likely to be at a risk of a fall. Those social dimensions, whether it's about isolation or having other care needs rather than health needs but they intertwine and intermesh so often that it's ridiculous, frankly, to carve a wedge like that between the two. There are lots of reasons why perhaps there

has been a sort of **wedge**... but from a **continuum of care** point of view, it doesn't make any sense at all." [NEAS-P1]

Engagement with health service stakeholders such as GPs and NHS Foundation Trusts has been cited as challenging by all the service providers involved in this study. Cultural issues concerning the attitudes of the stakeholders representing health services have been referred to as 'almost like professional snobbery' by one study participant who perceived that health is slightly 'aloof to social care and housing'.

"Health are a very difficult to engage with, very difficult to get money out of, that's for sure. For social care we say that more vocally than I would. I think there are some conflicts. I think it's systemic. I do see some cultural, almost like professional snobbery. I see health as being slightly more aloof to social care and housing. We're fairly new with the party. I think health a little bit unsure about, what are housing talking to us about? Why housing is important?" [HC-P1]

Echoing a similar view, another service manager has expressed disappointment of missing potential collaboration with health through utilisation of 24X7 availability of emergency telecare services to monitor health alerts for patients given the lack of interest from health due to a stigmatised perception of clinical staff on the social care services, which does not consider the telecare services as professionally managed.

"There's not many health services that are 24/7 to provide constant emergency, they're not, they all should let what we could do is monitor those alerts but then the decision is simply medical had to go to a medical professional, that's my idea, we can't make those decisions but they need to make more use of the fact that we are 24/7. Because the governance especially in the NHS is so risk averse...**I don't think they look on our services, professional services, because they are not medically trained and all that**" [DCC-P1]

Only in case of *Care Call*, where the Council's social worker teams are located as 'liaison workers' within the wards of local Queen Elizabeth hospital, the social workers maintain a good working relationship with medical staff. Such connection between health and social care helps *Care Call* to receive a substantial number of referrals for telecare from the hospital and also, facilitate the integrated assessment process across physical health, mental health, learning disabilities

and social care needs together. However, it has been found that the telecare services barely receive referrals from other health stakeholders such as GPs and District Nurses.

7.5.2.2. Awareness and Promotions

The issue of low awareness and visibility of the telecare services has emerged on several occasions - voiced by either the members of the service provider organisations concerning the services or by the industry level study participants such as managers from telehealthcare equipment suppliers and TSA. Two service managers from *Care Connect* and *HomeCall* respectively have emphasised the need for 'buy-ins' from local authority commissioners and social workers in promoting the uptake of assistive technology solutions through more number of referrals to the services.

“Again it's **the social workers** and things like that that should be promoting that. **Telecare should be done from our commissioners, social workers and things like that because they're the referrers.**” [DCC-P3]

“People aren't ready to pay; **you have to have buy-in from the Council.** The Council have to be pushing their social workers to see there's an additional level of service [...] and from general practitioners it's very difficult because they will seldom refer to something that you may potentially have to pay for. It would be **hugely beneficial to us to get local authority buy-in and general practitioner buy-in** but we're still struggling.” [HC-P2]

The vital need for involving families within the process of decision making around telecare provisioning and creating sufficient awareness of the service has also been highlighted.

“I think families are a challenge because some families don't want to consider any kind of equipment...it's more an awareness for families with to explaining that.” [GCC-P5]

Study participants representing TECS industry have acknowledged that 'awareness is the critical thing' and creating awareness outside the boundaries of the industry and/or service sector, especially within lay people is vital as just pushing technologies will not serve the purpose of wide-spread adoption.

“The opportunity has to be about putting technology at the heart of care and support as the first thing we think of alongside, then supported by community assets, but not in isolation. **You can't just push technology. Awareness is the critical thing.**” [TSA-P1]

“Unfortunately unless you in the sector, if it was the likes of you and I are looking for something for our parents, we probably wouldn't know where to start initially. **It goes back to the public being aware of these types of technology**” [TES-P2]

TECS industry adopts a traditional marketing approach that aims only older and vulnerable people as prospective customers for telehealthcare services, which could potentially stigmatise the usage among the public and thus, could be a barrier in mainstreaming these services, as the study participants from the industry have observed.

“The barriers being the **awareness** bit of trying to get the message that this **technology should just be mainstream and not seeing as a badge of vulnerability.**” [TES-P2]

“The marketing for I think the industry isn't sexy enough, it's not trendy enough, it didn't make me want one. **The marketing of the services in general has always been based on traditionally older people.**” [TES-P1]

7.5.2.3. Role of Intermediaries

Despite opportunities of creating higher value in the services through formation of collaborative partnerships at a local or regional level, and replication of best practices across services, without involvement of key people who could act as catalyst and help ‘to get the ball rolling’ as a service development manager from Ambulance services (NEAS), has noted.

“It's what frustrates me in an organization that is regional in scale. I'd like to do a lot of the stuff that they're doing in North Tyneside or in Sunderland. If there were **regional consistency** in that approach, then I think it would be easier to recognize the opportunities for us as a regional provider and capitalize at some of those, but that hasn't really been all that possible, either in telecare, or in telehealth....**It is only in North Tyneside where there has been Commissioner involvement to get things going. I do think that that was the catalyst to getting it in place because the Commissioner was really pushing for it too. That helped us to get the ball rolling.**” [NEAS-P1]

Such finding highlights the crucial role of intermediaries and/or champions to bring together relevant stakeholders from various organisations across the service ecosystem and promote meaningful conversations – to share knowledge and

practices and explore potential collaboration opportunities. Interviewees representing national-level organisations such as TSA and regional institutions such as NEAS and AHSN North East & North Cumbria have expressed their ambitions for championing the goals of an improved network of collaboration and innovation.

“We want to make sure that people see this almost as a health check on their business. **They see it actually as an opportunity to use the auditing function to help them actually grow their business, to learn about what's going on elsewhere.** To learn about where they should be trying to improve and it's also a chance for them to spread out the business” [TSA-P1]

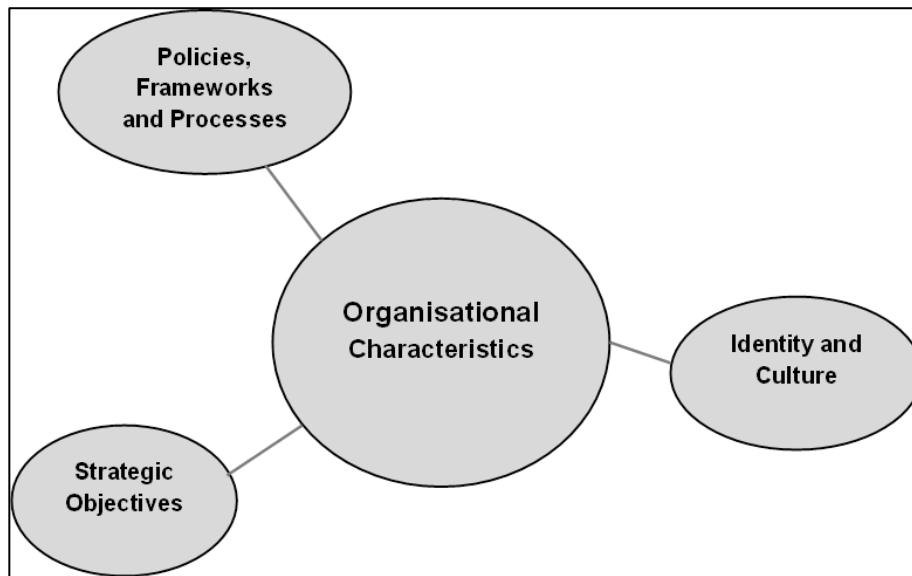
“**The objective of the AHSN, which is a network set up all over England, is really two-fold. One is to try and introduce innovation into improving health care and to share and spread these innovations as widely as possible.** On the health improvement side, which is what I've been involved with, a lot of our work has been to do with the introduction of digital technologies.” [AHSN-P1]

“The whole switch over to digital, fundamentally create technological challenge that the analogue system needs to be switched off. We've got to be exploring and doing better use of GSM-based technology. **I don't think we've really got a finger on what that looks like at the moment and this is where TSA come into the role as the sector representative.**” [HC-P1]

7.5.3. Theme 3: Organisational Characteristics

This theme concerns organisational structural and cultural elements that influence funding, provisioning and delivery of the four case services. Some of these aspects have already been discussed earlier in this chapter, with a comparative analysis of the organisational settings for the services (see section 7.3.1.1). Three distinct categories or sub-themes can be identified within the broader organisational issues revealed by the analysis (see Figure 7.9). One group relates to policies, frameworks and processes that impact value creation as well as value realisation elements with a service business model. The identity of the service provider organisation defines how organisational stakeholders view their organisation and service in terms of purpose and reveals potential tensions and constraints in pursuing business objectives. Finally, the strategic objectives outline how priorities are set for funding and provisioning the services.

Figure 7.9 Organisations Characteristics



7.5.3.1. Policies, frameworks and processes

This sub-theme primarily concerns the policies and frameworks used by the local authorities for procurement (commissioning) of the telecare services. Service managers from two provider organisations have perceived that the respective Council's procurement policies are quite restrictive, which do not allow them much flexibility in altering their service delivery models and competing them in the open market.

“Procurement is a huge **restraint**, you know, procurement rules and regulations they're not just the usual things that private companies have to deal with. ... and all our staff which is our main cost, which you'd expect in a frontline service but that then **does not make you able to compete against the private sector** because of sick pay, holidays and how could people terminate someone's employment, all that makes you really can't compete.” [DCC-P1]

“Our delivery model means that we're still tied in with a lot of Council processes. Yes, in theory, we can compete in the open market **but actually, we can't compete in the open market because we're tied in with Council processes. It's very difficult.** Because we've also had a £7.5 million efficiency to achieve from the Council, but **our hands are very tied** in terms of how we can achieve that.” [ST-P1]

A participant representing the TSA has echoed a similar view by mentioning that the local authority procurement frameworks are often rigid and the procurement

exercises follow 'tried and tested' paths, which do not allow opportunities to smaller companies to offer new innovative solutions.

"There've been quite rigid frameworks for four, five years. With the same sorts of companies...**That needs to change because clearly that's stifled innovation.** It means that the smaller companies that have got something new to say, the SMEs out there, haven't really had a vehicle, apart from the small pilots to show what they can do." [TSA-P1]

The account of another interviewee from a technology supplier organisation has suggested skill and knowledge gaps related to tendering processes for the telehealthcare equipment. The following excerpt from the participant's quote reveals that on numerous occasions, the tenders demand quite outdated technologies, which could be frustrating for the suppliers.

"What we found is some organizations, and I mean a high percentage of organizations, quite often leave procurement to do that tendering exercise themselves. **Those people really have very little knowledge in-- so sometimes, it is frustrating when we will get tenders coming out. That is probably detailing very very old technology or they even refer to our products which they have in the past but the products that were probably obsolete about ten years ago. They've probably just picked out the last tender they did from 10 years prior.** [...] For me, it's about not doing the research and understanding what they're procuring for I guess. Sometimes, I'm not saying that's every time but we do see that which is a bit **frustrating.**" [TES-P2]

7.5.3.2. Identity and Culture

The identity and cultural issues have been discussed earlier this chapter (see section 7.3.2), which reflects a tension between organisational identity and commercial focus for the provider organisations. Such tension has been aptly captured in one service commissioner's observation:

"What we can't do is get to a point where we've almost changed the function or we've become more of a commercial provider. We need to make sure that we've got that balance right. I think **some of it is around the marketing and the business side of things, because that's not our business, per se. We've come from a care background where we're responding to needs.** Some of the things are fundamentally similar, **but actually, we're not business people.**" [GCC-P3]

From a service provider's perspective, however, such a cultural legacy of the public institutions could be perceived as a barrier to acquiring business knowledge and experience, as one of the participants has voiced.

"I've been in local authorities for 30 hard years, there's not many of the managers here that haven't come from a local authority background....I haven't got that business experience and that I don't think we've got a lot of that experience in general in the company. I think that is a gap for us, we need some business thinking sometimes, it's too easy to do it in a local authority or a council way." [ST-P2]

A perceived need for a cultural shift from the existing transactional relationships between the technology suppliers, service providers and the commissioning bodies (Councils), to a more collaborative partnership, has been expressed by the participant from the national telehealthcare industry organisation, TSA.

"At the moment the relationship between a lot of technology suppliers and indeed telecare services with their commissioners is quite transactional...We now need to be more embedded within commissioners and within the front line staff. Because we've got to focus on changing the culture. Making sure people can measure the benefits and track them to understand what difference it's making and far less about installing just pieces of equipment." [TSA-P1]

7.5.3.3. Strategic Objectives

Findings from the data point out how the strategic objectives of the local authorities, in meeting their statutory duties under constrained financial budgets have influenced commissioning decisions of the telecare services to be guided by a reactive policy agenda. One commissioning officer interviewed for this study has explained why provisioning of telecare services with wide-spread preventative care agenda becomes difficult amidst the prioritised focus on delivering statutory social care services.

"It's a budget which is under pressure, because it funds in general preventive services. It fund services which support individuals who are not entitled to a social care service who don't need that eligibility criteria, and because it's not statutory with the funding pressures on the council, the council's been looking at what does it have to do?...I think that's a real dilemma we're going to have. Yes, it would nice to have it up here, but we would probably refer to as the gold-plated service, but can we afford the gold-plated service? We have to look at the service that we're offering and look at the

clients that we have, **look at the demand that we're having now and in the future and cover our cloth accordingly to deliver a service which meets need and it might be basic need and that's it. That's all we can afford.**" [DCC-P9]

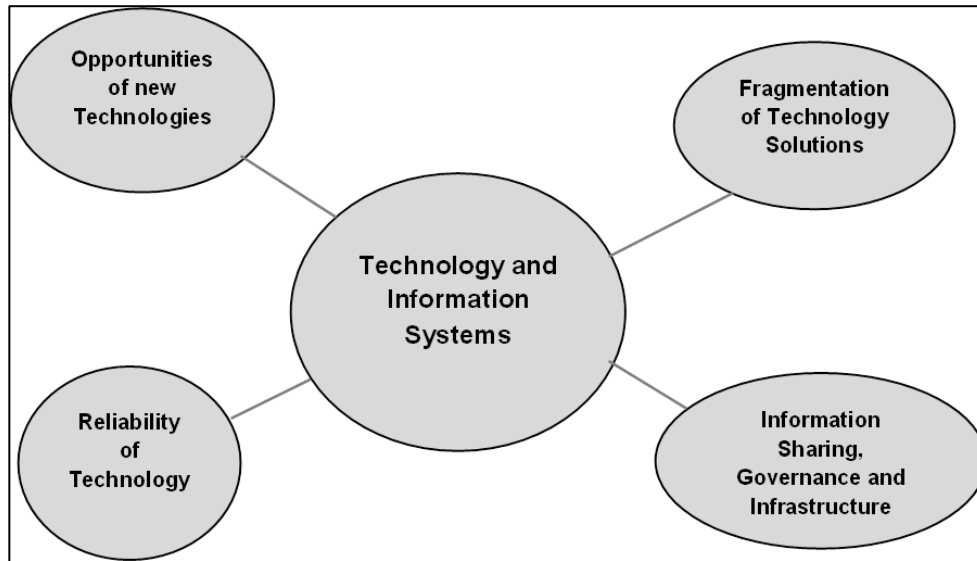
An industry stakeholder has attributed such reactive use of telecare services as a means for 'cost avoidance' by the local authorities since these services are often provided as a substitute of higher-cost care provisions, in meeting the savings targets.

"I think part of the issue is **traditionally telecare serves other social care functions** to see how it's necessary. It's branched out into health services or children services et cetera. It had **a pot of money to run a telecare service but the lack of it being protected** and then in a lot of cases then telecare as an entity is being **given a savings target within local authorities** and clearly that's quite difficult to deliver because firstly, it's not telecare's budget that you'd be taking the money from it would be other social care et cetera. Secondly, **a lot of these are cost avoidance**, we need to be honest. They say majority of this is **avoiding an escalation of costs.**" [TSA-P1]

7.5.4. Technology and Information Systems

Analysis of the data provides several significant findings related to application of technology within the services including the challenges of technology infrastructure, integration and sharing of information among various systems both within and beyond the organisational boundaries; reliability of technology solutions; and the fragmented nature of technology market that offers too many possibilities and choices for buyers. Such insights also cover the potential opportunities offered by future technologies, and the digital technology infrastructure upgrade plans such as changeover from an analogue to a digital network - to drive new service models for telehealthcare. Figure 7.10 shows the four sub-themes within this category, which are discussed below.

Figure 7.10 Technology and Information Systems



7.5.4.1. Reliability of Technology

Issues related to reliability of telecare equipment (and solutions) have been highlighted by several participants across the four services provider organisations. One interviewee has mentioned how Bed Sensors trigger alarms even in case of non-emergencies, and such fallibility of technology could result in abandonment of the equipment by the user.

“I think there's big issue with particularly sensor technology. Bed sensors are notoriously not used because they go off when someone turns over in bed rather than when they're getting up. People then choose not to use them or they put them on the floor. If put them on the floor, people can fall over them so that's obviously an issue. I think that's definitely a problem with the technology.”
[GCC-P4]

Telecare services are typically delivered using fixed-line analogue telephone connection at a user's home. In certain specific situations, it becomes necessary for the service providers to make use of GSM-based mobile networks, which have been considered problematic from a network reliability point of view.

“if a client didn't have their own telephone line installed, or non-working telephone line, we can provide them with the GSM unit. The only catch with the GSM is that we have to get them to sign an additional document to say that, obviously, the GSM is dependent on mobile signal. That could drop out at any time, or it could be poor in certain areas. But if we had no confidence that that was going to come through, we would try and push the client into getting their own phone line.” [GCC-P3]

Similar views have been shared by the industry representatives, particularly regarding advanced technology solutions that rely on mobile networks and digital technologies, in general. Such reliability issues could lead to severe risks for users, especially the application of these technologies concern older, vulnerable people.

“A number of our members provide things like GPS located devices, that all relies on a very robust mobile network. What needs to be proven in all this shift to digital is, if we no longer rely on the other landline, whilst it may feel like old technology, it's the most reliable signal you have. Clearly, we've got to make sure that every time you have a failure on a digital network that could be somebody's life even more at risk.” [TSA-P1]

“I love my Alexa but she does break down every now and again. I lose connection. I wouldn't like my parents to be having to communicate over that model just yet. .. I think we have to be aware that these sorts of technologies, they do have a place for somebody who just needs some sort of voice-- and when I say activation. I don't mean a call for help kind of activation but they're absolutely fantastic for people who need to use it for other things....It does have its place, but I don't think it has its place in terms of being mainstream for somebody needing to call for help.” [TES-P2]

Another interviewee has illustrated a situation where non-availability of Wi-Fi signals creates a problem for digital systems such as telehealth, which emphasise the need for adequate backup provisions in the technology solutions.

“The other thing, it's the old thing as well, technology is great when it works so for example for us, when we don't have any Wi-Fi that's just a bit of a nightmare because then you can't send the readings to the web systems. I think it's about the systems being effective and having good backup plans if you like, so that you can still actually be able to do that.” [GCC-P4]

Because of the fallibility of digital technology, one participant, a senior manager from a technology supplier organisation has lent support to the requirement of having an adequate backup in the equipment and highlighted why multiple communication paths remain critical within such telehealthcare technology solutions.

“The routers that we've got have got no battery backup. As soon as mains goes down that systems gone. I think there's always going to be an opportunity for a diverse path to communicate. That still might be in an IP world because it's using 4G, 3G, 5G...then that would be a digital connection. The voice, I would think would still be required because in that situation you need to be

able to communicate to the individual. Part of the response is to establish what is happening on the property, if there's a fire can hear the smoke alarm going off?" [TES-P1]

7.5.4.2. Fragmentation of Technology Solutions

Findings from the case studies suggest that there is a concern among study participants concerning the abundant choices provided by the technology solutions to the buyers (or users), which can be confusing for procurement of these technologies. The rapidly changing nature of technology has made a wide range of technology solutions from numerous suppliers available in the market. As the quotes from several interviewees below have reflected this fragmentation issue, such profusion of technology choices could be challenging for the local authorities and the TECS industry as well from standardisation and quality control perspectives.

"I guess the other key challenge is that the technology is ever changing over time. What we've got to be very careful of is we don't, as organizations, local authorities don't end up buying lots and lots of devices that will be obsolete within 12 months, two years et cetera, that we don't get bombarded by a range of suppliers now entering the space. Again, if we open up the procurement tunnel and people can purchase from a much wider range of suppliers, what we don't end up doing is almost creating not just every local authority doing it differently but there are so many different solutions they could purchase..." [TSA-P1]

"I think the technology has just come on by leaps and bounds. If there are any challenges in technology, it's just what they call glut, there are too many possibilities. I don't know how many apps there are for helping manage your diabetes, but there are hundreds of them. How do you choose the right one?" [AHSN-P1]

7.5.4.3. Information Sharing, Governance and Infrastructure

This sub-theme captures of challenges related to technology infrastructure, and integration of IT systems for the service providers leading to poor information sharing between various stakeholders within the service ecosystem. The issues of poor digital infrastructure and lack of interoperability between the IT systems have been mentioned by several participants in explaining the disjointed nature of

information infrastructure which renders the sharing of information across different systems so difficult.

One service manager interviewed for this study has explained how the lack of interoperability between the Council's social care IT system (*CareFirst*), the telecare technology platform (*Tunstall*) and the IT system used by the GPs (*EMIS*), affects the sharing of useful information with the concerned GPs.

"But then again that's the same with the social care system, our social care system doesn't have interface with the GPs EMIS system" [GCC-P1]

Variety of communication protocols and system interfaces employed by different suppliers for their telecare devices/sensors could be problematic for predictable functioning of the equipment, and efficient service operations, as have been cited by several participants from the service provider organisations.

"The problem that you have if you're using different suppliers for your equipment is to make sure that their protocols show up correctly on the Tunstall system. It's fine when it works well, but when it doesn't, it's looking into the background at your protocols, your codes and everything to make sure that what is being used comes through correctly into the control room. Because if it doesn't tell you what it is, or what you're expecting, then you have problems with it." [DCC-P6]

"We currently starting to use the (Tunstall) Care Clips because Buddi, our main tracking devices so if people going out and (lost about), they go through a Buddi Monitoring Centre. Buddi won't let us do our own monitoring. They won't program their units to come direct through to us. They have to go to their monitoring centre. That monitoring centre passes on all the information to us. Whereas the new Tunstall care clips, they're very, very similar to a Buddi. It's a tracking device where the client can press the buttons on the sides. That call would come direct through to our PLC" [GCC-P2]

An interviewee has cited the absence of digitisation efforts and information infrastructure about the challenges for effective sharing of information.

"EMIS and SystemOne. Those two electronic systems don't talk to each other and they are able to interact with not very much else. It's much worse in hospitals though, because in hospitals the majority of hospital clinical records are still paper. The vast majority of communication between hospitals and patients is in paper. Newcastle hospitals spend £750,000 a year on postage." [AHSN-P1]

The problem of non-availability of granular data from the telecare platforms for insightful analysis and reporting, points to the maturity of information infrastructure from a service perspective.

“The system (telecare) we have at the moment, I wouldn't suggest it particular good for reporting. Some of your factual report, like you call handling information is black and white, it's good for that. But where I think it falls down a little bit is you can just get the call reasons, but then on their own, it's only part of the story. I find that quite frustrating. You can't have a call reason for every single; you got to have some general ones. We'd have to do that manually, which is a bit ridiculous really. Even customer profiling, it's a lot of manual. If we really needed to dig down and know certain things, we have to invest a lot of time and being able to do that, which is really, I would have to say a bit of a negative of the system that we have now.” [HC-P4]

However, when asked about this limitation of the telecare monitoring platform, a technology supplier has explained that challenges of analysing the partial information captured in the databases and deriving meaningful insights from the data, considering the way service processes interface with other stakeholders.

“Well, the data analysis is more difficult because the data's owned by the local authority. The issue with the data is for every single call that's presented to a monitoring centre, there's a call reason and a call action. They'll have data, but they won't understand that bit of data after that person's been collected by the ambulance because that information isn't available. The data they have is based on if they have rectified the situation themselves. The thing with the databases, you can only ever get out of it what you put in.” [TES-P1]

The issue of information governance has been cited as one of the key barriers for integrated way of working between the health and the social care sectors (see section 7.5.2.1). Elaborating on the issue, the participant representing the AHSN organisation has mentioned how privacy of individual information could hinder information sharing across the two sectors.

“Of course, health and social care should be joined up, but I guess there are two big problems to this. One, again, comes back to the issue of information governance. For example, if I've got a prison record... Maybe I'm well known to social services because my children haven't been very well looked after or whatever it is. Should health services have the right, automatically, to know that information? The obverse is, should social services have the right to know that at one time I had a serious mental health problem? That did not affect social care at that time, but should they have the right to know that? The joining up of that information is not necessarily extremely easy” [AHSN-P1]

7.5.4.4. Opportunities of New Technologies

This particular theme is dominated by the perceived future opportunities for telehealthcare services, driven by the advanced technological innovations such as Machine Learning (ML) and Artificial Intelligence (AI), digital infrastructure, mobile broadband and also, by combining telehealth and telecare technologies, in developing new service models.

“I think that's the next battleground and that's taking it away from **traditional telecare** services and **more into arming frontline workers with a toolkit of technology where the machine learning** part kicks in and then they can be armed with "This is the report you need to make an **informed decision** about how to support somebody but aren't you doing that wrong?" I think **in terms of both the tech landscape and in terms of the role of services and social healthcare going forward, that for me is the big enabler**. It's machine learning and AI trying to help us make decisions.” [TSA-P1]

The upcoming telecommunications infrastructure upgrade in England that plans to switch-over to digital connectivity by 2025 (TSA, 2017) will bring significant opportunities for the telehealthcare industry, to offer innovative solutions and service models, as the technology suppliers have noted.

“I think the sector is being forced in a positive way, may I add, to change the technology. With the technology changes should come service design changes or more opportunity... **I think we're in this very exciting change at the moment where the analogue to digital changeover is going to and have to change service delivery on the ground.**” [TES-P2]

“I think the opportunity is to embrace the technology that we all become accustomed to and bring our equipment our telecare stuff into that technology environment. **I think that's a challenge but the opportunity is significant as a result of that. If we could make our devices work into a mobile phone. Every mobile phone manufacturer puts one of our receivers inside it so you could have it linked to telecare. That would be massive.**” [TES-P1]

However, the technology suppliers have cautioned about the challenges of security and reliability associated with the new generation of technology solutions, emphasising the critical need for robust and secure mobile network infrastructure to be implemented.

“I do believe our customers are going to have to take a lot of time and consideration and paying attention to **new technologies** to ensure that they're

encrypted and that they're **secure in terms of over-the-air connectivity**" [TES-P2]

"I think specific situations for customers like Dementia are going to be critical. The mobile network's going to be critical. **I think the connectivity into the IP world is going to be critical.**" [TES-P1]

Citing the complementarity of telecare and telehealth technologies, in addressing both the reactive and preventive care needs holistically, several participants expressed that bringing these two technology solutions together could be another area of opportunity as supporting integrated care pathways.

"Telecare is really important in enabling people to live independently for longer at home and that's a really valuable role. But I think there's also a much bigger role for telehealth in the assessment side, in the diagnostic side, in the identifying people earlier on rather than their responsive sides....for me the two should be really closely interlinked" [GCC-P4]

A Programme Manager from the NHS Sunderland CCG, interviewed by the researcher has explained the objectives of the two collaborative projects between health and social care related to the implementation of NHS NEWS (National Early Warning Score) based 'Digital Tablet' and 'Connected Care Homes' – that she has been overseeing. While referring to the synergy between telecare and telehealth services, the interviewee [NHS-P1] has suggested:

"We're doing a telecare review at the moment. **We're looking at how do we optimize the best of the telecare devices that we've got and because there's a health and social care aspect to that.** Because what you're trying to do is do prevention where a lot of the Telecare stop as a bit of activity, day to day activity monitoring and independence, **now all these they complement each other"**

7.6. Chapter Summary

This chapter presents the findings from the four telehealthcare services investigated in this study with a comparative analysis of organisational contexts, service profiles, and the vital elements of service business model impacting the value creation and value realisation across these services. Four principal themes emerge from the analysis of the data - (i) Nature of the Service, (ii) Advocacy and Collaborations, (iii) Organisational Characteristics, and finally, (iv) Technology and

Information Systems. These outcomes partially explain the challenges and opportunities of value co-creation and value realisation within the telehealthcare service ecosystem examined in this thesis. However, a critical realism informed lens, adopted in this study, deems such explanation as partial and demands further exploration and analysis of underlying structures and causal mechanisms. In the next chapter, the relevant literature on the business model and service logic is revisited, allowing comparisons between the empirical evidence presented in this chapter and new theoretical propositions. Further deliberation on macro-level contexts influencing the telehealthcare service ecosystem, as elaborated in Chapter 2, is also made.

Chapter 8: A Critical Realist Analysis and related Discussion

8.1. Introduction

This chapter is divided into two parts. The first part examines the empirical findings of the study presented and analysed in the previous chapter by using a framework for analysis developed for this thesis based on the principles of Critical Realism (CR) (see Figure 5.5 in Chapter 5). Following the framework, a process of *abduction* or theoretical redescription of the empirical data, which is a key principle of CR methodology, is performed. The four key themes that emerged from the data are re-described using the theoretical concepts of value co-creation and value realisation drawn from the literature of business models and service-dominant logic (see Chapter 4). The process of *abduction* exposes some findings that challenge existing explanations in the literature and points to causal mechanisms operating in the 'real' domain of critical realism ontology – the effects of which are manifested in events (or outcomes) observed empirically. Secondly, this necessitates engaging in the next stage of critical realist analysis, consisting of a process of *retroduction*. Retroductive reasoning is used to identify the causal mechanisms and also the necessary contextual conditions under which these mechanisms get activated and which then generate the events at the empirical level. The causal mechanisms identified through the process of *retroduction* are described, and subsequently, a theoretical explanation for the current state of a telehealthcare service ecosystem in North East England is proposed.

Using this explanation of reality concerning the current state of telehealthcare service business models, nationally and more specifically in North East England, the second part then seeks to answer the research questions of this thesis. Two archetype telehealthcare business models are proposed based on a typology that considers two contextual dimensions comprising service characteristics and funding/provisioning logic. In exploring

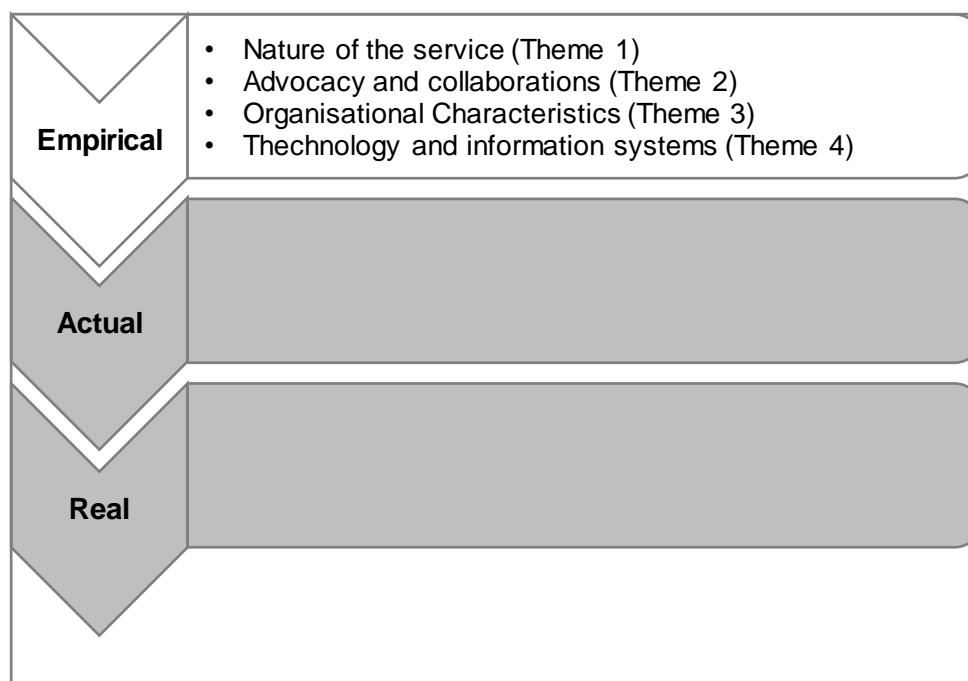
the possibilities of designing value-creating and sustainable telehealthcare business models, critical components of the business model construct are decomposed to identify potential choices for the service provider together with the consequences and the possible causal connections between them (Casadesus-Masanell and Ricart, 2007). Finally, the relevance and implications of the business model design choices for the two archetype models are further highlighted. The chapter then concludes with a discussion that underlines opportunities for designing a hybrid business model together with an identification of the enabling factors or pre-conditions which must be considered and incorporated at the macro context level.

8.2. Revisiting the Empirical Evidence using a Critical Realist lens

To represent reality in a social world, critical realism uses a stratified ontology which considers three domains: *the Empirical, the Actual, and the Real* (Bhaskar, 1978). The Real domain consists of structures with causal powers (mechanisms) that the researcher seeks to discover. These mechanisms may (or may not) trigger events in the domain of *the Actual*, irrespective of whether or not these events are observed by the researcher. The final domain, *the Empirical*, is a subset of the actual and consists of the events that are directly observed or perceived by the researcher from the data. In the preceding chapter, **four common themes: 1. Nature of the Service, 2. Advocacy and Collaborations, 3. Organisational Characteristics, and 4. Technology and Information Systems** have emerged from the analysis of data for the four telehealthcare services. The development of these themes corresponds to the analysis of empirical data from the four case studies, as the initial step outlined in the CR analysis framework mentioned earlier (see Figure 5.5 in Chapter 5). These themes suggest that what is empirically observable is only an element of what really exists. Based on the principles of critical realism, the themes abstracted from the data can be mapped to *the Empirical* domain of the stratified reality (see Figure 8.1). Following the tenet of critical realism ontology which maintains ‘what happens in the world is not the same as what is observed’ (Danermark, Ekström, Jakobsen, and Karlsson, 2002, p.

20), the next stage of analysis aims to uncover the underlying structures with their associated causal powers (mechanisms) within *the Real* domain. The aim of this stage of analysis, using the processes of **abduction** and **retroduction**, is to provide an explanation of the reality within the telehealthcare ecosystem involving the key mechanisms, which under specific contextual conditions, get activated and produce events that are either beyond human perception or experience at the domain of *the Actual* or observed at the domain of *the Empirical*.

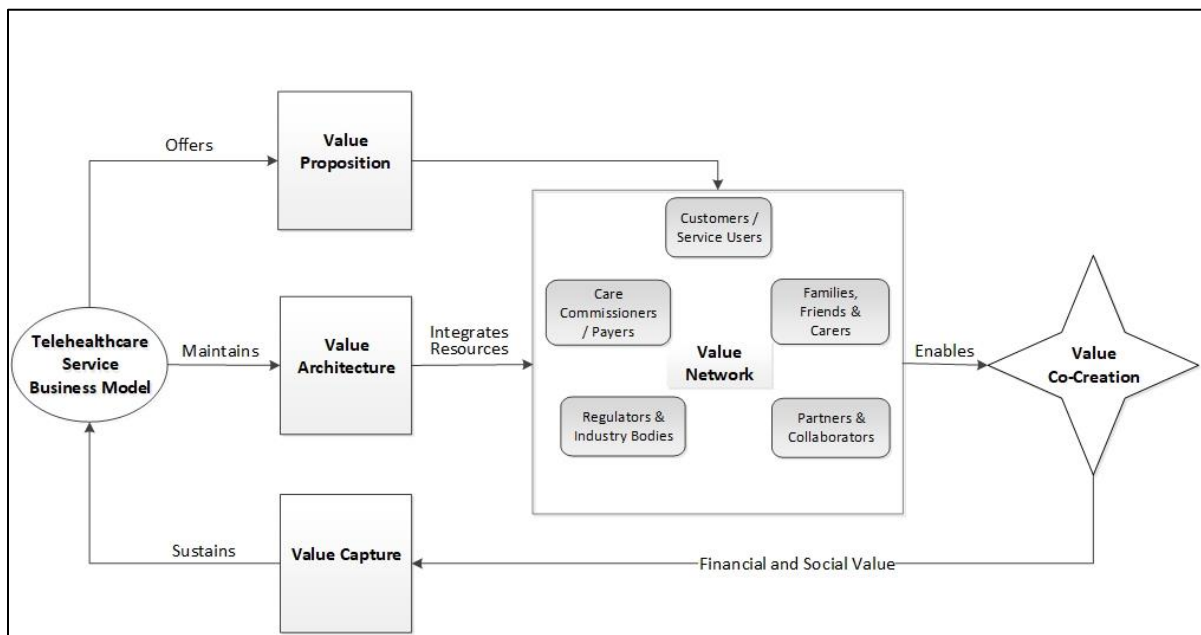
Figure 8.1 Illustrating *the Empirical* layer of Reality (source: own illustration)



8.2.1. Examining the Literature and the Empirical Data together

Following the steps described in the CR analysis framework (see Figure 5.5 in Chapter 5), it becomes necessary to re-describe the empirical data in an abstracted way, using theoretical concepts, in order to hypothesise the most plausible mechanisms that caused the events (O'Mahoney and Vincent, 2014). Accordingly in this section, the empirical findings are examined and explained through the theoretical concepts of a telehealthcare service business model as previously outlined in Chapter 4 (reproduced in this chapter as Figure 8.2).

Figure 8.2 Conceptual framework for a telehealthcare service business model



The aim of this exercise is to understand how explanations derived from empirical data converge or diverge from the explanations provided by existing theories and knowledge. The empirical findings are examined by using the key theoretical constructs of a service business model comprising: *value proposition, value co-creation and value realisation*.

8.2.1.1. The Problem of poor Value Propositions of the Telehealthcare Services

Data from all the four case studies reveals several issues related to the value proposition of the services. One of the major issues concerns the availability of choices on levels of service (or packages) for users of the services. The reactive usage of telecare solutions providing 'peace of mind' or as having insurances in the event of emergency is not aiding customers' value perception of the service (Johnson et al., 2008). Empirical data, from this research study, further suggests that the current range of service offerings are not addressing more diverse, meaningful and life-enhancing needs of specific customer segments and thus, lack unique value propositions for them (Magretta, 2002; Osterwalder et al, 2005).

The existing literature acknowledges an important role for social and relational marketing efforts in healthcare technology adoption (Giuseppe and Geisler, 2009; McGuire, 2012;

Wright and Taylor, 2005), which appears to be missing to a large extent in the empirical evidence and findings from this research study (see Theme 2).

Findings from the data indicated that there is a limited value proposition of the service to other stakeholders of the service ecosystem (Stahler, 2002; Andersson et al., 2006) in the absence of any meaningful collaborations and partnerships concerning the services (see Theme 2).

8.2.1.2. Missing Opportunities for Value Co-creation in the Service Ecosystem

As discussed and elaborated in Chapter 4, the literature on business models and service logic suggests that value co-creation in the service ecosystem happens through the integration of interactional resources, primarily consisting of knowledge, technology, and institutions (Akaka and Vargo, 2014). Such co-creation of value relates to all the participating actors in an 'activity system' (Zott and Amit, 2010) that form a 'value constellation' (Normann and Ramirez, 1993). From a telehealthcare service provider's standpoint, interactional resources such as information infrastructure and governance, skills, and knowledge of the staff; business processes, and policies; relationships with the Councils and other partners are vital constituents of its value architecture (Al-Debei and Avison, 2010).

In the literature, telehealthcare has been described as a 'complex innovation' (Sugarhood et al., 2014) that to work effectively requires collaboration across a diverse range of stakeholders, with the sharing of risks and the alignment of interests and incentives (Arrow, 1963; Christensen and Remler, 2009). Empirical evidence from the four telehealthcare services has shown only token interactions between the service providers and with the NHS or other health organisations. Only two services (*Sunderland Telecare* and *Care Call*) are found to have limited collaboration with NHS CCGs, Hospital Trusts, and Public Health - that are limited to only receiving referrals for the service. While all four services maintain mutually beneficial relationships with other public services, namely Fire, Ambulance, and Housing services, the interactions mostly relate to reciprocal signposting /referrals and lack formal collaborative partnerships in any delivery of the telehealthcare service. The lack of such

collaborations points to a weak value network and challenges the co-creation of value in the service ecosystem (see Theme 2).

In order to explain the challenge of value co-creation in terms of resources of the service provider, it is useful to revisit the diagram conceptualising value co-creation mechanism in a service ecosystem through the integration of resources, as illustrated in Chapter 4; which has been reproduced in this chapter (see Figure 8.3). The implications of three distinct categories of provider's resources shown in the diagram comprising: *technology, knowledge, and institutions*, for the value co-creation, are discussed below.

- **Technology**

Technology resources comprise information infrastructure, information flow, and governance. A robust information infrastructure contributes to the success of telehealthcare services (Collinge and Liu, 2009) and any such infrastructure, backed up by effective information governance that supports interoperability, data sharing and integration of information systems are critical to driving collaboration across health and social care organisations (Waring and Wainwright, 2015).

Data from the case studies reveal several issues around the integration of systems and interoperability, which are hindering the flow of information within the organisation as well as across the ecosystem (see Theme 4). In many cases, the lack of technology infrastructure (such as non-availability of PDA / tablets for mobile responders) or lack of integration across IT systems (example: no integration between the Council's CareFirst and Telecare monitoring platform) results in manual entries, affecting productivity and efficiency of the service. As telehealthcare systems generate vast amounts of data on users' daily activities and risk events, these can effectively be used as information providing tools for other stakeholders (for example, GPs and other health professionals (Buckland et al., 2006). The absence of information strategies and governance can be attributed, at least in part, to the outcome that such information sharing and data analytic opportunities are not being realised in practice.

- **Knowledge**

Deficiencies in both skills and competencies of the frontline staff in service provider organisations, concerning application of digital health technologies (Lennon et al., 2017) as well as a lack of technical competence in operating telecare equipment (Sander et al., 2012) are cited as one of the critical barriers in any large scale deployment of telehealthcare implementations. Empirical data, from this research, identify some specific skill gaps, especially for social workers who perform assessments of the care needs of individuals to ascertain eligibility criteria leading to referrals to assistive living services (see Theme 3). High-quality telecare assessments are often attributed to successful telehealthcare adoption (Wey, 2006; Greenhalgh et al., 2015). The assessment function and processes demand a sophisticated understanding of the needs of the prospective telehealthcare user, at both physical and cognitive levels, that can then be matched by available technology. Without sufficient technology skills, there lies a risk that social workers might fail to identify 'real' needs as part of the assessment process, or to 'over-prescribe' the technology without matching the need, which puts the role of telecare as both preventive and an unrealistic panacea (Woolham, Steils, Fisk, Porteus and Forsyth, 2018).

Another area of skill gaps observed in the data relates to business skills. In a majority of the provider organisations, dedicated positions to oversee business analysis and development are either absent (in case of Sunderland Care and Support) or have only recently been introduced. During conducting the case studies, the researcher has often requested the service managers for quantitative data on their business/service, including the demographic composition of customers, potential market size (based on the geographic area of operation), and potential market segments. The availability of such information was either found to be not available or, if available, barely presented meaningful insights for the business. Arguably, this dearth of business knowledge and skills hinders the development of convincing or competent 'business cases' to highlight (and 'sell') the value proposition of the service to other key stakeholders in the ecosystem.

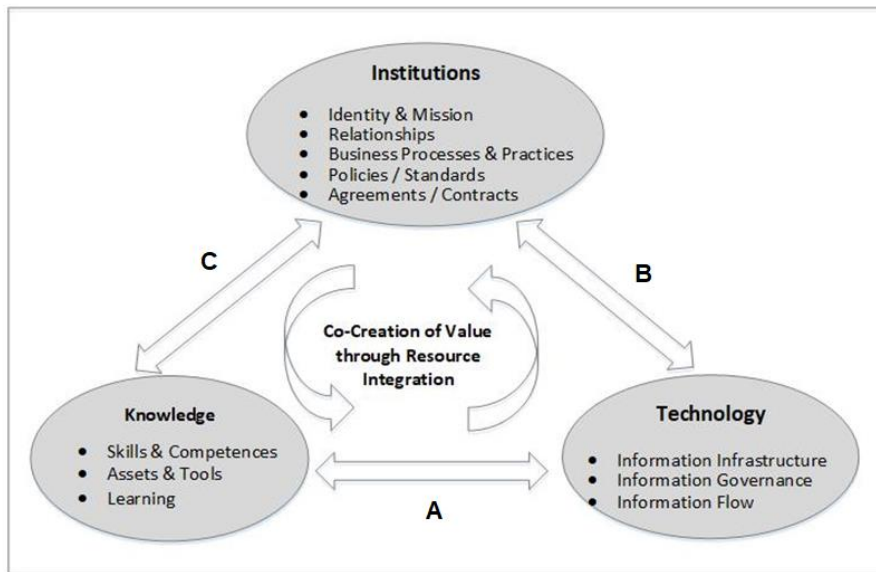
- **Institutions**

Telehealthcare services are sociotechnical systems embedded in their organisational, social and political contexts (Greenhalgh et al., 2012) and institutional elements such as relationships, shared institutional logics (agreements or contracts), business policies and practices play a vital role in value co-creation in the service ecosystem (Lusch and Nambisan, 2015). The healthcare literature cites that social relationships play a prominent role in supporting the adoption of telehealthcare technology through both user engagement and a process of 'domesticating' into the routines of everyday life (Koivunen, 2013). For the service providers, such as relationships with users and their families, provide opportunities for co-learning and knowledge sharing. The literature cites the issue of maturity of telehealthcare technologies and advocates adopting 'user-centred design' that addresses the risk of failure through the analysis and co-design with service users (Buckle, 2013).

Empirical data, found in this research, does not provide any substantial evidence of such user engagement and co-design of telehealthcare systems happening in practice. The data also reveals the chasm between social care and health organisations in terms of asymmetric power relations, disjointed goals, and different cultural norms (see Theme-1). Relationships with the Telecare Services Association (TSA) is found to be driven by the needs for compliance with the TSA code of practice and in meeting target key performance indicators (KPIs) necessary for accreditation. Co-creation of value is also negatively impacted by the rigid procurement policies instigated by the local authorities that do not provide many incentives to the service providers to become more entrepreneurial in designing and delivering innovative services.

Figure 8.3 Value co-Creation in a telehealthcare service ecosystem

(Source: adapted from Akaka and Vargo, 2014)



8.2.1.3. A Dearth of Evidence: Value Assessment Strategy and Tools

The literature on business models emphasises the monetisation of value from service through various revenue streams (Osterwalder et al., 2005), and also the importance of the role of profit or surplus generation (Johnson et al., 2008) to the growth and sustainability of service. Data from the case studies, in this research, suggests that organisational constraints (see Theme 3) such as a lack of commercial focus, and rigid procurement policies and guidance of local authorities do not favour the telecare service providers in terms of maximising their revenue sources and also, managing their cost structure to compete effectively in the market.

Empirical evidence, from this research, demonstrates that a ‘lack of evidence’ remains one of the critical challenges in drawing any advocacy and acquiring appropriate funding from the institutional authorities (see Theme 2). Given that most of the evidence relies on anecdotal information, the absence of number-based ‘hard’ financial and operational evidence on cost savings, the effectiveness of the telecare services is often questioned (Henderson et al., 2013). The overall value created by telehealthcare services should not only be measured in tangible and traditional economic currencies, but also in the form of long-term benefits that can be measured using intangible social currencies, such as citizens’ well-being, support for

independent living and better quality of life (Schwamm, 2014; Lluch, 2011; Goodwin, 2010). Social business model designs, with a 'profit with purpose' mission (Osterwalder and Pigneur, 2011), need to accommodate a type of "social profit equation" as well as an "economic profit equation" (Yunus et al., 2010, p319). It can be argued that social contributions could be a part of the demonstrable evidence base that offers additional value propositions to the commissioners and to other institutions and facilitate attracting funding support for the service. Capturing social value as generated in the service must be used together with effective mechanisms and tools for assessment, such as social return on investment (SROI) that allows reporting both tangible economic and intangible social benefit value (Ryan and Lyne, 2008; Millar and Hall, 2013; Nicholls, 2009). However, the empirical data from this research, suggests minimal uptake of the SROI metric as only one service (*HomeCall*) has performed an SROI calculation for their service. Even with a decent measured value of SROI, service managers have no clue about how to use that metric for promoting their service.

Empirical evidence amassed from the four case studies is abstracted above using the business model and service logic-based theoretical concepts developed in Chapter 4. It is found that the theoretical redescription of this data reflects a significant level of convergence between the explanations derived out of the empirical data (Themes 1 through 4) and that offered by existing theories and knowledge synthesised from the literature. However, it is interesting to note from that empirical evidence that the nature of the telehealthcare service (see Theme 1) and organisational constraints (see Theme 3) are key influences that can have significant impacts on the value proposition, value co-creation, and value realisation aspects in a service provider's business model. The review of the literature on service business models, related to the healthcare domain (in Chapter 4), does not reveal much useful insight related to any specific characteristics exhibited by their adoption and use to develop telehealthcare services. The absence of such insights (or explanations) could be attributed to two main factors. First, the majority of these studies discuss business model

concepts concerning healthcare services (not social funded telecare services) in clinical (or medical) settings. Second, only the handful of studies that concern services in community settings, concern socio-economic and organisational contexts, which are arguably dissimilar to those in the UK. Thus, it can be reasoned that existing theoretical knowledge does not fully explain the events (or outcome) found empirically within this doctoral research study, and such gaps exposed in the explanation demands digging deeper into the reality for underlying hidden mechanisms. A critical realist perspective treats all explanations of reality as potentially fallible (Bhaskar, 1978) as the explanations provided by the research participants' experiences and understanding related to the phenomenon of business and service models can challenge the existing scientific knowledge available in the form of theoretical perspectives, and vice versa (Fletcher, 2017, p. 188). The next section of this chapter focuses on identifying important causal mechanisms which can be used to provide a better understanding of reality, and subsequently, present a more rational and comprehensive explanation of the events (outcomes) observed and experienced when examined within the empirical research layer.

8.2.2. Exploring Hidden Mechanisms at work

The final step in a critical realist analysis, *retroduction*, is the 'central mode of inference' in critical realism (Lawson, 1998, p. 156) that aims to unearth the causal mechanisms in the domain of the real and also, the contextual conditions necessary for a specific mechanism to come into effect. *Retroductive* reasoning and inference allow the researcher to identify the circumstances or prerequisite conditions under which the mechanisms exist, by means of adopting alternative explanations or positions, described in the literature as 'counterfactual thinking' (Danermark et al., 2002; Meyer and Lunnay, 2013, p.8). Following the third step described in the CR analysis framework (see Figure 5.5 in Chapter 5), the researcher has applied counterfactual thinking, in order to seek an answer to the fundamental question: ***'what causal tendencies do the internal structures within a service ecosystem hold, and under what prerequisite contextual conditions these causal powers***

(mechanisms) get activated and exercised, which can explain the outcome observed empirically? Such thoughts have necessitated moving from the concrete (data) to the abstract (theoretical concepts) and back again, presupposing ‘absences’ of things that could have generated the causal outcome (Mingers, 2010, p. 17). Through this process of *retroductive* reasoning, the three most significant causal mechanisms, namely Organisational Inertia, Fragmented Ecosystem, and Quasi-market Characteristics, have been identified (see Table 8.1).

As discussed earlier, value creation and realisation in a telehealthcare service depend on the contextual embeddedness, and thus, examining the potential effects of both macro-level socio-economic and political conditions in enabling or constraining the causal mechanisms becomes necessary. Such contextual settings match up with the ‘macro social organisation’, the topmost layer of the *research map* (Layder, 1993, p. 72) described in the research methodology chapter (see Figure 5.4 in Chapter 5). The literature on telehealthcare, concerning the UK government’s policies, vision, and *macro* contextual elements, including the Market and Industry landscape for TECS (detailed in Chapter 2) has been revisited, in order to draw logical links with the empirical data from this research and to explicate the underlying mechanisms.

Table 8.1 Structures and Mechanisms (Source: own illustration)

Mechanism	Key structures involved	Contextual conditions that activate and sustain the mechanism
Organisational Inertia	Government’s policies on Adult Social Care, Procurement policies of Local Authorities, Social structures and Cultural systems of the Councils and the Provider organisations	<ul style="list-style-type: none"> • Constrained public funding in services under economic austerity measures • Inadequate focus on adult social care in the UK Government’s digital technology vision and policies • Political sensitivity around the ‘cost saving agenda’ in care services
Fragmented Ecosystem	Government’s Health and Social Care policies, Social structures and Cultural systems of concerned organisations, Technology infrastructure, Information Governance policies	<ul style="list-style-type: none"> • Undervalued contributions of the Social Care and Housing sectors within a whole-system care pathway • Lack of leadership and advocacy at regional as well as national levels • Deficient application of digital technology systems and tools in the service provisioning and delivery processes
Quasi-market Characteristics	The UK Political system, Industry and Market structures	<ul style="list-style-type: none"> • Tensions between ‘welfare state’ and market-based provisioning of service • Uncertainties on policies, directions and perceived risks

8.2.2.1. Organisational Inertia

The structural and operation complexity of innovations in telehealthcare services are cited as high, given the involvement of a large and diverse set of stakeholders, and the requirement for closer integration with other care services (Barlow et al., 2006). Innovations that require changes in existing practices are often perceived as introducing new risks in the ways of working unless a strong evidence base on the effectiveness of new practices becomes available (Finch et al., 2008, p. 524). The first causal mechanism concerns the issues of risk-averseness and inertia in the care sector that stifle a 'creative culture' (Bock et al., 2012) which is necessary for business model innovation. Critical realism maintains 'the ideas and meanings held by individuals – their concepts, beliefs, feelings, intention, and so on – as equally real to physical objects and processes' (Maxwell, 2012, p. viii) and such cultural and historical traits then situate organisational structures and practices (Potter and Lopez, 2001). Empirical evidence from this research suggests that the cultural norms that sustain and encourage 'tried and tested' practices, and that minimises risk for the local authorities and care institutions; have historically produced particular ideological social structures and cultural systems (Archer, 1998).

Findings from the empirical evidence, in particular the accounts of participants from the telehealthcare industry, lend support to the issue of the embeddedness of a 'risk averse' culture in local authorities. While talking about the Council's procurement policies, they have highlighted the challenges of bureaucracy, outdated commissioning practices and lack of innovative thinking. It can be argued that financial risks associated with accountability of spending public money and also, the political risk of being perceived of not working for the public interest could lead to risk-averseness for local authority provisioned services. This situation becomes clear from these following interviewees' statements:

"In local authority procurement, because you are using public money, you've got to abide by certain rules. There are exceptions to that but you've got to be really brave to go down the exception route because you can be challenged" [TES-P1]

“We can generate more income without pulling ourselves at risk of being accused of having profited off the backs of people of Gateshead....There's obviously some places have taken a decision to move [telecare service] out as part of a different model. There is no desire or will to do that in Gateshead. Our politicians are very keen on us doing things in-house” [GCC-P3]

“I just think **even politically from the council's perspective** if there wasn't your basic HomeCall, an awful lot of people would be at risk” [HC-P3]

While the policy literature talks about health and social care in the same breadth, it can be argued that policy focus remains primarily restricted to the health/clinical area. Despite a commitment made by the Conservative Government in March 2017 for the publication of a Green Paper on adult social care, in order to allow a public consultation, the new social care policy has been delayed several times (HCL, 2019). According to media reports, the most recent delays are attributed to the Government concentrating on Brexit and also a lack of clarity and detail about the proposals to be included in the Green Paper. Headline findings from the Whole System Demonstrator (WSD) trials had shown promising results in terms of outcomes of telehealthcare solutions (DOH, 2011; Steventon et al., 2012). Encouraged by these results, the Department of Health launched ‘3 million lives’ campaign (DOH, 2012) with a commitment to work with industry, NHS and social care to promote wide-scale adoption of telehealthcare services. However, papers with detailed and comprehensive findings from WSD got published around 2013/ 2014, and reported mixed results on the cost-effectiveness and outcomes of the telehealth and telecare solutions (Cartwright et al., 2013; Hirani et al., 2014; Steventon et al., 2013). Moreover, on the face of criticisms around commercial interests involved in the industry-led project, just over a year after the launch, NHS England took over and repositioned the ‘3 million lives’ campaign (POST, 2014). While such setbacks did not influence the provisioning of telehealthcare services at the local authority level (Woolham et al., 2018), enthusiasm and advocacy around telehealthcare in the policy literature appears to have subsided conspicuously. In the backdrop of austerity and cuts in public funding, there may be a fear of political backlash from the public and the government may be reluctant to proactively promote technology in social care. Such apprehension has

been reflected in the account of one of the service commissioners [GCC-P3] interviewed for this study.

“We wouldn't just do it because it would be cheaper. We genuinely believe it's the right thing to do and the law requires us to do it in terms of least restrictive practice. **But for some people, they're convinced, or it's hard to convince them otherwise, that it isn't just about reducing costs and the council trying to do things on the cheap. Because people know that we are trying to save money and we've got issues with money**, then I guess that can be a bit of an uphill struggle to convince people that it's the right thing to do”

8.2.2.2. Fragmented Ecosystem

The second causal mechanism points to the chasm between the Health and Social care systems in terms of collaborative partnerships and information sharing (Waring and Wainwright, 2015). While the health and social care policy narratives advocates a vision for integrated health and care services (NHS, 2014) and calls for health and social care bodies to work collaboratively (NAO, 2018), the empirical evidence from this research reflects a different reality on the ground. Findings from the data suggest an underlying mechanism at play in the service ecosystem, manifested through fragmented organisational dispositions, objectives, and confused identities among its participating entities.

Findings from the review of literature and the empirical evidence (see Theme 2) both emphasise the disparities in institutional characteristics and cultural practices between the Health and Social Care organisations, and a fiefdom-like control of territories and privileges that hinder working collaboratively towards common goals and joint objectives. As a senior manager from Gateshead Council [GCC-P3] observed:

“When you look at some of the big stuff that's going on around integration... what has been really crucial there is that **local authorities who have democratically elected leaders are understandably not prepared to give up their fealty around some of the decisions. You've got centrally-managed NHS and any democratically locally managed social care system, and how do you port those two things together and serve two different regimes.**”

The findings further suggest gaps in terms of stigmatised perceptions of the role of the Social Care and Housing sectors within the ‘whole system’ of healthcare delivery. The dearth of ‘hard evidence’ on the effectiveness of telehealthcare services, especially for telecare solutions, creates ‘uncertain incentives’ for the stakeholders in the ecosystem –

hurting the overall value proposition of the services (see Theme 2). To illustrate this point, empirical evidence suggests that Health organisations are typically reluctant in acknowledging the contributions made to the overall care pathway of their patients, by the preventive measures provided by the social care and housing services. The empirical data reveals that there are aspirations among the stakeholders for a system-wide collaboration to realise a 'regional hub' with centralised operations which could potentially provide more efficient services through 'economies of scale' and the much-needed sustainability. However, a lack of regional leadership and provision of intermediary management roles are hindering the formation of such collaboration networks.

Empirical evidence (see Theme 4) suggests that technology infrastructure and policy issues concerning Interoperability standards and Information Governance strategies, among others, have been hindering the free flow of necessary information between Health and Social Care sectors. In reply to a question concerning the challenges of integration between Health and Care, one of this senior participant of representing AHSN organisation [AHSN-P1] mentioned:

"I guess there are two big problems to this. One, again, comes back to the issue of information governance. I would say that the second part, which is always the case, is "Empire building." I'm the social services empire, and I'm the health empire, and I don't like to cross between the two."

8.2.2.3. Quasi-market Characteristics

The third causal mechanism concerns a tension between the prevailing market environment in England, in which telehealthcare services are provisioned and delivered. A considerable extent of debate is found in the social care and health policy discourses and literature with respect to successive national government's policies. These advocate competition and the use of market-based mechanisms, often referred as the 'quasi-market' (Le Grand, 1998) into the delivery of traditionally publicly funded welfare services. Introduced during the 1990s, such quasi-market reforms, have affected both the demand and supply side of public services, and have created a 'mixed economy' of supply of services in the English care market (Rodrigues and Glendinning, 2015). Such policy narratives prioritises consumers'

choices and focuses on creating a personalisation agenda through market based mechanisms, for instance self-directed support, personal budgets, and direct payments (Glasby, 2014, p. 252). Critics of the 'quasi-market' narrative argue that consumerist market-driven mechanisms for health and care services are highly problematic (Daly, 2012; Glendinning et al., 2008). The majority of service users are elderly people with physical, cognitive and sensory limitations, and viewing these vulnerable people as being fully informed, empowered with appropriate competencies and skills, and also as rational consumers could be false and tricky (Meinow et al., 2011; Allen, 2013). Proponents of a 'welfare state' based ideology, regard telehealthcare as a service that is "not like shopping" (Daly, 2012, p.185), and emphasise the vital role of an intermediary, in the form of local authorities or social carers, to support and guide users, in making choices about the design of their care packages.

Principles of business model based thinking have been applied in the context of social business models (Osterwalder and Pigneur, 2011; Seelos and Mair, 2007; Yunus et al., 2010). However, the 'quasi-market' type environment in which telehealthcare service ecosystems operate is not adequately addressed in the mainstream literature on business models. One of the challenges that arise out of the quasi-market characteristics is the divided ownership relating to more forceful and creative advocacy and promotion for telehealthcare services within the general population. Such challenges are aptly reflected in the account of the study participant representing telehealthcare industry body TSA [TSA-P1].

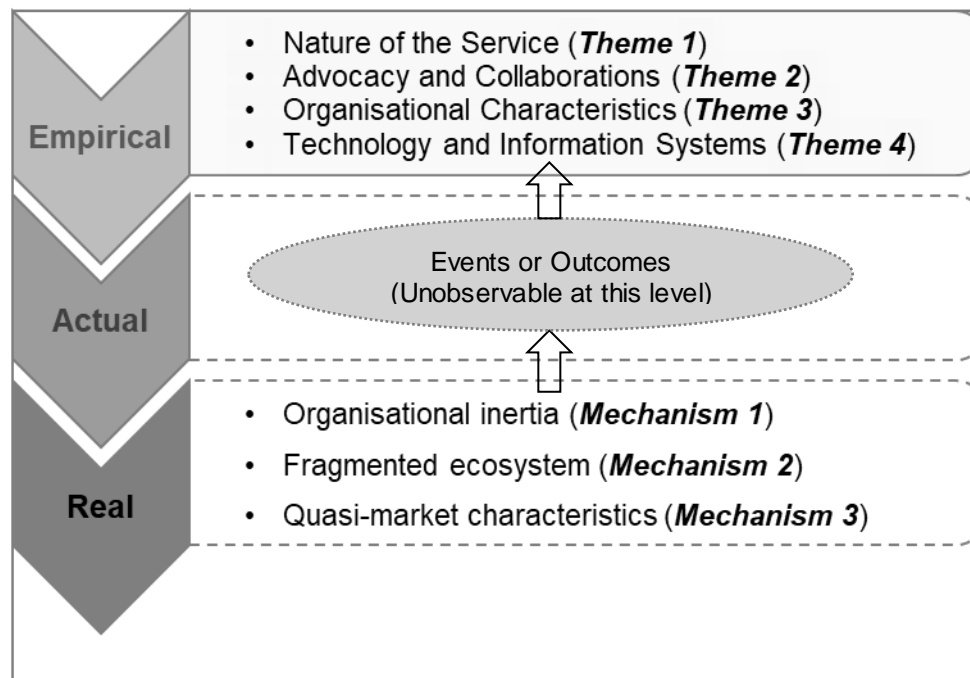
"It's through a state-funded model. It's people coming to a point of crisis and then being supported through social care and health intervention. Again, it's back down to this relationship between the commissioners and the supply market. If commissioners aren't necessarily stretching those suppliers a bit differently, then we'll get the same old solution... It's an easier sales process; it's easy to manage the relationship. It's very much harder to engage with the wider population".

8.2.3. Towards a Theoretical Explanation of Reality

Having identified the causal mechanisms, all the three domains of the stratified reality can be depicted (see Figure 8.4). The complexity of the telehealthcare service ecosystem could result in causal misattributions, since different mechanisms could give rise to the same

events at the empirical level (Easton, 2010). While critical realism acknowledges the fallibility and epistemic relativity of knowledge, it rejects ‘judgmental relativity’ which means all explanations are equally valid and there is no rational ground for choosing between them (Bhaskar, 1998, p. 57). The validity of the proposed causal mechanisms needs to be tested using empirical corroborations, by assessing the explanatory power of the mechanisms based on linkages between the empirical data and theoretical explanations; then the mechanisms that offer the strongest explanatory power in relation to the empirical evidence are to be chosen (Sayer, 2000).

Figure 8.4 Illustrating three strata of Reality (source: own illustration)



It is fair to mention here that a critical realist study ideally needs to follow an iterative cycle of data collection and data analysis, up until to the point of an ‘epistemological closure’ when all rival candidate mechanisms could be ruled out (Easton, 2010). Unfortunately, constraints of time and resources as well as the practical challenges of re-engaging with the case organisations do not allow the researcher to maintain such rigour. In view of the epistemological fallacy recognised in a critical realist explanation, an approach of ‘judgmental rationality’ is adopted which allows the researcher to put forward his claims about reality as he thinks it is (Easton, 2009, p. 124).

8.3. Two Archetype Business Models for Telehealthcare Services

In the previous section, a critical realist explanation of the notion of reality with reference to our current understanding of telehealthcare service business models was presented. Such an explanation elucidates and identifies key barriers and enablers for higher value creation and value realisation in the design of more contextually aligned business models. This study aims to answer the three research questions that concern possibilities of designing future business models for telehealthcare services with better value propositions, with higher opportunities for value co-creation and finally, that are financially sustainable. The literature suggests that real-world business models can be studied effectively as models that embody organisational business logic; in order to provide a recipe for successful design of commercially viable business models (Baden-fuller and Morgan, 2010). However, as the empirical findings within this research project and subsequent discussions reveal, telehealthcare contextual elements play a significant role in influencing critical organisational business choices. Thus, the design of archetype business models, contextually adapted for telehealthcare systems and organisations, need a more detailed and sophisticated consideration of such contextual embeddedness (Greenhalgh et al., 2016; Hamblin et al., 2017).

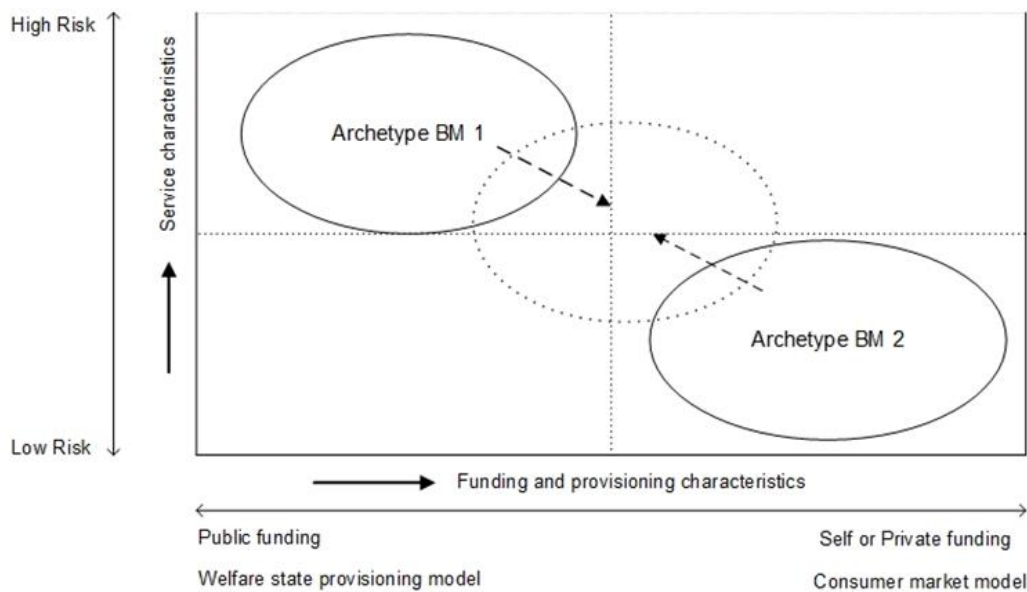
In this section, a typology of telehealthcare service business models is proposed that are differentiated based on two contextual dimensions - *service characteristics*, and *funding and provisioning logic*. It has been found earlier in the thesis that telehealthcare services cover a wide range of technology interventions involving varied levels of risks for the service users and the service providers alike. To illustrate this point with examples, telecare solutions are meant to detect and trigger alarms for emergency and risky events such as falls, smoke, and fire that demand immediate attention and response action. On the other hand, assisted living solutions are focused around activity monitoring (e.g. 'Just Check In'²⁵) or lifestyle enhancement (e.g. safer walking devices) and typically deal with situations that entail a

²⁵ Details can be found at <https://justchecking.co.uk/>

comparatively reduced amount of risk. The risk element involved with the service necessitates differentiated business choices leading to alternate business model designs. The second dimension concerns funding and provisioning logic. Empirical data and the findings within this research reveals how the characteristics of a service provider organisation influence the business model designs, especially with respect to two elements – the *source of funding* (local authority commissioned contracts versus private customers) and the *primary logic* for service provisioning (welfare versus commercial).

The dimensions of the proposed business model typology discussed above, namely service characteristics and funding mechanisms are visually represented using a two-by-two matrix (Figure 8.5). Two service business model archetypes are positioned in two separate quadrants on the basis of how a particular business model design is governed by the service characteristics (y-axis) and/or funding mechanism (x-axis). One archetype business model (BM1) situated at the upper left quadrant of the diagram exemplifies telehealthcare services that primarily aim to serve health and care needs involving comparatively high risk elements, and also, are public funded and provisioned following the principles of a welfare state. In contrast, the second archetype business model (BM2) positioned in the lower right quadrant of the matrix, typifies telehealthcare services that involve relatively lower level of risks, and also, are predominantly funded and provisioned through market-based mechanisms.

Figure 8.5 Two Archetype Service Business Models (Source: own illustration)



Nevertheless, it is important to note the continuous nature of such a classification approach, in which possibilities of many variations of business models exist as shown with a dotted trajectory (as shown in Figure 8.5). The variations will be contingent to the contextual conditions surrounding the service, especially those influencing the service characteristics and funding logic.

To illustrate a telehealthcare service business model (or its key components), and situate the discussion around the potential choices made by the service provider organisation and their consequences to the outcome of the service, causal-loop diagrams are useful (Casadesus-Masanell and Ricart, 2007, p.4). In such representations, possible choices and associated consequences are linked by arrows representing causality. Nevertheless, it will be a fairly complex and impractical exercise to take into account all the probable choices (or all different combinations of choices) that a business could make and also the likely consequences that those choices might deliver. Therefore, a simplified and manageable illustration of an organization's business model necessitates the use of decomposition techniques and a representation of key parts of the business model in isolation (Casadesus-Masanell and Ricart, 2007, p. 5). While the rationale for making causal links between the choices and the related consequences primarily hinges upon the empirical evidence that

emerged out of the thematic analysis done in Chapter 7, it is fair to mention that such an exercise, at best, presents a partial attempt at a thorough causal analysis. Thus, on several occasions, the logics for causal connections are also built upon the 'theories' or conjectures made by the researcher (CR approach) which could be subjective and fallible in nature (Casadesus-Masanell and Ricart, 2009, p. 13). Therefore, representations of business model components made in this section embody abstractions of a highly complex and dynamic real-life business model, and serve to provide a good understanding of the working of the model without being totally comprehensive.

Revisiting the theoretical framework developed earlier in this thesis, also presented in this chapter (see Figure 8.2), the key components of a telehealthcare business model can be identified as *value proposition* (VP), *value co-creation* (VC), and *value realisation* (VR). Value co-creation in the business model is enabled by both the provider organisation's value architecture and the value network in which the provider is connected. Each of these components of a service business model is depicted using separate diagrams (Figure 8.5, 8.6 and 8.7) which consist of choices (shown in rectangular boxes), consequences (in plain text), and arrows indicating the potential causal connection between the former two elements. The suppositions or 'theories' that clarify relationship between a particular choice and a consequence are explained in following sub-sections that supplement the illustrations.

It is also important to note that while the needs for decomposing and representing parts of a business model in isolation arise from the perspectives of simplification and practicality, there is a trade-off involved in terms of losing the 'big picture' or comprehensiveness in understanding how one part of business model affects another. This is due to the interdependencies of the choices and their consequences across the elements of a business model. To illustrate this point with an example, a choice to invest in Information Technology (IT) infrastructure could be considered as part of organisational value architecture and accordingly, is discussed with reference to the value co-creation element of the business model. However, consequences of such choices have potential implications for other

elements; for example, enhanced IT capabilities could allow the service to interact and engage with its users and prospective customers through various channels of their choices, thus increasing the value proposition of the service. In order to make an aggregated view of a business model construct comprehensible to the reader from the 'zoomed out' illustrations of individual business model components, a particular illustration for a business model element makes necessary references to other relevant elements within the model -relating to a specific choice or a consequence. Such referenced choices or consequences are highlighted in 'grey' in the diagrams, together with a mention of the respective business model element referenced (example: VP, VC and VR).

8.3.1. Value Proposition (VP) for the Service

The value proposition in a telehealthcare service business model concerns all the stakeholders in the service ecosystem. However, a discussion on the value proposition for a telehealthcare service demands examining two distinct levels – at a 'micro' level involving the service users, their carers and families; and at a 'macro' level other stakeholders, including the local authority commissioners of the service. Such a distinction between these two levels of value proposals becomes necessary due to the 'quasi-market' environment (see Section 8.2.2.3) under which the majority of the telecare services is currently provisioned in England. In quasi-markets, unlike in a 'pure' market, the service users may consume the service but not necessarily choose and pay for it - as commissioners purchase the service package on behalf of the user, on the basis of care need assessment made by social care professionals (Daly, 2012, p.184).

8.3.1.1. Micro-level Value Propositions

- **Enhancing Choices, Personalisation and Affordability**

Empirical findings suggest that all the five (Case Study) services offer a limited range of packages or service levels for their customers to choose from. Only one provider (*HomeCall*) offers a tiered service that allows its customers to avail themselves of a cheaper "monitoring only" service level or to opt for "monitoring and response" package. Therefore, one of the

key choices to enhance the value proposition for the service users is to offer levels of service packages with differentiated features and charges.

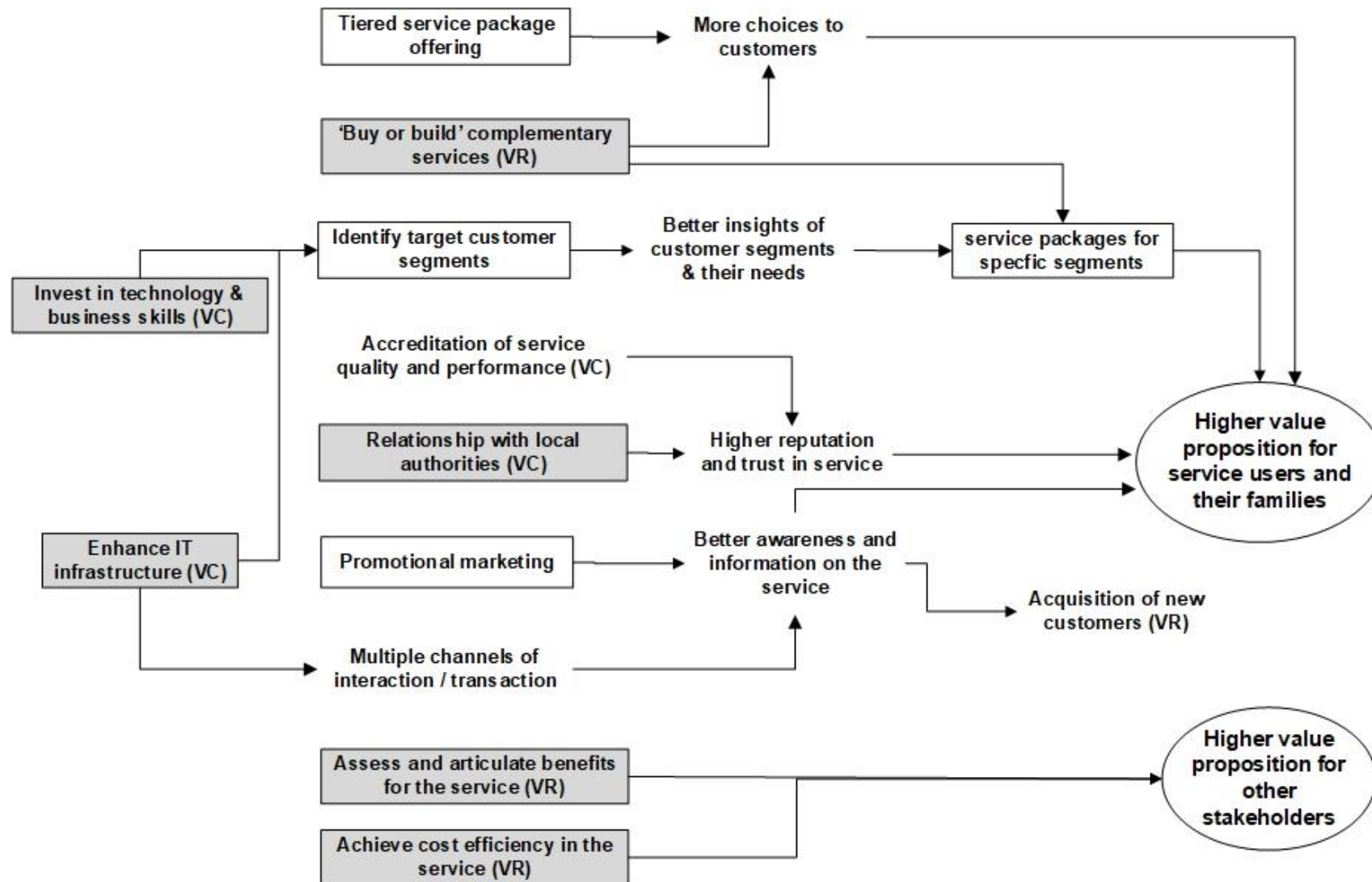
Findings from the case studies suggest that the most popular form of telecare solution has been using the push button pendant or watch based community alarms aimed at elderly service users. Such findings are supported by the conclusions of a nationwide survey conducted in order to understand the usage pattern of telecare technologies, in which 74% of respondents reported using the community alarms (Carers UK, 2012). Thus, the existing 'one-size-fits-all' offerings for older people ('bus' model) could be supplemented with bespoke service packages targeted to specific customer segments ('taxi' model) (Baden-Fuller and Haefliger, 2013, p. 421). Service designs employing innovative technology solutions such as GPS-based location tracking services designed to address special care needs of particular customer segments could provide tailored offerings with unique value propositions; and develop niche markets for such services (Berry et al., 2006). A few examples for specific customer segments could be young people with learning disabilities (Miles and Doughty, 2011; Wilkie, 2010), people with dementia (Woolham, 2006; McCabe and Innes, 2013; Cahill et al., 2007; Robinson et al., 2012), and people looking for 'smart home' and well-being solutions (Demiris and Hensel, 2008). Such opportunities for service providers to offer their customers with more choice-driven, personalised services gain further relevance with the introduction of personal budgets and direct payments for social care (Glasby, 2007; Carr, 2009).

In the healthcare literature the issue of social isolation and loneliness among older people and the related adverse effects on the individuals' quality of life, well-being, and mortality have been highlighted (Lund et al., 2010; Stepoe et al., 2013; Windle et al., 2011). The empirical evidence clearly suggests (see Theme 1, section 7.4.1.2) that unmet psychological and social needs such as lack of social contact and loneliness could result in potential misuse of telecare services leading to efficiency and productivity issues for the service. A published study conducted by NatCen Social Research and Ipsos MORI (Dunatchik et al.,

2016) shows high levels of unmet social care need, among men and women across all age groups over 60 years and from a range of social backgrounds. Therefore, telecare service providers could enhance the value propositions of their services either by offering complementary services themselves, or by signposting to a range of local, non-clinical 'social prescribing' services²⁶, which are typically provided often by voluntary and community sector organisations (The Kings Fund, 2017; NHS England, n.d.).

²⁶ Examples of these services include volunteering, group learning, arts activities, cookery, gardening, befriending and a range of sports

Figure 8.6 Illustration of value proposition (VP) element (Source: own illustration)



While the findings from the data do not clearly suggest any issue of affordability in terms of paying for the basic telecare alarm service which is typically available to the customers at a subscription fee of £5 per week, it is reasonable to assume that a considerable number of people who are vulnerable and in need of the service are currently excluded from the Council's social care assessment and subsequent referrals to the telecare services. Findings from the data mention issues concerning stigmas among people that prevent them from going through the official care assessment processes. In times when the telecare service providers are trying to acquire more self-funded private customers, such gaps could be an opportunity; however, as findings from the data suggest that telecare provisions for private customers are considerably more expensive compared to the customers assessed and referred to the services by the respective Councils. Services designed around the principle of a 'freemium' business model design pattern (Osterwalder and Pigneur, 2010) could potentially offer subsidised services- either free of cost or a low cost- to the 'at risk' and deprived segment of the users, while maintaining the sustainability of the service through premium service packages offered to the high-value customers. Such a freemium approach is also capable of creating a lock-in or leveraging effects of networks (Zott et al., 2011), thus promoting adoption of service at a commercial viable wider scale.

- **Building Reputation for Trust and Quality**

Empirical evidence suggests that affiliation of the service providers with a local authority has been helpful in building trustworthiness and reputation of the service. Findings from the review of telehealthcare literature in Chapter 3 emphasises the need for trust and transparency in the services (Lie et al., 2016; Bhattacharya et al., 2017). Accreditation to the 'Code of Practice' or 'Quality Standard Framework' provided by the Telecare Services Association (TSA) could also be a useful mechanism for the service providers in benchmarking qualities of their service and embedding trust elements in the service.

Many service users of telehealthcare services, particularly older people are often reluctant to or have difficulty in assuming the role of active consumers (Rodrigues and Glendinning,

2015). Introduction of personal budgets and direct payments for social care (Glasby 2007; Carr, 2009) has brought opportunities for service providers to offer customers with more choice-driven, personalised services. For such consumer-led yet public-funded telehealthcare procurement options, either local authorities or the concern service providers need to play an intermediary role in providing information and guidance to service users in order for them to make informed choices (Daly, 2012; Barrett et al., 2015).

- **Raising Awareness on Service**

While a private market for the services could be attractive for the providers, the knowledge about demographic or socio-economic characteristics of self-funders is limited within local authorities (Baxter, 2016). Empirical findings from the case studies suggest that only limited efforts are made by the providers in promoting the value of their services. Promotional aspects are largely restricted to relying on adult social care workers to make more referrals and also, maintaining good relationships with other public services, namely Fire and Ambulance services for signposting and reciprocal referrals. It is reported in the practice literature that several local authorities have taken important promotional initiatives such as implementing transactional e-marketplaces that focus on direct payment holders (ADASS, 2017).

The issue of low awareness of the telecare services within the overall context of health and social care services has emerged as one of the dominant themes in the data. It has been widely acknowledged that awareness of telecare services among the general public is substantially poor, and there is a stereotyped perception about the services assuming that they are meant only for older and vulnerable people. This could be a barrier in terms of higher adoption and mainstreaming of these services. This calls for advocacy, social promotions and relational marketing efforts to drive higher adoption rates of telehealthcare technologies (Giuseppe and Geisler, 2009; McGuire, 2012; Wright and Taylor, 2005).

The above views align with the insights from literature that portray market for older consumers in the UK as less attractive, homogeneous and largely unexploited by the marketers (Ahmad, 2002; Long, 1998). While relevant industry bodies such as the TSA has been working on lobbying and promoting the service at the national level, the TSA manager interviewed for this study [TSA-P1] observes that in current primarily state-funded driven provisioning model, telehealthcare solution providers lack enough incentives to shift beyond their comfort zone and argues for more private funded offerings that can be "something on the high street":

"It's an easier sales process; it's easy to manage the relationship. It's very much harder to engage with the wider population [...] a lot of people that don't necessarily know about this sort of stuff will see it as a specialist area so, therefore, is it really something we want to get involved with. I think consumers, it's almost the best-kept secret so people don't necessarily know this stuff is out there but when you explain what it can do, people say "Yes, that's great, but then where do I go and buy it because if I can't find it on the high street, where do I go?"

Such narratives provide claims that these telecare technology designs and ageist focused marketing terminology create a stigmatising effect by emphasising the use of negative messages such as disability and impairment rather than helping to promote an independent lifestyle (COMODAL, 2017, p. 26).

8.3.1.2. Macro level Value Propositions

The empirical findings suggest that any value proposition for telehealthcare services is primarily focused around cost savings targets for the local authorities operating under continuing public sector austerity policies and constrained adult social care budgets. This evidence is reinforced by the findings of a recent national survey of local authority telecare provision for older people in England (Woolham et al., 2018). From the local authorities' perspectives, both the quality and outcome of the commissioned care services are of primary concern. Financial pressures on the councils have affected funding for non-statutory services within a preventive care agenda, such as supported independent living for older people. Currently, local authorities follow 'Fair Access to Care Services' or FACS criteria (SCIE, 2012) in prioritising adult social care demands, and referrals to telehealthcare

interventions are made predominantly as a substitute for expensive residential care packages and/or prioritised for only 'substantial' or 'critical' needs such as care support following rehabilitation and recovery. Thus, a wider coverage of telehealthcare services that provides a 'safety net' to the people who are 'at risk' yet not deemed eligible for council's telecare service, elevates the value proposition to a system (societal) level. It can be argued that the proposed business model archetype BM2 (see Fig 8.5) could potentially address this unmet need for higher adoption and scale in general preventative services by offering a range of affordable choices to the wider population.

8.3.2. Value Co-creation (VC) within the Service

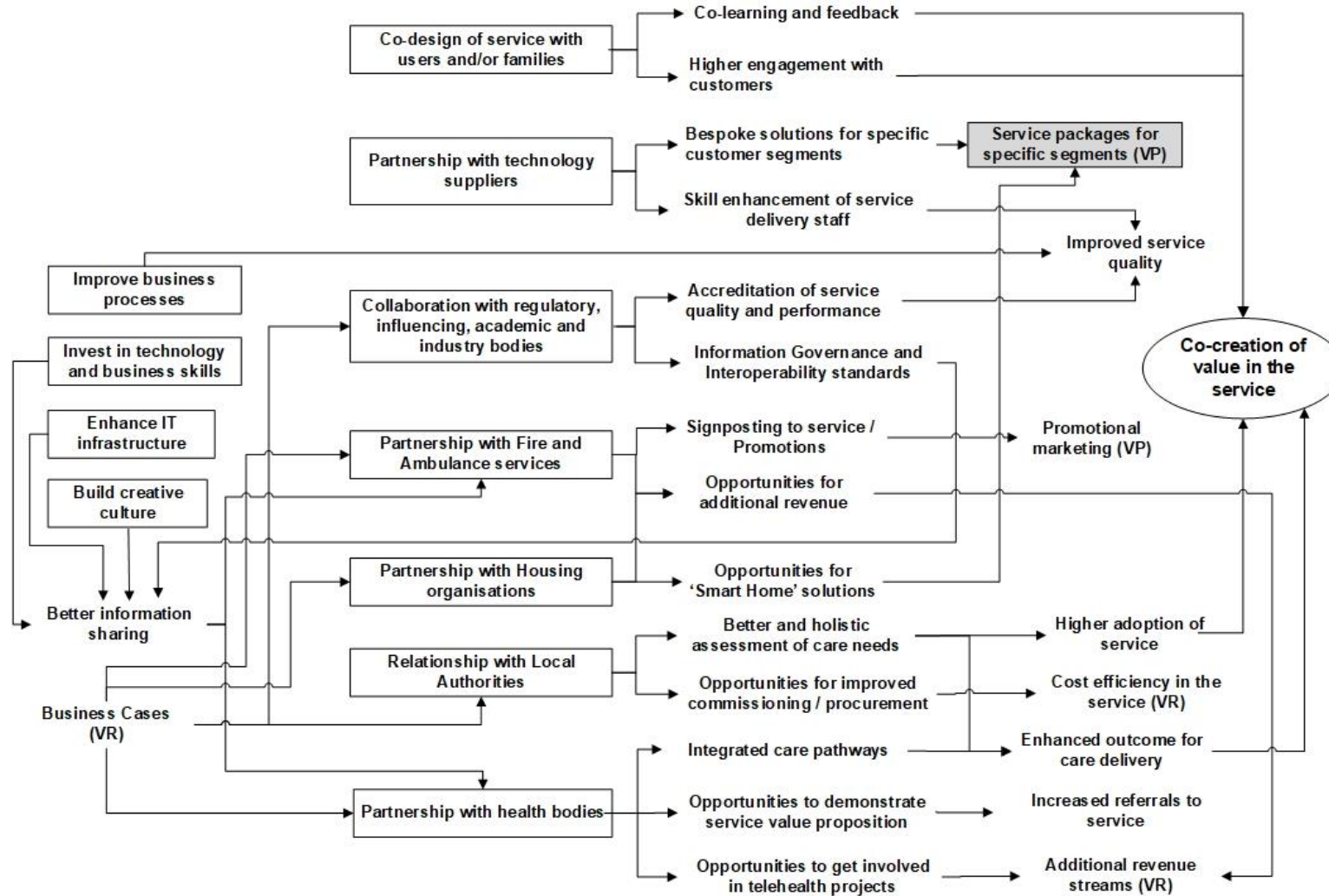
This element of a service business model plays the vital role of co-creating value within the service and entails two categories of choices for the provider – one, with respect to the value architecture elements that concern organisational capabilities, infrastructure, policies and processes; and the other relating to the partnerships and collaborations with other stakeholders in the value network. Figure 8.7 illustrates the potential choices and their outcomes.

8.3.2.1. Choices related to Value Architecture

Key choices for the telehealthcare service providers with regards to value architecture can be grouped in two categories. The first category of choices relates to organisational capabilities in terms of skills, knowledge and business processes. Findings from the review of the literature in Chapter 3 suggest that holistic assessments of care needs are vital to the adoption of telecare technologies (Wey, 2006; Dewsbury, 2009; Fry, 2014). Empirical evidence from this research project, indicates that there are significant technology skills gaps for social workers who conduct the care assessments for ascertaining needs and suitability of telecare devices. Issues related to skill deficits for carers and service professionals, potentially leading to mismatch of prescribed technology or the 'over-prescribing' of technology have been highlighted in the literature (Alaszewski and Cappello, 2006; Powell et al., 2010; Yeandle and Fry, 2010). Therefore, investments in building technology skills and

knowledge for frontline care professionals (see Figure 8.7) could result in improvement of service quality through better assessments of needs, and error-free installations of telecare devices. Enhanced technology capabilities for the service staff should also aid in sharing of key business information across the organisation. Data from the case studies also reveal a deficiency of business skills among the service managers. Accordingly, improving business skills for service managers could facilitate them in recognising and realising commercial opportunities in the marketplace. Deficiency of business skills among service managers, as indicated in the data, could also affect the articulation of business cases for the service (discussed in Section 8.3.3).

Figure 8.7 Illustration of value co-creation (VC) element (Source: own illustration)



The Second category of choices concern infrastructural aspects, largely in relation to technology infrastructure and IT systems, which are vital to successful telehealthcare implementations (Collinge and Liu, 2009). Empirical evidence draws attention to the lack of such robust information infrastructures within the provider organisations and also, the fragmented nature of IT systems across the service ecosystem, as observed in case of YHN's CCAS service (see Chapter 6, Figure 6.5). The absence of integration among disparate IT systems hinders collection of useful insights on service users from the monitoring data, and sharing of meaningful information with other stakeholders.

A robust information infrastructure could further boost productivity of frontline service staff given the majority of the processes related to customer data collection and reporting in the services has been found to be manual. However, system-wide sharing of information demands a 'creative culture' (Bock et al., 2012) in the provider organisation. As it can be seen in the next section, forming collaborations or partnerships with other actors in the value network - a vital ingredient for co-creation of value in the service depends heavily on relevant information sharing and demonstration of 'business cases' around the benefits of the service.

8.3.2.2. Choices related to Value Network

For a 'complex innovation' such as telehealthcare (Sugarhood et al., 2014) to work effectively, it requires collaboration across a diverse set of participants. Key choices for the telehealthcare service providers with regards to value network concern opportunities of value co-creation with other stakeholders within the service ecosystem. Such opportunities of value co-creation could entail collaborations and/or formal partnerships with a broad range of stakeholders, namely service users, their carers and families; commissioners of services (local authorities); telehealthcare technology suppliers and solution providers (for example, Tunstall and Legrand); regulatory and compliance bodies (example: the CQC²⁷ and the NHS

²⁷ CQC (Care Quality Commission) is the independent regulator of health and care services in England. More information on CQC can be found at <https://www.cqc.org.uk/>

Digital²⁸); telehealthcare industry bodies (TSA); other public service providers such as Fire and Ambulance organisations; housing associations and affiliated interest groups (example: ADASS²⁹ and LGA³⁰); health bodies (example: GPs, NHS CCGs and Public Health for England); and academic knowledge harvesting networks such as AHSN³¹.

The review of literature on telehealthcare and service logic underscores the relational and experiential aspects of the service in value co-creation with service users through co-designing and co-learning with service users (Elg et al., 2012; Peine et al., 2014; Wherton et al., 2015; Greenhalgh et al., 2015). Findings from the review of literature as well as data from the case studies emphasise the role of families and social relations (Koivunen, 2013) in influencing the perceptions and adoption of telehealthcare technologies. Thus, engaging with the families could be a useful strategy for the providers in raising awareness and uptake for the service.

The evidence also suggests that housing is critical to health across the life-course of an individual (Parliamentary Office of Science and Technology, 2011). Through providing services for more than 5 million residents in England (National Housing Federation, n.d.), the housing sector makes a significant contribution towards preventing health issues, for example, falls prevention through home adaptations; postponing the need for care through provisions of supported living such as Extra Care Housing (Housing LIN, n.d.) and thus, demonstrates the economic value of housing services to the NHS through cost-effectiveness and cost-benefit analysis (Buck et al., 2016; Buck and Gregory, 2018). Delayed hospital discharges cost the NHS England £820 million annually (Buck et al., 2016) and housing associations could play an important role in helping patients discharged from hospital to return home quickly, in supporting the patients to live independently and safely at their

²⁸ NHS Digital is the national provider of information, data and IT systems for commissioners, analysts and clinicians in health and social care in England. More information on NHS Digital can be found at <https://digital.nhs.uk/>

²⁹ More information on The Association of Directors of Adult Social Services (ADASS) can be found at <https://www.adass.org.uk/>

³⁰ More information on Local Government Association (LGA) can be found at <https://www.local.gov.uk/>

³¹ More information on Academic Health Science Network (AHSN) North East & North Cumbria can be found at <https://www.ahsn-nenc.org.uk/>

homes and thus, potentially avoiding re-admissions. Hence, collaborative partnerships between telehealthcare service providers and housing associations could provide opportunities for bringing the three sectors - health, social care and housing – together and promote value co-creation across the service ecosystem.

Opportunities for value co-creation in the service can be realised through effective collaboration with relevant regulatory bodies, industry organisations and academic institutions (see Figure 8.7). For example, service providers can demonstrate superior quality and performance of their services through accreditations and benchmarking against industry recognised standards such as the 'TSA Quality Standards Framework' (TSA, n.d). Choices pointing to collaboration with regulatory bodies with the likes of NHS Digital and academic knowledge sharing networks such as AHSN could help the service provider in adopting relevant technology interoperability standards and in participating in regional information integration and governance initiatives like Great North Care Record programme (Great North Care Record, n.d.). Academic collaborations with universities can support local authorities and service provider organisations in imparting relevant training and education for their staff, in view of the issues reported in the literature around adequacy and quality of such training programmes (Woolham et al., 2018).

While possible collaborative partnerships with Health organisations are perceived to be challenging given the divide between health and social care sectors (see Section 7.4.2.1), evidence from both the literature and the empirical data suggests localised initiatives that brings stakeholders from these two sectors working jointly to enhance the outcomes of telehealthcare services (Care Home Professional, 2018; AHSN, 2018). One of the themes emerging from the data highlights the vital role of intermediaries – at regional as well as national levels – to bridge the gaps and to realise the policy vision of integrated care pathways.

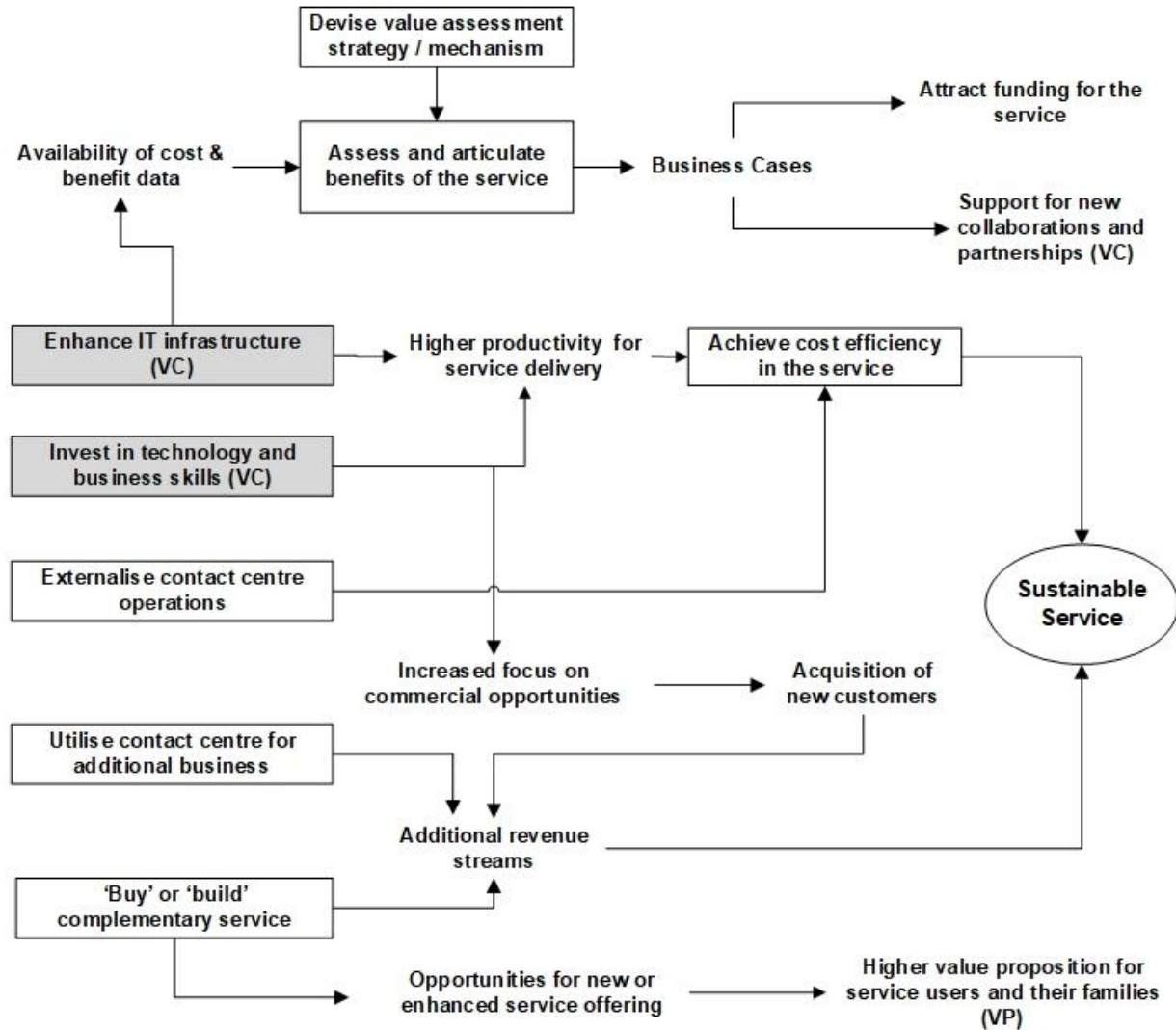
Strategic partnerships with telehealthcare technology suppliers or solution providers could potentially help the service provider in designing new service offerings, impacting the value

proposition element (see Figure 8.6). Feedback from the service providers with rich experience about their users could aid the equipment manufacturers in develop ethical and 'person-centric' designs of technology (Buckle, 2014; Pols and Willems, 2011)) that promote usability and adoption. Likewise, partnerships with other public services, notably Ambulance and Fire services could provide useful value co-creation opportunities for telecare providers - through contributing to promotions, signposting and also, potential cost-sharing on service infrastructure and workforce.

8.3.3. Value Realisation (VR) from the Service

Key choices concerning the realisation of value from the service are focused around generating profit or surplus for the service to ensure growth and financial sustainability of the service. Thus the choices primarily revolve around either achieving cost efficiency in the service through means such as gains in productivity, or earning additional revenues through diversification of service offerings (see Figure 8.8).

Figure 8.8 Illustration of value realisation (VR) element (Source: own illustration)



In pursuit of additional revenue streams, one of the choices available to the telehealthcare service provider is to offer ancillary services that complement customers' unmet care needs. This choice could facilitate an additional value proposition for the service through offering a range of additional services to the service users as discussed earlier (see Section 8.3.1). The service provider could choose to either "buy" (or externalise) the ancillary service from a third-party and share the risk, as is the case with *HomeCall's* collaboration with another local care service provider in providing personal care services (see Chapter 7); or build the service through investment in staff skills, additional service infrastructure, and regulatory compliances such as CQC certifications.

Effective utilisation of the 24x7 telehealthcare contact centre infrastructure against a fluctuating demand for the service is vital from cost efficiency perspective. Thus, one of the business choices for service providers, especially for those pursuing more commercial objectives (archetype model BM2) could choose to externalise the contact centre monitoring function of the service, and benefit from the 'economies of scale' offered by a bigger and centralised contact centre run by another organisation - through cost sharing arrangements that reduce fixed costs associated with the infrastructure. Service providers that are closely linked with local authorities (archetype model BM1) however, would likely own and/or manage their own contact centres due to the higher risk involved with service. Also, this may enable them to harness new opportunities for utilising their service infrastructure to generate additional revenue streams through various call handling operation and support contracts with local authorities and other organisations. It can also be argued that in-house monitoring centres facilitate delivering a better quality of service through the use of their localised knowledge of the communities and access to service users for emergency response and /or reassurance purposes. In addition to increasing their earnings from the service, another focus area for the service providers is to achieve cost efficiency. Investment in technology skills for the frontline staff (discussed in section 8.3.2), technology infrastructure and

associated productivity gains could aid to the goals of cost effectiveness in the service (see Figure 8.8).

The review of the literature on telehealthcare in Chapter 3 suggests considerable challenges for collecting as well as demonstrating valid evidence for cost effectiveness related to provision of telecare services (Barlow and Hendy, 2009; Henderson et al., 2014; Barrett et al., 2015). Empirical evidence from the case studies discussed in Chapter 7 has further mentioned how telecare service providers find it difficult to articulate and subsequently, propose plausible economic arguments or 'business cases' concerning their contributions towards wider health and other well-being objectives of the NHS. One of the challenges could be related to the practice of evaluating processes and mechanisms. Traditionally, cost-effectiveness analysis is used to inform strategic decisions in the NHS and the wider health and care sector (Drummond et al., 2015) and adopting such evidence-based approaches (Wainwright, Oates, Edwards, and Childs, 2018) to establish quantifiable 'return on investment' indicators could be problematic for telecare services (Giordino et al., 2011).

Findings from the data further suggest that service providers, including the local authorities are not equipped with resources and/or knowledge to enable them to adopt similar cost-benefit analysis techniques. Therefore, one of the key choices available to a service provider is to devise its own value assessment strategy and mechanism through which the provider could gather evidence of effectiveness and potentially articulate justifiable 'business cases' for either its partners to collaborate, or to demonstrate the value of the service in drawing funding support. One example of such a business case could be for an illustration aimed at Health Bodies (such as CCGs and GP Practice) on how preventive actions through using telehealthcare interventions can lead to realising better outcomes or higher cost effectiveness across the care pathway. However, it will be important for the providers to develop the business cases using credible, quantitative evidence, not just anecdotal and experiential accounts of service users. Organisational capabilities, especially the information infrastructure, technology and business skills, and the sharing of relevant and useful

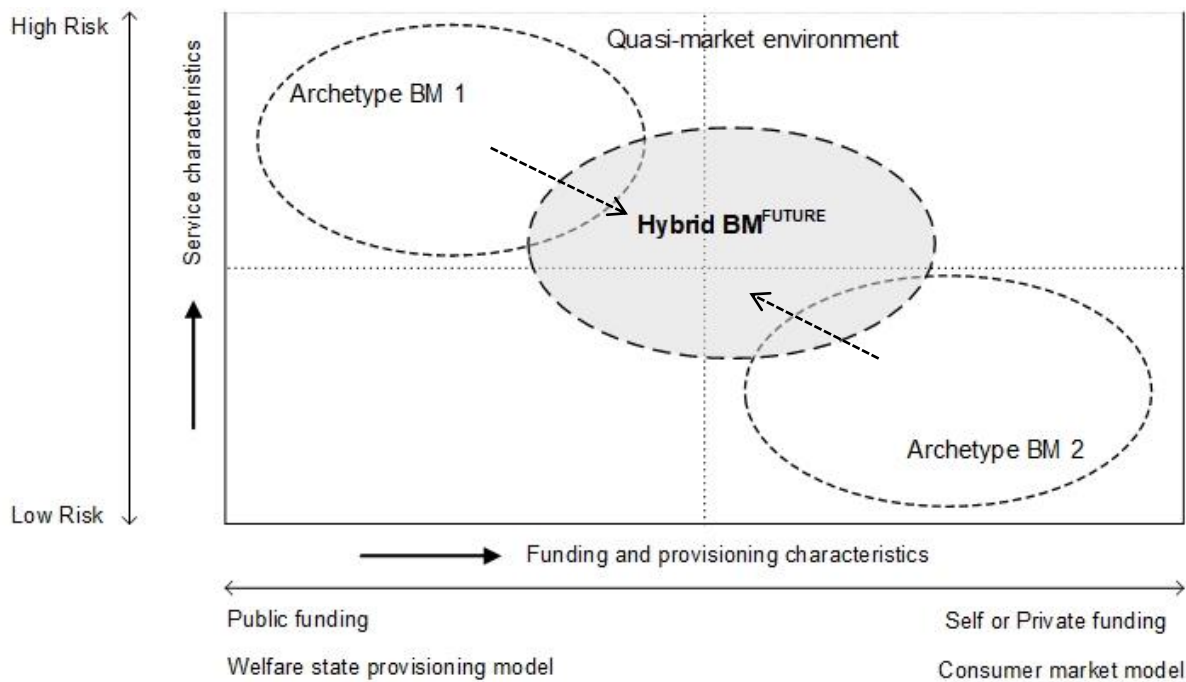
information (for example, falls history of an elderly service user with her GP) as discussed earlier (see section 8.3.2) should enable the provider to establish a plausible evidence base.

8.4. Discussion

In the previous section, the key components of two archetype business models are illustrated following a 'choice to consequence' based causal logic. The relevance and implications of the key choices for the two archetype business model designs, BM1 and BM2, are also explained. This thesis does not intend to offer a prescriptive solution by claiming superiority of one design over another, given the prominence of contextual elements - especially the nature of telehealthcare services and the logic for provisioning of these services in England (see Figure 8.5). The analysis of empirical evidence from the five case studies (including the pilot), and also, findings from literature review, suggest that each of these two alternative business model designs has its own merits and shortcomings. Therefore, it can be reasoned that potential designs of business models for value co-creation and sustainability necessitate considering a blend of both archetypal designs, which leads to the emergence of hybrid business models (Baden-fuller and Haefliger, 2013). This section focuses on elaboration of the above argument that leads to a discussion on the opportunities and also, on the critical enablers for designing such hybrid business models. An exemplary future business model for telehealthcare services in England hereafter denoted as BM^{FUTURE} is depicted in Figure 8.9.

As explained earlier, in reference to the illustration of two archetype service business models for telehealthcare in Figure 8.5, designers of business models need to pay appropriate attention to the *macro* as well as *meso* level contextual conditions in which the service would operate. The variations in contextual conditions, especially those concerning the service characteristics and funding logic, necessitate exploration of a range of business choices and careful deliberation on the probable outcomes derived from those choices. Therefore, it may be noted that illustration of BM^{FUTURE} serves to suggest just one possibility, out of many variations of design choices.

Figure 8.9 Future ‘hybrid’ business model for telehealthcare (source: own illustration)



The discussion revolves around three central focus areas that potentially influence the design choices for future telehealthcare business models. These three broad-level design themes are described below.

8.4.1. Redefining the Boundaries and Scope of the Services

Future technology trends suggest an availability of a superior broadband infrastructure providing ultra-fast network connectivity and access to users (Frontier Economics, 2017) and also the proposed (and planned) changeover to digital networks from the current analogue system in England (McCaskil, 2018), which could potentially alter the technology landscape for the telehealthcare services.

A recently published report from the Office for National Statistics (ONS, 2019) suggests a steady increase in household and individual internet access in the UK – with almost 93% of all households having access to the internet and regular usage of the internet by 87% of all adults in 2019. The findings reveal that about 9 in 10 adults use the internet to perform a range of activities including online banking, email and social media communications,

shopping and for finding information on goods and services. Interestingly, over half of all adults aged 65 years and over (54%) are found to be performing online shopping in 2019 (ONS, 2019). While an increased interest among adults looking for online health-related information has been reported, the number of people using assistive technologies to support with their health and care needs is still considered to be fairly limited due to a lack of knowledge, advice and information among users and their families (Carers UK, 2017).

In their recent report on technology trends and opportunities, techUK, the organisation that represents the technology business sector in the UK, has reported an increasing market interest and consumer adoption of 'Smart Home' or 'Connected Home' technologies that include systems for home entertainment, health and prevention, security and control, energy and lighting, and domestic appliances (techUK, 2018). While the report is based on polling from a sample of 1,000 customers whose socio-economic backgrounds have not been mentioned therein, the report indicates growing presence of a 'premium' market segment in England in which consumers prefer an enlarged role of new innovative technologies in maintaining and controlling their lifestyles and well-beings.

Value propositions for services, with a business model BM2 archetype, centres around the 'not-so-critical' well-being elements of independent and assisted living support, such as general preventive needs, social interaction and psychological needs. The business logic of a value proposition for these services will anchor around offering a range of choices on service packages, opportunities for personalisation, and ensuring the affordability and sustainability of the service. The enhanced use of mainstream consumer technology (for example mobile apps, Amazon Alexa etc.) in telehealthcare solutions; and innovative technologies like the Internet of Things (IoT) and Big Data (Analytics) could facilitate development of new innovative designs and delivery mechanisms for such services (TSA, 2017). For realisation of value from these services, however, providers need to primarily rely on market-based channels (such as self-purchases and personal care budgets). This

category of service business models should aid in attaining the much-desired scale through higher adoption and usage by users.

In the healthcare literature the issue of social isolation and loneliness among older people and the related adverse effects on the individuals' quality of life, well-being, and mortality have been highlighted (Lund et al., 2010; Stepoe et al., 2013; Windle et al., 2011). Empirical evidence also reveals (see Theme-1 / Section 7.4.1 in Chapter 7) that unmet needs such as lack of social contact and loneliness could result in potential misuse of telecare services leading to efficiency and productivity issues for the service. Future designs of telehealthcare services following business model type BM2 could further aid in either providing complementary services or signposting to appropriate services such as 'social prescribing' or community referrals (The Kings Fund, 2017; NHS England, n.d.).

Value propositions for services with business model BM1 archetype, that deal with critical risk events, would however, hinge upon the quality of service in terms of addressing or mitigating the risks and levels of trust embedded in the service (Bhattacharya et al., 2017). Bespoke designs of service packages targeted to address specific segments of customers with special needs (such as people with dementia, or with learning disabilities) could drive higher value propositions at the system level through integrated care pathways, enhanced outcomes and collaborative funding arrangements across social care (local authorities) and health bodies. The system-wide value proposition is contingent upon good relationships and formation of collaborations based on clear 'business cases' that enhance outcomes and demonstrate cost effectiveness for all stakeholders.

Business model designs that follow BM1 archetype could facilitate combining the benefits of telecare and telehealth services together, by exploiting the complementarity of telecare and telehealth services. Both the findings from the literature and the empirical evidence reveal the 'systemic' divide between the health and the social care sectors, which is hindering the vision of integrated care pathways, to serve assisted as well as preventive self-care agenda of healthcare. In one of the services investigated in this thesis, *Sunderland Telecare*, the

vision of such integrated care is found to bridge the gap, albeit partially and in a modest scale, through the 'Connected Care Homes' project (AHSN, 2018). The project, funded through the NHS Vanguard Programme (NHS England, 2015) and implemented through a collaboration between Sunderland CCG and Sunderland City Council, aims to address preventive health and care needs for people with learning disabilities living at care homes through a telehealth system powered by the NHS NEWS³² based data, handheld computer tablets and Cloud-based technology infrastructure (Care Home Professional, 2018). At the time of conducting the empirical study, the project has been exploring how telecare and telehealth could complement each other to help support the social care as well as the healthcare aspect of the patient's well-being. Another example of such collaborations between the health and the social care authorities can be found in 'Nottingham City Homes' located in central England's Midlands region, in which a jointly funded programme between the Nottingham CCG and the Nottingham City Council, has brought together elements of telecare monitoring of critical risk events with preventative self-care through telehealth service – in offering integrated care packages (Skidmore, 2018; NHF, 2018).

8.4.2. Enhancing Institutional Advocacy and Information Brokering

A published study that was jointly conducted by NatCen Social Research and Ipsos MORI (Dunatchik et al., 2016) shows high levels of unmet social care need, among men and women across all age groups over 60 years and from a range of social backgrounds. Interestingly, the study indicates that such unmet care needs affect those eligible for local authority financial support as well as self-funded service users. Among several barriers to reporting unmet needs, a lack of personalised information and advice and difficulties in accessing general sources of information; have been reported in the study. The deep-rooted societal stigmas attached to ageing could contribute to people's willingness to seek help for their unmet care needs (Burstow, 2017).

³² National Early Warning Score is NEWS is a tool developed and used by the NHS to serve standardised assessment of acute illness severity and deterioration in adult patients. More information on NEWS can be found at <https://www.england.nhs.uk/ourwork/clinical-policy/sepsis/nationalearlywarningscore/>

While the service providers recognise the growing importance of private users of telehealthcare services for their businesses, the findings from literature tend to suggest that the potential of a self-funded market is yet to be realised (Baxter, 2016). The author further mentions that the advice and information offered by the Councils to self-funders has been perceived as poor. The Care Act (2014) stipulates that the local authorities with responsibility for adult social care need to ensure the availability of information and advice relating to care and support for adults and support for carers. Thus, towards making a journey from the BM1 archetype to a future business model design (BM^{FUTURE}), the local authorities need to commission a range of services from basic online information to advocacy services for individuals. This is necessary in order to signpost and redirect people towards a private marketplace for self-funded purchase. As the recent policy guidelines from NHS England encourages GPs to offer 'social prescribing' to their patients (NHS England, n.d.), such information brokering roles could facilitate greater engagement between Health and Social Care institutions.

Information and advocacy services could potentially be delivered through online interactive directories of local service providers and/or transactional e-marketplaces that allow users or their carers to locate products or services relevant to their care needs and subsequently, to purchase those (ADASS, 2017). In a public-private service ecosystem, local authority-based service providers could offer an online information portal that is designed based on principles of an 'infomediary business model' (Janssen and Zuiderwijn, 2014) in which the service provider acts as a kind of intermediary between open data providers (telehealth solution providers, device manufacturers, network partners, etc.) and service users. Such business models can use a two-sided platform (Rochet and Tirole, 2006), in which users get the content free whereas content owners (or advertisers) might pay small fees for hosting information on their products or solutions to be available on the portal.

8.4.3. Building Public-private Partnerships for Funding /Provisioning of Services

Quasi-market characteristics that support 'a 'mixed economy' of supply of care services within the English health and social care system, suggests that the public sector is going to face an increasing level of competition with private sector actors (Rodrigues and Glendinning, 2015, p. 650). It can be argued that the current focus of Health and Social care policies on the aspects of personalisation and user choices will continue or even increase in the future - through provisions of personal budgets and direct payments (Glasby, 2014). Following Fotaki (2010, p. 948), such policies necessitate new 'hybrid' and collaborative partnerships between the 'market driven providers and various public agencies under the marketized welfare'.

Thus, it can be reasoned that public-private partnerships (PPP) could be a strategic choice for designing future hybrid models for telehealthcare both nationally and more specifically in North East England. Such collaborative partnerships can be informed by the best practices and/or lesson learned from the implementation experience of similar partnerships that have been successfully realised within England or in other parts of the world. One example that can be cited is from Southern England where Hampshire County Council has implemented, in partnership with a private solution provider (PA Argenti), a pilot service that uses consumer level technology based on Amazon 'Alexa' voice-activated home audio system and apps (HCC, 2018). The second example is from the West Midlands, and concerns a partnership between Birmingham City Council and Tunstall, a major technology solution provider in the telehealthcare domain. In 2012, Birmingham City Council partnered with Tunstall, in a first of its kind in the UK for a large-scale, city-wide telecare service. With £14m investment from the City Council, the partnership service model aimed to provide telecare support and reassurance for over 25,000 older and vulnerable citizens over a 3 year period (Smith and Tomlinson, 2013). The programme ended in 2015 after achieving limited success against its stated goals.

Internationally, one of the successful public-private partnerships for telehealthcare can be found in the Barcelona City Council (Barcelona, Spain) telecare programme, often cited in the literature as the 'Barcelona model' (Navarro et al.,2017). The city was facing challenges of an ageing population, financial austerity and public funding cuts that could be comparable to those in the UK, in providing telecare service to its residents through a state-provisioned model. Back in 2013, a collaborative partnership between the Barcelona City Council and a private solution provider, Tunstall Televida was formed. With increased preventative focus, the new telecare service model incorporates proactive service elements, such as reassurance phone calls and visits by the social care workers and routine information sharing across social care and telecare teams (The Guardian, 2015). Since the inception of the new model, the service has grown steadily to about 90,000 individual users (20% over a 3 years period) and evaluation of the programme reveals a significant contribution of the service in improving quality of lives and in addressing social isolation among the elderly inhabitants of the city (Navarro et al.,2017).

8.5. Chapter Summary

The first part of this chapter has examined the empirical findings from the five case studies (including the pilot) by employing an analysis informed by critical realism. Following a sequence of *abductive* (using 'theoretical redescription') and *retroductive* (using '*transfactual thinking*'), three causal mechanisms have been identified, together with the related structures within the telehealthcare service ecosystem and contextual conditions necessary for activation of those mechanisms. Identification of these mechanisms has provided a theoretical explanation for the outcomes observed / experienced in the five telecare services (case studies) that this thesis investigated.

The second part of this chapter is developed on the explanation of reality with reference to the current state of telehealthcare service business models in England and seeks to answer the three research questions set out in Chapter 4. A typology of telehealthcare business models has been proposed based on two contextual dimensions comprising service

characteristics, and funding / provisioning logic. Illustrations of key elements of a service business model are made, outlining the potential choices for the service provider together with the consequences and the likely causal connections between them. Finally, a discussion is made to highlight the three central focus areas that could have implications for future designs of value creating and sustainable business models for telehealthcare services in the context of North East England.

Table 8.2 provides a summary view of the key choices alongside the enabling conditions and/or actions that could facilitate desired outcomes for all concerned stakeholders within the service ecosystem - through better value propositions, higher opportunities of value co-creation, and finally, realisation of adequate value from the services.

Table 8.2 Summary of key choices and enablers for future business model designs (Source: own illustration)

BM element	Key choices for the service provider	Enabling conditions / actions
Value Proposition (VP)	To offer differentiated and diversified service packages for specific customer segments, matching their needs, preferences and affordability	<ul style="list-style-type: none"> • Switchover to digital connectivity under a proposed telecommunications infrastructure upgrade in England by 2025 (TSA, 2017a)
	To build reputation through accreditation from national institutions for service quality and performance	<ul style="list-style-type: none"> • Benchmarking of services through endorsement and accreditations of service quality standards by industry regulatory bodies
	To raise awareness of customers through promotional marketing of the services	<ul style="list-style-type: none"> • Better insights on customers' demographics, needs and preferences, in order to connect and engage with them • Availability of an effective technology infrastructure that allows multiple channels of interaction with the customers • Policy initiatives focused on building awareness of telehealthcare services among the general public at a national level
Value Co-Creation (VC)	To co-design/co-learn with the service users and/or their families	<ul style="list-style-type: none"> • Better awareness about the service among the services users and/or their families to allow higher participation and engagement
	To build partnerships and collaborations with other organisations	<ul style="list-style-type: none"> • Availability of intermediaries or local champions to facilitate the collaborations • Articulation of the value of the service for all concerned stakeholders through viable business cases
	To improve service delivery capability through investment in technology infrastructure and skills for staff	<ul style="list-style-type: none"> • Organisational funding and support for upgradation of infrastructure and staff skills
	To promote an open culture that encourages innovation and information sharing not only within the service organisations but also across organisational boundaries	<ul style="list-style-type: none"> • Availability of an effective technology infrastructure that allows integration with other systems and facilitates information sharing • Availability of information governance policies, standards and guidelines
Value Realisation (VP)	To achieve cost efficiency in the service through gains in productivity and/or through strategic decisions	<ul style="list-style-type: none"> • Use of sound business processes, technology infrastructure, and tools for provisioning and delivery of services
	To seek opportunities for increasing revenues through effective utilisation of service infrastructure, diversification, and redesigning of service packages	<ul style="list-style-type: none"> • Availability of an effective technology infrastructure and skills that facilitates delivery of complementary / additional services • Adequate business skills for service managers to seek commercial opportunities
	To assess and articulate benefits (value) of the service through an evidence-based approach that establishes a plausible 'business case' for the service	<ul style="list-style-type: none"> • Availability of an effective technology infrastructure that allows collection, organisation, and analysis of service data • Adequate business skills for service managers to develop appropriate business cases

Chapter 9: Conclusion

This chapter summarises the research by laying out the conclusions based on the analysis of findings from the study, and subsequent discussions made in the previous chapter. The aims of this research pronounced at the beginning of this thesis are revisited first, followed by a summary of the research processes that highlight how the research questions were further refined and reframed and how the empirical inquiry was conducted. The main findings of the research are presented next, in relation to how the three research questions have been addressed in this thesis. The theoretical, methodological, and practical contributions of this research are stated together with some practical recommendations related to the policy and practice of telehealthcare. Finally, the limitations of this study are acknowledged, and some suggestions for future research directions and possibilities are offered.

9.1. Summary and Key Findings

The primary aim of this research was to explore technology enabled assisted living services such as telehealthcare within the context of English Health and Social Care systems, with a geographical focus on North East England. Accordingly, one of the main objectives of the research was to develop better theoretical insights by adapting and adopting business concepts from other disciplines, which could potentially inform and enrich the future designs of telehealthcare service models. Thus, this thesis started with the following initial research question:

How can telehealthcare technologies act as drivers for new models of care in the context of North East England?

An in-depth review of relevant literature on telehealthcare performed in Chapter 3, suggested that to date, prior research has not sufficiently addressed the business perspectives for value-creating and sustainable service designs, which are considered critical to the effective justification and adoption of complex technology innovations such as telehealthcare. This thesis, therefore, has brought together two interdisciplinary and complementary theoretical frames, from the extant literature on business models and service innovation, to develop a theoretical framework in order to examine, interrogate and explain the phenomena of value creation and value realisation within a telehealthcare service ecosystem.

Following a focused review of literature on business models and service logic, the initial broad question was further refined and reframed into a set of three separate research questions in Chapter 4. The three research questions that this thesis aims to answer are:

Research Question 1:

How can new service business models, with better value propositions for the users and other stakeholders, be designed?

Research Question 2:

What are the opportunities for value co-creation within such designs of new telehealthcare service business models?

Research Question 3:

How can telehealthcare services achieve sustainability through sufficient realisation of value within these business models?

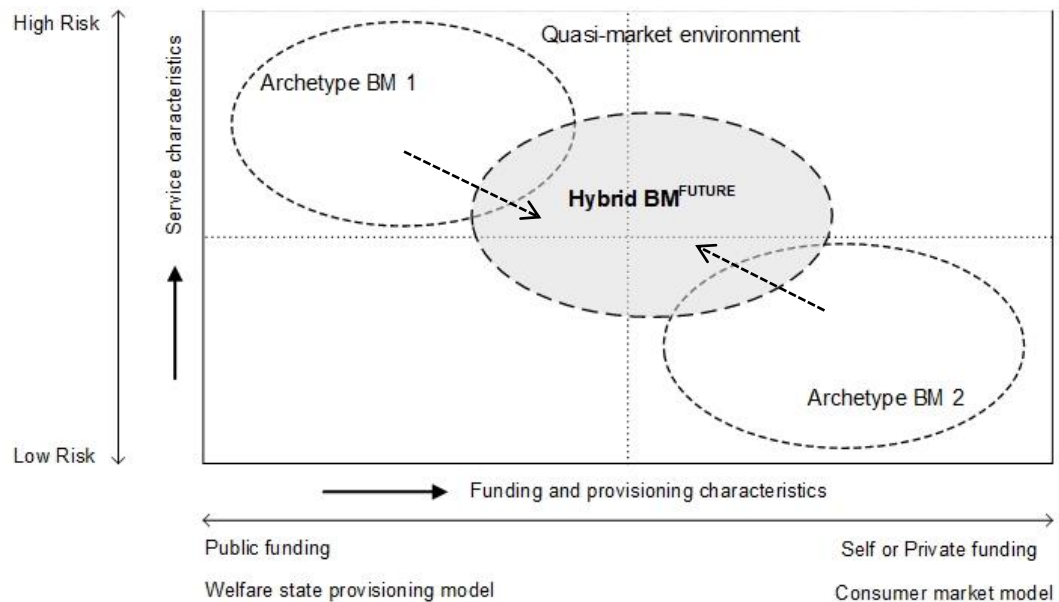
Using the principles of Critical Realism (CR) to inform a case study approach, this thesis employed a multiple case-based research design, resulting in five case

studies of telecare services (including a pilot study) in North East England. Empirical data was collected from these case studies, including a representative sample comprising forty key-informant stakeholder interviews, combined with documentary and observational evidence. Following the steps of a framework developed in Chapter 6, *abductive* and *retroductive* reasoning were applied, which necessitated moving from the concrete (empirical data) to revisiting the abstract (theoretical concepts) and back again, a theoretical explanation concerning the underlying structures and their causal powers (mechanisms) at the *Real*, *Actual* and *Empirical* layers within the stratified reality of a telehealthcare service ecosystem was presented (see Figure 8.4 in Chapter 8).

A critical realist explanation presented in this chapter elucidated our current understanding of the telehealthcare service ecosystem and identified key barriers and enablers for higher value creation and value realisation in the future designs of more contextually aligned business models. Accordingly, this research proposed a typology of telehealthcare service business models based on two contextual dimensions comprising service characteristics, and funding/provisioning logic (reproduced in Figure 9.1 below). The typology signifies the dynamic possibilities or potential variations of business model designs contingent upon the operational contexts for which the business models are to be developed. Illustrations of three central elements of a telehealthcare service business model, comprising: value proposition, value co-creation, and value realisation, were also made to identify a range of design choices and/or considerations for the service providers together with the potential outcomes. Finally, the thesis articulated how an interplay between the design choices and the enabling conditions (or action), at both *macro* and *meso* levels, could facilitate desired outcomes for all concerned stakeholders within the service ecosystem -

through better value propositions, higher opportunities of value co-creation, and finally, realisation of adequate value from the services.

Figure 9.1 Future ‘hybrid’ business model for telehealthcare



9.2. Contributions of the Research

The contributions of this research can be divided into three distinct areas: 1) theoretical 2) methodological and 3) related to policies and practice. These contributions are discussed below.

9.2.1. Theoretical Contributions

Theoretical frameworks play only a modest role in the research concerning the domain of technology enabled care services such as telehealthcare (Mackert, 2006; Gammon et al., 2008). A review of the extant literature on telehealthcare services performed in Chapter 3 reveals that only a handful of studies have employed theoretical perspectives, primarily drawing from theories related to disciplines of evaluation, implementation, and social science. Gammon et al. (2008) argue that while sociotechnical perspectives adopted in studies involving technology enabled care services are important, those studies are not fully

capable of addressing issues or illuminating distinguishing features of the research domain. This thesis has contributed to filling this knowledge gap by offering a theoretical framework in order to investigate and analyse the distinct challenges and opportunities surrounding diffusion, adoption, and the sustainability of telehealthcare services in North East England.

Insights gathered through the review of telehealthcare literature in Chapter 3 highlight that the business perspectives are under-represented in the literature. The market for telehealthcare services has been evolving with a 'mixed economy' of supply (Rodrigues and Glendinning, 2015, p. 649) characterised by a 'quasi-market' environment (Bartlett and Le Grand, 1993; Fotaki, 2011) within a publicly funded system. An increasing shift from a predominantly statutory to more self-funded provision indicates a move towards more market-based mechanisms catering to the health and care service needs for the ageing population (AKTIVE, 2013; Barlow et al., 2012).

It has been argued that a transformation strategy for a healthcare system needs a value-based agenda focussed on creating value for the stakeholders (Porter and Lee, 2013). Accordingly, this study needed a theoretical lens that explores conceptualisations of value - in relation to the processes of both value creation and value realisation within a telehealthcare service. This thesis has brought together two separate theoretical frames from the literature of business models and service innovation, to develop a theoretical framework that concerns the key elements and the interacting relationships between these elements of a telehealthcare service business model (see **Figure 4.2 in Chapter 4**). A business model based thinking conceptualisation allows an understanding of how a service provider could create, deliver and capture value for its customers - through unique value propositions, configurations of organisational capabilities and resources,

and revenue logic (Al-Debei and Avison, 2010). On the other hand, service-based logic offers a systemic perspective of value co-creation through the integration of stakeholders' interactional and relational resources (Akaka and Vargo; 2014) which underscores the vital role of collaborations and partnerships in a complex and diverse service ecosystem such as telehealthcare (Sugarhood et al., 2014). It can be claimed that the synergies and complementarity between these two theoretical perspectives provide some useful and fresh conceptualisations of value which has not been represented in the healthcare literature so far.

Another area of theoretical contribution relates to a proposed business model typology based on two contextual dimensions of service characteristics and funding mechanisms (see **Figure 8.9** in **Chapter 8**). Such a classification approach, illustrated with the examples of two archetypes business models, signifies the dynamic possibilities or variations of business model designs contingent upon the settings in which the business models should operate. Illustrations of three vital elements of a service business model – value proposition, value co-creation, and value realisation – using causal connections between the potential design choices and their likely consequences (Casadesus-Masanell and Ricart, 2007) should serve to provide a simplified yet meaningful representation of a service business model. These illustrations of business model elements (see **Figure 8.6**, **Figure 8.7**, and **Figure 8.8** in **Chapter 8**) hold implications for future empirical research through refining, elaborating, and testing the models; and for practice discipline in which the models could serve as templates to aid the provider organisations, in designing specific service models for their businesses.

9.2.2. Methodological Contributions

Traditionally, research pathways in the healthcare domain follow either positivist notions of 'evidence-based practice' within closed systems (Cruickshank, 2012, p. 72), or interpretive approaches that focus on individual agency and micro-level phenomenon but ignore the macro structural issues (Clark et al., 2007). So far, only a limited volume of healthcare literature has applied philosophical and theoretical tenets of critical realism, primarily with the goals of evaluating telehealthcare interventions in clinical settings (Angus et al., 2006; Kontos et al., 2010; Harwood and Clark, 2012; Berge, 2017). This PhD study has adopted a critical realism informed approach, which offers an alternative way of examining issues around the adoption of telehealthcare technologies within the English Health and Social care system. Such a critical realist approach has enabled this analysis to uncover both the *meso* and *macro* level aspects of a telehealthcare service ecosystem and to provide contextual explanations concerning underlying structural issues and causal mechanisms (McGuire, 2005; Clark et al., 2007). It can also be considered that critical realism asserts an axiological commitment of research to human well-being, empowerment and democratic emancipation (Wynn and Williams, 2012; Connelly, 2001), which bears significance in order to enhance and enable the transformative capacity of telehealthcare policies and practices in the English health and social care systems (Department of Health, 2012; NHS England, 2014).

Another area of the contribution that this research makes to critical realist methodology concerns the application of a multiple case study design. The dominant approach to critical realist case study research concerns examination of a single case with idiographic or intensive focus (Wynn and Williams, 2012, p.788). Comparative analysis of multiple case studies provides greater depth of

analysis with both contexts and mechanisms (Harrison and Easton, 2004, p. 190), through an exploration of ‘demi-regularities’ (Lawson, 1997). Furthermore, a multiple case-based study design provides a stronger basis for theoretical generalization than a single case-based design (Tsang, 2014), considering that the ‘evidence from multiple cases is often considered more compelling’ (Yin 2009, p. 53). In this thesis, a framework providing step-by-step procedural guidance concerning the processes of *abduction* and *retroduction* has been developed (see **Figure 5.5** in **Chapter 5**) and subsequently, applied for a critical realist analysis (see Chapter 8) – leading to theoretical explanations through identification of underlying structures, and causal mechanisms (Kessler and Bach, 2014; Danermark et al., 2002).

9.2.3. Contributions to Policy and Practice

Insights gained from this study hold both strategic and operational implications to the policies and practices related to telehealthcare that deserve considerations from policy-makers, industry bodies and technology suppliers/solution developers at a macro (national) level; and commissioning authorities, health and social care provider organisations at a *meso* (local or regional) level.

While considerable enthusiasm and promotions around telehealthcare services in contemporary practice literature (Skidmore, 2018, TSA, 2018) can be found, advocacy for these services within the policy literature has been somewhat muted. Findings from this study suggest a gap in terms of awareness concerning technology enabled care services (telecare and telehealth) among the general public. Such gap calls for a renewed policy focus in promoting the usefulness and effectiveness of these services both at a national level, using media channels (for example, newspapers and television); and also, at respective local authority

levels, by providing information about the availability of the services and signposting people to appropriate services, wherever possible.

Findings from this study further suggest that the Councils need to revisit their procurement policies that support more innovative ideas and practices on the commissioning of telehealthcare services. It is vital that adult social care functions within the local authorities adopt more comprehensive and user-centric approaches in their care need assessments, involving the service users, their carers, and families. Such a holistic approach in assessments will ensure that referrals are made for appropriate provisions of technology services and signposting to other services (for example: 'social prescribing' services), wherever necessary. Empirical findings also point to skill deficiencies, which calls for local authorities and care service provider organisations need to pay due attention to developing skill development strategies and plans for their workforce. Partnerships with local universities and academic institutions could provide opportunities for quality training and education programmes on digital technology and business-related skills (Woolham et al., 2018).

Another important finding for the practice concerns the role of intermediaries and local champions in building and nourishing collaborations and partnerships among relevant stakeholders of the service ecosystem, cutting across Health, Social Care and Housing sectors. The fragmented nature of the technology market in which a wide array of telehealthcare solutions are available to buyers necessitates appropriate quality and safety standards to be put in place, in order to facilitate informed choices by users based on assured product/service qualities. These issues highlight the vital role of telehealthcare industry bodies such as the Telecare Service Association to guide the provider organisations in adoption and replication of best practices and quality standards. The uptake of assisted living

services is found to be closely associated with the perceived usability, usefulness, and reassurance of the safety of the technologies involved (Cook et al., 2018). Accordingly, there is an urgent need for suppliers and developers of these technologies to move away from existing 'transactional relationships' with local authorities and provider organisations, and work closely with them to co-learn and co-design their solutions.

Findings from this PhD research point towards several useful ideas that could inform relevant stakeholders to frame policies and to develop practices on telehealthcare, to enhance effectiveness and facilitate better adoption of telehealthcare services. Accordingly, a set of practical recommendations have been put forward below (see Table 9.1).

Table 9.1 List of Recommendations

For	Level	Recommendation
Policy	Macro / Meso	Policy level promotions of technology enabled care services (telecare and telehealth) targeted to the general public with aims to create better awareness on the technologies and to promote uptake through advocacy.
Practice	Meso	Proactive role of intermediaries (example: TSA) and local champions to build and sustain collaborations and partnerships among the organisations across health, social care and housing sectors
Practice	Meso	Initiatives around development of technology and business skills by the local authorities and telehealthcare service provider organisations for their workforce.
Policy	Meso	The local authorities need to review their procurement policies for technology enabled care services, in order to encourage commissioning of innovative yet affordable service solutions for the users.
Practice	Meso	A more comprehensive and user-centric approach for assessments of care needs for service users, in order to ensure appropriate provisions of technology services leading to continued use and non-abandonment.
Practice	Macro	Appropriate quality and safety frameworks and standards to be put in place, in order to facilitate informed choices by users based on assured product / service qualities
Practice	Meso	Service providers need to pay attention to building credible evidence base and to articulating the benefits of the service (business cases) for concerned stakeholders

9.3. Generalisability

The theoretical framework developed and subsequently elaborated in this thesis, which describes a telehealthcare service business model, presents generalisability concerning the dynamics of interactions between the critical elements of the business model within a complex service ecosystem exemplified by a diverse range of stakeholders. The five case studies (including a pilot study) have been conducted in this thesis to investigate telecare services within the demographic and socio-economic contexts of North East England.

While the findings of these case studies are context-bound to a considerable extent, a critical realist approach has allowed this research to assemble layered perspectives (Layder, 1993). By combining *meso* level empirical insights from the domain of telecare practice with the *macro* level environments concerning national Policies, Market/Industry, and Technology in England, in-depth contextualised explanations (Welch et al., 2011) of the critical issues surrounding wider adoption of the services have been provided. Such contingent explanations that illuminate the 'transfactual conditions and hidden mechanisms' (Danermark et al., 2002, p. 77), provide opportunities for generalising, although to a limited degree, beyond the localised contexts of this study.

Funding models and provisioning mechanisms for health and social care services in the UK differ considerably with some other developed economies, for example, the United States; and thus, several aspects of telehealthcare service business models found in this study could be context-sensitive and challenging to replicate in countries that take a purely market-driven approach. However, health and care policies of the majority of developed Western European nations espouse welfare agenda that promotes a mixed-economy of service provisions. Therefore, it is possible that the design considerations for telehealthcare service business models

presented in this thesis can be applied, conceivably with appropriate adjustments, in designing similar service models embedded in other geographical contexts.

9.4. Limitations and Further Research

As with all research, this study faces some constraints or limitations which need to be clarified here. Case study research with a critical realist approach traditionally involves an examination of a single case setting (Easton, 2010), with a specific and intensive focus ((Sayer, 2000) in order to provide in-depth, contextually relevant analysis of a complex organisational phenomenon (Wynn and Williams, 2012). However, such studies demand prolonged and deeper access to and commitment of the considerable resources by the participating case organisation (Sayer, 2000; Fletcher and Plakoyiannaki, 2011), which remains a challenge for an academic PhD project. However, a critical realism informed multiple case study design adopted in this thesis has allowed the researcher to examine five telecare services based out of North East England, under a variety of sociotechnical and organisational contexts and to perform a comparative analysis across these services. The emergence of themes from the comparative analysis of these case studies has facilitated the identification of broader causal tendencies or 'demi-regularities' (Lawson 1997), leading to better explanations concerning the underlying structures and mechanisms within the telehealthcare service ecosystem (Ackroyd and Karlsson, 2014).

Critical realist research recommends empirical corroboration to validate the causal inferences drawn through the *retroduction* process (Wynn and Williams, 2012). The researcher acknowledges that an opportunity of presenting the findings of the thesis and getting them corroborated by the key informants of the empirical investigations could have strengthened the theoretical explanations presented in this thesis. However, such a prospect of further engagement with the study

participants has been considered to be not feasible, given the timeline for this PhD and challenges of availability of the senior stakeholders from the concerned organisations.

A multiple case study based research design, informed by critical realist perspectives, has allowed the researcher to collect and analyse both qualitative and quantitative data from a range of sources to aid and enrich the causal analysis (Wynn and Williams, 2012). During the collection of data for the case studies, on numerous occasions, the researcher had struggled to gather structured and meaningful quantitative data that could provide 'hard' facts and figures about the services, for example, financial information concerning costs and earnings; demographic compositions of the service users; and service operational performance data for monitoring and response. Although the perceived sensitivity around sharing data could partially explain such difficulties in collecting quantitative information related to services, at a broader level, however, non-availability of data indicates absence of organisation level focus, and processes and standards for collecting, organising and utilising data for creating valuable insights (Beale et al., 2010).

This research holds several implications for future empirical research. First, this thesis has primarily focused on telecare services in the context of a service ecosystem in North East England. Further research investigations could expand the boundary of telehealthcare service ecosystems to include the NHS England, Clinical Commissioning Groups, and Public Health England. Amidst the overarching policy visions and national initiatives promoting collaborative working between Health and Social Care (NHS England, 2017a), such a broadened scope of research should allow future studies to examine the barriers as well as opportunities of wide-spread adoption, value co-creation and sustainability within

the integrated care pathways (Chrysanthaki et al., 2013), embedded within telehealthcare service ecosystems.

Secondly, future research could refine, elaborate, and ultimately test the potential effectiveness of archetypical telehealthcare service business model designs, as proposed in this thesis, adopting evidence-based approaches (Wainwright, Oates, Edwards, and Childs, 2018), to develop, and evaluate quantifiable performance indicators for the newly designed service models under varying contextual conditions. Finally, the theoretical framework developed in this thesis, by drawing from two interdisciplinary perspectives, business models and service-dominant logic, could be further developed into a 'midrange' theoretical framework, to inform service innovation research in the healthcare and Information Systems domains (Joiner and Lusch, 2016; Vargo and Lusch, 2017).

Appendices

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Appendix 3.1 – List of Studies included in the Literature Review

1. Alaszewski, A. and Cappello, R. (2006) 'Piloting telecare in Kent County council: The key lessons', Canterbury, Centre for Health Services Studies, University of Kent, [online] Available from: https://www.kent.ac.uk/chss/docs/Alaszewski_PilotingTelecare_Dec_2006.pdf (Accessed 8 July 2018).
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Appendix 3.2 – Data Extraction Sheets for the Literature Review

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
1	England	Health Service	A qualitative case study design using interviews with key stakeholders across the pilot sites	To present the findings of a project funded by Kent County Council involving three pilot telecare projects in Kent, UK	Several practical problems encountered in implementing telecare and related lessons
2	UK	Management Studies (Implementation Science)	Single case study of a telecare scheme	To explore the extent to which the mainstream deployment of telecare is likely to happen in the UK	Lack of champions and lack of understanding of care processes at systemic level have led to confusion over funding and responsibilities. person-centred care.
3	UK	Health Science	Critical Overview, conceptual work	To explore the factors that contribute to the adoption of telecare technologies in the UK	Poor adoption is due to the quality of the evidence base for its benefits, problems in integration with existing care services and responsibilities for payment and reimbursement.
4	UK	Management Studies	Systematic review of literature (meta-analysis)	To review the benefits of home telecare technologies for frail elderly people and patients with chronic conditions.	The review findings point to insufficient evidence on telecare interventions, particularly on the cost-effectiveness of these interventions.
5	UK	Health and Social care	Critical Overview, conceptual work	To explore various issues related to adoption of telecare technologies in the context of UK health and social care system	The paper makes several recommendations including the need for improvement of awareness of telecare services within people, an active and ongoing approach to stakeholder engagement, a strategic approach to workforce development.

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
6	UK	Health and social care	Quantitative simulations	This paper aims to develop a dynamic model to understand the systemic impact of telecare implementation over time.	Findings from the study suggest that an increased emphasis needs to be put on understanding the systemic impacts of the implementation of service innovations over time.
7	Scotland	Health Economics	Secondary data available from the partnerships via quarterly returns, postal questionnaires distributed to service users and informal carers, and case studies.	To present a summary of the evaluation of the Scottish Telecare Development, focussing on the measurement of overall program progress toward eight predefined Scottish Telecare Development objectives.	Evidence from the case studies emphasises the need for adequate infrastructure as a prerequisite for telecare implementations and a local 'champion' is key to success.
8	UK	Health Service	Qualitative Framework analysis of data collected through 22 semi-structured interviews	To examine the reasons why people choose not to adopt Telecare, with specific focus on reasons relating to design and suitability of the intervention	Findings from the study suggest that design-related barriers have yet to be addressed despite the technological advancements.
9	Norway	Social Science	Realist Evaluation	To provide a nuanced approach to telecare evaluations by looking at various contextual elements	The study shows how telecare works differently in different situations, which leads to different outcomes. When telecare is correctly adjusted to match the user's needs, abilities and contexts it enables them to feel safe and remain in their own homes.

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10	Scotland	Gerontology	Qualitative analysis of interview data	To present the findings of an evaluation of a telecare implementation in Scotland.	Contextual factors are important for proper understanding of the impact of telecare. The human use of technology and its moral context are critical to its success or limitation.
11	England	Medical Informatics	Analysis of patient-level secondary data linked to various care settings to track patients' care costs in the 12 months before and after their fall.	To explore the whole system cost of the care pathway for older people admitted to hospitals as a result of falls in a community based out of South-west of England, over a two-year period	The study has found that on average, the cost of hospital, community and social care services for each admitted for a fall were almost four times as much in the 12 months after admission, than the cost of the admission itself.
12	England	Medical Informatics	Quantitative analysis of 'real-time' data from telecare sensors	To present a technical overview and discussion of an information provision approach to telecare which was trialled as one aspect of a pilot service in Liverpool, UK.	The Liverpool Pilot study has shown a potential use of telecare as an information provision tool for carers.
13	UK	Social Science	A Prospective Hazard Analysis (PHA) approach has been used within the overall ACTIVE Study Project.	To investigate the human factors (or ergonomics) in telecare systems to identify macro level risks	Failures of technology are of increasing importance given the advances in technology being made. Increased technological capability and complexity, although often with less transparency, will become the norm in such applications. Ensuring the humans in the system are comfortable with such advances may yet turn out to be the greater challenge.

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
14	Ireland	Health Science	A mixed methods approach was used in ENABLE study. A qualitative approach is used in order to collect rich, detailed and in-depth information while a quantitative approach is also used in order to collect more systematic information.	To report findings from the ENABLE study which trialled assistive technologies in the homes of people with dementia across five European countries and assessed their use and usefulness.	Findings from the study reveal that in general, most assisted living devices trialled were used and considered useful by people with dementia.
15	England	Health science	Pragmatic, cluster randomised trial nested within the WSD trial	To assess the effect of home based telehealth on health related quality of life, anxiety, and depressive symptoms in patients with long term conditions.	Telehealth in the WSD trial did not improve quality of life or psychological outcomes for patients with chronic obstructive pulmonary disease, diabetes, or heart failure.
16	UK	Management Studies (Implementation Science)	Qualitative, longitudinal study across nine UK sites that implemented telehealthcare as part of the WSD programme. Ethnographic methods - participant observations and	Drawing on organizational theory, this study aims to explore the issues and opportunities around the policy agenda of whole system integration of health and social care	Findings suggest that due to lack of integration and much ambiguity around what 'whole system working' actually entails in practice, the concept of whole system redesign around remote care can be unrealistic under the current circumstances.

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
			interviews are employed in the study.		
17	Scotland	Information Systems	Qualitative analysis of focus group data	The study aims to identify the existing barriers to the successful adoption of assisting living technologies such as telecare in Scotland.	The findings from study reveal a number of barriers to the adoption of telecare technology. The issues have been identified across the following areas: 1. Acceptance issues; 2. Ethical, legal, privacy issues; 3. Availability of resources; 4. Personalisation and evolution of provision; 5. Awareness, education and training.
18		Information Systems	Critical Review, Conceptual Work	To review published literature on telecare, including government reports and case study papers to illuminate the key system components of a telecare system.	A telecare system can be conceptualised as an information architecture, which details the fundamental system requirements for various parts of the system.
19	England	Health Service	Data collected through semi-structured interviews. Framework analysis of qualitative data.	To explore the factors that influence the decision to adopt and engage with telehealth and telecare services	The referrers of telehealth and telecare services play a vital role in the adoption and retention by service users. There is also a need to improve the collaborative working between the users, referrers, GPs and healthcare providers.
20	England	Information Systems	Quantitative analysis of service users' telecare data	To present the findings from the analysis of contact data within one telecare call centre in North East England.	Findings from the study reveal that a significant proportion of contact episodes were due to the reasons other than the emergencies.

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21	USA	Information Systems	Qualitative (thematic) analysis of participant workshop and focus group data	To better understand older adults' perceptions of smart home technologies and to identify the barriers to adoption.	While there has been interest in Smart Home technologies, a variety of concerns that included usability, reliability, trust, privacy, stigma, accessibility and affordability have been voiced by the participants
22	Wales	Social Care Policy	Quantitative analysis of survey data	To explore the perceptions of the service users about the value that telecare provides for them and their families	Telecare service has provided reassurance to the users and the families. Also, the users have found the service 'value for money'.
23	Sweden, Spain and Slovakia	Social Science	Quantitative analysis of field trial data	To report results of the impact of an information and communication technology (ICT) platform and telecare services on the quality of life (QOL) of older people in three European communities.	Overall findings show that healthier, more independent users perceived more benefits from the services compared to users who report more health problems and are less independent.
24		Information Systems	Systematic review of literature	To provide a comprehensive review of health related smart home projects and identify the key challenges.	The paper has found that the ethical aspects of the Smart Home solutions demand due attention, in addition to the technology elements.
25	UK	Information Systems	Method for Dependable Domestic Systems (MDDS) and a model, Dependability Model of Domestic Systems (DMDS).	To present development and application of the Dependability Telecare Assessment tool (DTA) and the Telecare Assessment process.	DTA could be an useful tool for conducting Person-Centred telecare assessments accommodating the holistic needs of the users and mitigating their risks.

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26		Medical Ethics	Critical Overview, conceptual work	To examine the telecare technologies critically with respect to the ethical issues related to autonomy and independence of the elderly users affected by the remote and impersonal monitoring.	The paper brings about some issues highlighting the ethical tensions related to application of telecare technologies for the care of the elderly.
27	UK	Social Care Policy	Critical Overview, conceptual work	To explore the ethical issues raised by the use of telecare monitoring and surveillance equipment	The ethical implications of telecare are not being sufficiently considered, due to the focus on bio-medical aspects, rather than relational ones
28	The Netherlands	Management Studies	Single case study of a Dutch smart home implementation employing interviews for data collection	To explore the key market barriers in Smart Home value networks from the literature, and based on an empirical study, provides a value network analysis of a Dutch smart home implementation case.	The findings from the study suggest that requirements of end-users requirements need special attention while designing and implementing a Smart Home platform and also, integration and management of the platforms are crucial.
29	Sweden	Social Science	Qualitative analysis of interview data	To explore senior citizens' experience on telemonitoring surveillance and monitoring in relation to their privacy.	The study has found that electronic surveillance can have a dual nature of not only constraining but also enabling the service user.
30	UK	Social Science	As part of the overall AKTIVE Study Project.	This paper focuses on older people's health conditions and the kinds of care support mechanisms they had in place, so it is important to identify some of their characteristics.	The study highlights the need for 'holistic' assessment of all aspects of older people's lives, which considers a wide range of factors as such assessment could help determine which telecare devices, in which combination, are likely to be most effective.

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31	England	Health and Social Care	Analysis of WSD results	As part of the Whole System Demonstrator Action Network (WSDAN) briefing papers, this paper examines the experiences of the network's 12 member sites in implementing telehealth and telecare.	The paper presents several key issues emerging from the experiences of the WSDAN sites which need to be addressed for the successful adoption of telehealth and telecare.
32	UK	Health and Social care	A scoping review of 171 assistive technology products and 331 services	To explore how assistive technology is being used by people with dementia and their carers in their daily routines.	The paper suggested that a greater attention is needed on provision of information related to about assistive technology services across an increasingly mixed economy of dementia care providers.
33	UK	Health and Social Care Policy	Review of evidence base (primarily from the preliminary findings from WSD programme)	To examine the challenges and opportunities for integrated care with respect to telecare and telehealth technologies.	The paper has found that more understanding of the benefits is required for wide-spread adoption and diffusion of telehealth and telecare in England.
34	UK	Health Science	A mixed method approach that employs in-depth ethnographic studies of people's experience of assisted living technologies and organisational case studies.	To conceptualise a new paradigm for studies of assisted living technologies in their organisational, social, political and policy context.	The paper has viewed the telehealthcare technology as part of a dynamic, networked and unstable system and highlighted the situated behaviours and transferable insights to comparable settings.
35	UK	Health and social care	A mixed method approach that uses interviews, ethnographic case	To define quality in telehealthcare technology products and services that aim to support older people living with illness or disability.	Findings from the study suggest that technological advances must be underpinned with a user-centred approach to design and delivery of

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			studies, and design workshops with concerned stakeholders.		telehealthcare services.
36	UK	Health Science	Discourse analysis of publications supplemented with field notes	To examine how different stakeholders understand telehealth and telecare technologies	
37	UK	Social Science	Data collected through ethnographic methods were analysed phenomenologically and contextualised using a structuration approach.	To develop a phenomenologically and socio-materially informed theoretical model of assistive technology use.	The study has found that technology providers need to revise their assistive technology design policy to provide more flexibility to the users and their carers which could improve the situated, lived experience of multimorbidity.
38		Dementia Research	Using an analytical framework supplemented with field research as part of the ENABLE project.	To describe the development of a protocol for a multinational assessment study of different assistive aids to be used by people with dementia living in their own home.	The paper has described the development of the protocol for the assessment of assistive technologies for people with dementia and made some practical recommendations.
39	UK	Information Systems	Empirical research with a large UK housing provider that includes surveys, interviews and ethnographically	To examine aspects of user engagement with assisted living technology.	The findings from the study show that user engagement with assistive living technologies is shaped and supported by the ongoing social interactions of residents and skilled staff at independent living schemes.

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			informed observational work over 2 years.		
40	UK	Social Science	Part of the overall AKTIVE Study Project.	To explore the identities and lifestyle choices of older people participating in the AKTIVE study and to gather insights on how telecare can support the maintenance of independence and preferred identities.	The paper has found that there is a 'trade-off' between how telecare made people feel or look and its contribution to their identities as active, independent and embedded in places and communities which they valued.
41	Uk	Social science	Content analysis of data based on a coding template derived from a systematic review of the academic literature on smart homes and their users.	To presents the results of a content analysis of industry-produced smart home marketing materials.	The findings from the paper reveal several important insights on the adoption of Smart Home solutions.
42		Health Science	Human Centred Design (HCD) processes	To assess users' capabilities and attitudes towards technology and to make analytical recommendations for human-centred design approaches and design specifications.	The paper has shown how the fit between capabilities of the user and demands of the device can be optimised in a process called 'Human Centred Design' and has made some analytical recommendations for design approaches and design specifications.
43	UK	Health Science	Pragmatic, cluster-randomised controlled trial with nested economic evaluation	To examine the costs and cost-effectiveness of telecare	Telecare has not been found as a cost-effective addition to usual care.

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44	UK	Health and social care	Three qualitative case studies of the sites from WSD Programme. Data collection through semi-structured interviews, participant observation and document review.	To investigate organisational factors influencing the implementation challenges of telehealth and telecare	Simultaneously gathering evidence from large-scale RCTs and the implementation of remote care services can create confusion. Local incentives must be taken into account from the very beginning of implementation
45	UK	Health Science	Pragmatic, cluster randomised controlled trial nested within the WSD trial - Participant-reported questionnaires	To examine the effect of telecare on health-related quality of life, anxiety and depressive symptoms	Telecare may afford relative benefits on some psychological and health-related quality of life outcomes compared to users who only receive usual care.
46		Medical Ethics	Critical Overview, conceptual work	Examines the issue of physical and social isolation of vulnerable individuals in a telecare service and proposes an alternative view to explain the issue.	The paper suggests that the potential disconnect between telecare designers/service providers and users causes users' isolation.
47	UK	Information Systems	Critical Theory	To offer an alternative perspective on telehealth, which focuses on different rationalities, knowledge claims and legitimisation processes	There are competing rationalities influencing telehealth, and conflicting knowledge claims that legitimise telehealth.
48	UK	Health Economics	Review of evidences from previous studies and documents,	To examine the economic case for accelerated investment in technology that could deliver savings on the overall cost of care for people with	The study has found that role of digital technology based solutions are limited in dementia care and support, and. Identified a range of barriers to the use

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			and from interviews with a range of experts.	dementia.	of technologies by people with dementia and carers.
49	UK	Social Science	Part of the overall AKTIVE Study Project.	To examine the social relations and their types in the everyday lives of participants in the AKTIVE study and to gather insights on how telecare fits into these.	Findings reported in the paper suggest that older people's social relationships could play a more prominent role in supporting their use of telecare at every stage.
50	Israel	Gerontology	Mixed methods	To examine the ethical aspects of using assistive technologies, such as tracking devices leveraging Global Positioning Systems (GPS) for tracking people with dementia.	The study recommends that the preferences and best interests of the people with dementia should be given highest priority while making difficult decisions involved in dementia care.
51	UK	Health Science	A mixed method approach that employs a range of methods including interviews, focus groups, project meetings, participant observation, survey responses, and document analysis	The aim of the study is to examine barriers and facilitators to implementation of national telehealthcare program: "Delivering Assisted Living Lifestyles at Scale" (Dallas) conducted between 2012 and 2015.	The study has identified several factors hindering large-scale adoption of telehealthcare services. These factors include: lack of IT infrastructure, uncertainty around information governance, lack of incentives to prioritize interoperability, and a market perceived as difficult to navigate.
52	UK	Gerontology	Critical Overview, conceptual work	To present a conceptual analysis of trust in assistive living technologies.	The paper finds found that relationships between the older person and the technology should be based on trust. Institutional providers of these technology services also need to instil trust among the users.

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53		Medical Informatics	Systematic Review (meta-analysis)	To examine the levels of technology readiness among older adults and evidence for smart homes and home-based health-monitoring technologies that support aging in place for older adults with complex care needs.	The paper finds that the level of technology readiness for smart homes and home health monitoring technologies is limited.
54	8 European countries	Social Science	Multiple case study based design	To investigate the role played by incentives and reimbursement schemes in the development of integrated care and telehealthcare technologies uptake.	The study suggests that incentives for an integrated care are missing in current payment paradigms.
55	Spain	Social Science	Qualitative	to discuss how autonomy is embodied through the use of a telecare device.	The paper has argued that the concept of autonomy is not straightforward, it can be expressed in different ways depending on the technology, self-monitoring practices, people involved and spaces in which they live.
56		Social Science	Critical Overview, conceptual work	To examine the concept of patient engagement in relation to the digital technologies that offer self monitoring and self-care.	The paper argues that the technoutopian discourses commonly found in the mainstream healthcare policy literature do not acknowledge the complexities and ambivalences involved with the application of self-monitoring and self-care technologies.
57		Information Systems	Systematic Review of literature	To present a comprehensive review on the state-of-the-art research and development in smart home based remote healthcare technologies.	The review findings suggest that the smart home products and solutions which are currently available in the market are proprietary and lack interoperability. A common platform for all systems based on industry standards

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					should result in many alternatives for the consumers, creating higher adoption for smart homes.
58		Information Systems	Systematic Review of literature	To explore the effectiveness of smart home technologies as an intervention for people with physical disability, cognitive impairment or learning disability.	Findings from the review highlights the current lack of empirical evidence related to benefits of smart home technologies within health and social care systems.
59	UK	Health Service	Large scale comparative study employing qualitative data collection techniques: semi-structured interviews with key informants, task-groups, and workshops; framework analysis of qualitative data informed by Normalization Process Theory.	To identify factors that inhibit the implementation and integration of telecare systems for chronic disease management	Slow and uneven implementation and integration do not cause problems of adoption. Incomplete understanding of the role of telecare systems and contextual embeddedness contributes to the problem.
60	UK	Social Science	Qualitative (thematic) analysis of data collected through two Focus groups.	To present the views of 12 people with dementia, 3 caregivers and 5 older people about GPS devices to promote safe walking.	The study finds that GPS devices for people with dementia is generally perceived as useful by older people, people with dementia and family caregivers, in supporting independence.

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61	England	Gerontology	Focus Groups, Interviews and Questionnaire Survey	To explore the ways older people and their carers gain information about assistive technologies.	Findings from the study suggest that there is a scope for improving the access to information on assistive living technology products and services across the board.
62	UK	Information Systems	Critical Overview, conceptual work	This paper aim to examine some of these issues related to home care system design and implementation.	The paper finds that there is a need to address the dynamically changing needs of the complex network of people involved in a home care service.
63		Health Science	Systematic review of literature (meta-analysis)	To examine the evidence regarding the benefits, risks and costs of telehealthcare.	Findings from the review suggests that the greatest benefits are likely to be achieved for patients at highest risk of serious outcomes and there is a need for longer-term studies for the evaluation of the benefits.
64	England	Social Care Policy	Review of a survey of local authorities which demonstrates a clear expansion of AT provision	To demonstrate the need for telecare service providers to broaden their horizons in order to offer an extended range of service options.	The paper proposes that the Nottingham model of assisted living provider services as an example of how home improvements, community equipment and telecare services may be integrated
65		Social science	Research draws ethnographic and deliberative panel data from European Community funded research.	To examine how telehealthcare technologies contribute to a reshaping of the place and experience of care for older people.	The paper contributes to conceptual debates around the issue of de-territorialisation of the physical structure of the care institutions and its re-manifestation through new spaces.
66		Gerontology	Systematic Review of literature	To assess the effectiveness and feasibility of smart-home technologies for promoting independence, health, well-being and quality of life.	The review has reported that the adoption of smart-home technologies among older people can be improved by addressing the privacy concerns.

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67	England and Spain	Social Science	Thematic content analysis of data collected through Ethnographic field notes, interviews, and focus groups.	To examine discourses about how telehealth and telecare technologies assume certain forms of patients	The paper proposes that the aims of telecare policies and the designs of telecare systems should allow creative engagement with technologies, thus promoting the co-production of care relations.
68	Sweden	Management Studies	Systematic Review	To review the existing literature on the issue of innovative technology adoption by older people.	Findings from the review reveal several trends on the elderly people's technology adoption.
69		Health Service	Critical Overview, conceptual work	To discuss the importance of an overall client-focused assessment approach for telecare solutions.	The paper suggests that telecare needs to be embedded within the care pathway to enable it to become integrated and mainstreamed.
70	Germany/ The Netherlands		Interviews	This paper critically examines the dynamic interactions between people and places in the application of telecare technologies.	The paper emphasizes the place-dependency of the use and meaning of technical devices by showing how the same technological device can do and mean different things in different places.
71		Social science	Review of literature	The paper aims to answer this question: can smart home technology contribute to independent living, according to older adults themselves?	Older people who are not using smart home technology feel that it could support independent living, although they also express various concerns. They also perceive that smart home technology is not intended for themselves, but rather for other older persons who are less healthy
72	The Netherlands	Health Service	Data collected through Postal questionnaire is analysed by	To gather insight into client characteristics and characteristics of home telecare contacts, and also, to examine the applicability of four	Results of the questionnaire show that all clients' perceived that DOI attributes had a significant influence on adoption.

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			regression techniques, employing a theoretical model.	perceived attributes in Rogers' diffusion of innovations theory, which may influence the adoption: relative advantage, compatibility, complexity and observability.	
73	UK	Gerontology	Qualitative analysis of Focus group data	Aims to examine the practical and policy implications of telecare, in relation to the possible uses of telecare and the perceptions of the stakeholders involved.	Development of policy and practice concerning telecare needs to pay careful attention to concerns held by all stakeholders, particularly in regard to individual choice, surveillance, risk-taking and quality of service.
74		Medical Ethics	Critical Overview, conceptual work	The aim of this paper is to critically examine the ethical issues concerning application of telecare for people with intellectual disabilities and to situate the issues within a broader ethical framework.	The paper has advocated for a wider debate on the ethical issues discussed, in order to guide development on related policies and strategies.
75	Sweden	Social science	Critical Overview, conceptual work	To explore whether the telehealthcare technology designs enable a mode of healthcare delivery which is independent of space and time.	The paper suggests that telehealthcare technology designs invariably unfold new spaces of visibility.
76	Scotland	Social Care Policy	Not Specified	To review the evidence on the cost effectiveness of preventative support services that assist older people with care and support needs to remain in their own homes., in the context of the Supporting People Programme implemented by the Scottish Government.	The paper has found that limited availability of data on the costs of low-level support services remains a significant challenge. It is also problematic to ascribe typical costs to preventative support services because those interventions can vary considerably in their nature and intensity.

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77	The Netherlands	Health Science	Ethnography with participant observation and interviews.	In the context of Dutch telehealthcare practices, this study aims to analyse the impact of technology innovation such as telehealth on the by comparing the promises of intervention with actual processes of incorporating technologies in healthcare practices.	Findings from the study suggests that when innovative technologies such as telecare are put into practice 'the same' technology will perform differently and in order to function, technology has to fit the practices of the users.
78	The Netherlands	Medical Informatics	Qualitative Analysis of interviews	The aim of this study is to arrive at a set of key factors that can be used in further implementation of video communication.	The study findings highlight the vital need for a champion-led implementation of home telecare to advance to the next stage.
79	UK	Gerontology	Qualitative Analysis of interviews	To explore the perspectives of carers of people with dementia.	The study has reported several key challenges, including establishing an appropriate balance between two goals for the service - maintaining privacy and autonomy and, maximising safety.
80	UK	Health and Social care	Review of qualitative data on the older people and their carers	Aims to explore the effect of supplementing and/or substituting, traditional forms of face-to-face care with remote care technology, such as telecare on the lives of its user	Findings from the paper suggests that telecare interventions could lead to increased work for older people and their carers and feelings of dehumanization.
81	UK	Health and Social care	Interviews with telehealthcare suppliers and service providers, followed by detailed ethnographic studies of individuals to map the complex	This paper presents the findings from the ATHENE (Assistive Technologies for Healthy Living in Elders: Needs Assessment by Ethnography) project.	The study concludes that the success of telehealthcare programmes hinges on effortful alignments in the technical, organisational and social configuration of support.

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			healthcare, social care and socio-cultural needs of older people and their carers from a range of ethnic and social groups		
82	England	Health Science	Cluster randomised controlled trial conducted as part of WSD telehealth programme	To investigate the data from the WSD trial programme, in order to understand acceptance of the telehealth devices to the patients involved in the trial and to articulate how acceptance of the technology impacts widespread deployment of telehealth.	Active rejection of the telehealth intervention has been found to be the most frequent reason for withdrawal.
83	UK	Gerontology	A three-stage participatory design process involving focus groups, participatory design workshops and prototype development.	To critically discuss the role of technology to facilitate independent living for people with dementia from a practical and ethical perspective.	The paper advocates for an acceptable and effective technology solution through a user-centred design process involving users and their carers.
84	UK	Health Science	Qualitative (thematic) analysis of data gathered through interviews, observations and a focus group with service users and their carers.	To examine the extent to which the telecare systems are integrated with the social practices that incorporate the patients, their interactions with professionals and the synergy.	The findings from the study suggest telecare could be an acceptable alternative to usual care, with added benefits such as reduced need to travel and the reassurance provided by continuous monitoring.

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85	UK	Social Science	As part of the overall AKTIVE Study Project.	To explore the limits and barriers to the take-up and adoption of telecare	The paper suggests that individual service users are reluctant to use telecare for a variety of reasons, including the perceived stigma, reliability of technology, a lack of provision in their local authority, and inadequate information and training.
86	UK	Health Service	Qualitative study nested within a large randomised controlled trial under WSD programme	To explore barriers to participation and adoption of telehealth and telecare	The disruption of interventions and withdrawals go beyond more common expectations about privacy and dislike of technology.
87		Medical Ethics	Critical Overview, conceptual work	To identify different types of self-management, and to investigate compliance logics embedded in the telecare systems.	Telecare promotes forms of self-management in which compliance to medical knowledge is central. There is a need to develop telecare systems that incorporate concordant and collaborative forms of self-management, in which the patient's own perspective is empowered.
88		Health Science	Critical Overview, conceptual work	To examine the legal, ethical and socioeconomic aspects of telecare services , with respect to older persons' community care.	Factors examined include equipment liability, service malpractice, technical and service standards, consent and mental capacity, liberty and justice, research trials, human factors, dependence, privacy, security, accessibility, quality, affordability, social inequalities and community factors.

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89	England	Gerontology	Analysis of qualitative data collected from the semi-structured interviews. Constant comparative analysis following the principles of Grounded Theory.	In the backdrop of UK national policy agenda of 'Ageing in Place' for older people, this paper explores the benefits, problems and challenges that exist in relation to 'Ageing in Place' in the UK	While the notion of 'ageing in place' has become a significant part of the health and social care policy discourse and there are many benefits of this, there can be significant issues due to loneliness and a lack of community support.
90	England	Health Service	Unspecified	To present the results of a collaborative project between Birmingham City Council and Tunstall UK, in implementing a large-scale, city-wide telecare service with the objectives of ensuring safety and support for older and vulnerable residents whilst maximising their independence.	With over 5500 referrals, the telecare service has reduced waiting times for social care, reduced ambulance call-outs and achieved savings in the tune of approximately £900,000.
91	UK	Health Science	Cluster randomised trial comparing telecare with usual care	To assess the impact of telecare on the use of social and health care	Telecare in the WSD trial did not lead to significant reductions in service use.
92	UK	Health Science	Pragmatic, multisite, cluster randomised trial comparing telehealth with usual care	To assess the effect of telehealth interventions on the use of secondary healthcare and mortality	Telehealth in the WSD trial leads to lower mortality and emergency admission rates.

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
93	UK	Gerontology	Qualitative analysis of interview data collected as part of the 'Assistive Technologies for Healthy Living in Elders: Needs Assessment by Ethnography (ATHENE)' project.	To identify and explore factors that influence adoption, implementation and continued use of telecare technologies.	Telecare is a complex innovation that requires coordination and collaboration between, people and organisations. These contextual factors must be understood and addressed to promote higher adoption.
94	Scotland	Health Science	Questionnaire Survey	To present an evaluation of the user experience of a telecare product.	Findings from the study suggest that while the users view the service extremely positively, but the patterns of usage of the product have been driven by a variety of psychological factors.
95		Information Systems	Critical Overview, conceptual work	To review the advances in telecare technologies during the past decade	The paper provides a summary of past developments in telecare and the prospects for the future.
96	England	Information Systems	Action research study design	Using a lens of systems integration theory, the paper aims to investigate how health and social care delivery, through the Better Care initiative, is currently being transformed in a major UK city.	The study highlights the need for interoperability and integration of information systems to support an integrated way of working between health and social care. Information governance is one of the key challenges and barriers of data sharing between the two sectors.
97		Gerontology	Critical Overview, conceptual work	To examine how telecare can assist people with dementia to live independently and maintain their identity	Several practical ways that telecare can assist people with dementia have been proposed, including the support to the person's daily activities and reassurance

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
98	UK	Management Studies (Implementation Science)	Design workshops with users of telehealth and telecare, their carers, service providers and technology suppliers supplemented by vignettes developed from in-depth ethnographic case studies.	To investigate the issue of low uptake of telehealthcare services by older people and explores stakeholders' perspectives on the design features of technologies and services to enable and facilitate the co-production of new care solutions.	Findings from the study highlight the need on supporting the social processes that facilitate the co-production between formal and informal care networks in telehealthcare ecosystem.
99	UK	Health Science	Following an initial interview, study participants were given a set of cultural probe materials, including a digital camera and an activity book to complete in their own time for one week. After one week, the researcher and participant jointly reviewed the materials as part of the home visit interview	The paper describes the development of a cultural probe tool produced as part of the ATHENE project and how the tool was used within the study.	It has been proposed that cultural probe methods can help building a rich picture of the lives and experiences of older people to facilitate the co-production of assisted living technologies.

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
100		Occupational Therapy	Systematic Review (meta-analysis)	To present the findings from a literature review that examined the topic of compliance of patients with prescribed adaptive equipment post hospital discharge.	The factors identified by the review that reportedly affect compliance are considered under five discrete categories: medical-related, client-related, equipment-related, assessment-related and training-related.
101	England		A series of pilot studies undertaken by the Cheshire East Council Community Services in improving the telecare service provisions.	This paper presents findings from a series of pilot projects rolled out by Cheshire East Council and discusses the outcomes, in terms of cost savings and improved processes in provisioning telecare services.	The study has presented the findings from the pilot studies, which suggest a significant amount of savings in a year, and improved processes for assessment.
102	UK	Social Care Policy	An online survey questionnaire	The primary aims of this study is to examine local evidence against the strategic aims of telecare services to older people and to investigate how telecare services are been operationalised and delivered.	Among several findings from the study, it has been highlighted that provisioning of telecare in most local authorities has been intended to save money.
103	UK	Social science	As part of the overall AKTIVE Study Project.	The focus of the paper is on the different types and configurations of formal and informal support in place, alongside telecare, to support frail older people.	The paper has suggested three networks of support for telecare. Identifying the caring network preference as part of the telecare assessment process should help in enhancing uptake of the telecare services.

Reference Id	Country (if applicable)	Discipline	Study design / Method	Aims / Focus	Key Findings
104	UK	Information Systems	Multiple case study based design	This document is the final report on the research commissioned by European Commission that has been conducted between January and May 2009 in the U.K., specifically in England. The aim of the research is primarily to examine the way ICT is used by those receiving and delivering care in domiciliary settings.	Findings from the study demonstrate the considerable potential and current limitations of ICT-based systems in the provision of social care, in relation to both service users and healthcare professionals.
105		Medical Informatics	Systematic Review	Institute of Prospective Technological Studies (IPTS) of the Joint Research Centre, European Commission	Barriers to the adoption of assisted living technologies are: privacy, trust, functionality/added value, cost, and ease of use and sustainability for daily use, perception of no need, stigma and fear of dependence. The “gerontechnologies” that specifically target older people invokes negative attitudes about the uptake of technologies

Appendix 4.1 - List of Healthcare Literature concerning Business Models

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Appendix 5.1 - Interview Topic Guide for the Case Studies

Question category	Theme	Topics / Questions
Introductory	Opening Questions : Personal profile, Organisation & Service - Vision and Strategic Goals	Role, Years with the Organisation, Job responsibilities etc.
		Overall experience of the organisation (purpose, culture etc.)
		Current state of service. Scope, Performance, Challenges, Issues etc.
		Future plans
Strategic / Operational	Value Proposition	For the service users
		For the family and carers
		Service KPIs, evaluation mechanism
		Accreditation of service
		For the commissioners
Strategic	Financial Model	Revenue streams
		Costs involved in delivering the service
		Profit / Surplus generation plan
		Competition scenario
Strategic / Operational	Customers	Typical profile of your customers
		How do you communicate to / engage with your customers?
		Any suggestion on how such relationships can be further enhanced?
		Customer pain points and perspectives of the Telecare service
Strategic / Operational	Resources & Capabilities	Infrastructure - Physical (equipment, office, transport, computers)
		Information Systems - Maturity and Adequacy

Question category	Theme	Topics / Questions
		<p>Information flow within or beyond the organisation (GP Systems, Council, NHS CCG, Housing Associations, Public Services - Fire , Ambulance Service etc.) - Formal as well as Informal</p> <p>Knowledge sharing and capturing - tools or mechanisms</p> <p>Assets - Best Practices , Templates, Tools, Processes for service delivery</p> <p>Staff skills - Functional and Digital</p> <p>Who are your Suppliers, Partners and Collaborators? How do you engage with them? Procurement / Finance etc.</p> <p>How do you see your working relationships with the network - partner / collaborators in future?</p>
Operational	Processes	<p>Pain Points / Challenges</p> <p>Ideas for improvement</p> <p>Decision making processes</p> <p>Innovation in work - how new ideas are generated, encouraged and implemented?</p>
	Conclusive Question	Future of the service and TECS in general


Appendix 5.2 - Participant Consent Form for the Interviews



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Participant Information and Informed Consent Form

Newcastle Business School
University of Northumbria

Title of Research	Strategic Modelling of ICT-enabled Assisted Living Health and Care (Telehealth/Telecare) Services in the North-East England
Name of Researcher	 Suman Bhattacharya
Address for correspondence	Newcastle Business School Northumbria University, City Campus East 1 Newcastle upon Tyne NE1 8ST, UK
Telephone	0778 4039898
E-mail	Suman.bhattacharya@northumbria.ac.uk
Description of the broad nature of the research	The purpose of the research is to explore the ICT-enabled assisted living health and care (Telehealth/Telecare) services through the lens of business models, service design and value creation. The project investigates the nature of collaboration, information / knowledge flows that facilitate better integration between health and care systems and emergence of new value-creating and sustainable business models. It employs a qualitative multiple-case study based research design and data collection is performed through individual interviews, focus group discussion / workshops and document studies.
Description of the involvement expected of participants including the broad nature of questions to be answered or activities to be undertaken, and the expected time commitment	<p>The expected involvement of the research participants is as follows:</p> <ul style="list-style-type: none"> • Face-to-face (preferred) or Telephonic interview (approximately 45 minutes to 1 hour) • Any other meetings deemed necessary for the research upon negotiation with the research participant. <p>The interviews will be based upon employees' experiences related to Telehealth / Telecare services. The semi-structured interview will be exploratory in nature and the interview questions will touch upon various aspects of the Telehealth / Telecare services including the value proposition and realisation, provisioning, delivery, challenges and opportunities. Interviews will be recorded with a digital voice recorder and transcribed. Participants have the right to withdraw at any stage.</p> <p>Anonymity will be assured by changing the names of the participants, the organisations and people that they name during the interview in the transcripts. Interview transcripts will be emailed back to participants for reviewing and agreement. Participants are free to make any amendments, deletions or additions to the transcripts. Confidentiality will be maintained in terms of storing data securely on computer and ensuring hard copies of transcripts and field notes are stored in a locked cupboard.</p>
Additional information about the research	The data collection timescale of this study is from September 2017 to January 2018.

Information obtained in this study be anonymous (i.e. individuals and organisations will not be identified *(unless this is expressly excluded in the details given above)*).

Data obtained through this research may be reproduced and published in a variety of forms and for a variety of audiences related to the broad nature of the research detailed above. It will not be used for purposes other than those outlined above without your permission. Participation is entirely voluntary and participants may withdraw at any time.

Northumbria University is the data controller under the Data Protection Act (1998)

By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this study on the basis of the above information.

Participant's Signature

Date

Please keep one copy of this form for your own records

Appendix 5.3 - References of Case Study Documents

Id	Document	Document type
1	Coast and Country (2016). Corporate Plan 2016-2020. Available from: www.coastandcountryhousing.org.uk [Accessed 28 January 2018]	Business plan
2	Redcar & Cleveland Borough Council (2016a). Adult Social Care: Market Position Statement 2016/17. Available from: https://www.redcar-cleveland.gov.uk/resident/adult-children-health/adult-care/commissioning-market-development/Pages/Market-Position-Statement.aspx [Accessed 30 June 2018]	Business plan
3	Redcar & Cleveland Borough Council (2016b). Adult Care & Health and Children's Services: Commissioning Plan 2016 -2019. Available from: https://www.redcar-cleveland.gov.uk/resident/adult-children-health/adult-care/commissioning-market-development/Pages/Commissioning-Plans.aspx [Accessed 30 June 2019]	Business plan
4	Coast and Country (2017, May 15). Coast & Country's HomeCall recognised for 'Transformation' of services. Available from: https://homecall.me/news-and-publications/coast-countrys-homecall-recognised-for-transformation-of-services-1865/ [Accessed 30 June 2018]	News press release
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6	Coast and Country (2017, April 28). HomeCall and Zetland FM Partner to Raise Awareness of Independent Living Service. Available from: https://homecall.me/press-releases-and-news-features/homecall-and-zetland-fm-partner-to-raise-awareness-of-independent-living-services-1861/ [Accessed 30 June 2018]	News press release
7	Sunderland Care And Support Limited (2018). Annual Report. Available from http://www.sunderland.gov.uk/Committees/CMIS5/Document.ashx [Accessed 30 June 2019]	
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11	Sunderland City Council. https://www.sunderland.gov.uk/article/16448/Smart-home-technology	Website article
12	Academic Health Science Network (2018). Well Connected Care Homes. Available from: http://www.ahsn-nenc.org.uk/what-we-do/improving-population-health/digital-health/well-connected-care-homes/ [Accessed 30 June 2018]	Website article

Id	Document	Document type
13	Sunderland Care & Support (2014, February 20). New approach to care and support. Available from: http://www.sunderlandcareandsupport.co.uk/news-and-information/press-releases [Accessed 30 June 2018]	News press release
14	Care Home Professional (2018). SUPPLIER FOCUS: Over 500 care homes install digital health monitoring system. Available from: https://www.carehomeprofessional.com/supplier-focus-500-care-homes-install-digital-health-monitoring-system/ [Accessed 30 June 2019]	Website article
15	Digital Health (2018). Partnership Working – Advisory Series. Available from: https://www.digitalhealth.net/2018/04/advisory-series-partnership-working/ [Accessed 30 June 2019]	Website article
16	Gateshead Council (2018). About Gateshead Council. Available from https://www.gateshead.gov.uk/article/3748/About-Gateshead-Council [Accessed 30 June 2019]	Website
17	Gateshead Director of Public Health (2017). Inequalities 'It never rains but it pours'. Available from https://www.gatesheadjsna.org.uk/article/5217/Health-inequalities [Accessed 30 June 2019]	Website article
18	Gateshead Council (2014a). Adult Social Care Market Position Statement 2014 - 2016. Available from https://www.gateshead.gov.uk/article/4978/Policies-and-strategies [Accessed 30 June 2018]	Business plan
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22	Durham County Council (2018): Care Connect Annual Performance Report 2017 – 2018. Available from: https://www.durham.gov.uk/article/3410/Care-Connect-annual-performance-report [Accessed 28 January 2018]	Annual Report
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24	Durham County Council (2019): Care Connect Annual Performance Report 2018 – 2019. Available from: https://www.durham.gov.uk/article/3410/Care-Connect-annual-performance-report [Accessed 28 June 2019]	Annual Report
25	Newcastle City Council (2015). Adult Services Market Position Statement. Available from: https://www.newcastle.gov.uk/sites/default/files/wwwfileroot/business/tenders-contracts-and-procurement/market-position-statements/adult_services_mps_2015-17_-_lets_talk_	Business Plan

Id	Document	Document type
	_reviewed_v0_1.pdf [Accessed: 30 January 2017]	
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27	Newcastle City Futures (2017). An Overview. Available from: http://www.newcastlecityfutures.org/wp-content/uploads/2018/06/NCF-Overview-June-2017.pdf [Accessed: 30 January 2018]	Website
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29	Gateshead JSNA (2018). Gateshead JSNA. Available from https://www.gatesheadjsna.org.uk/article/5102/Gateshead-JSNA [Accessed: 30 January 2019]	
30		

Appendix 6.1 – Projection on Falls and related Hospital Admissions in Newcastle

Data retrieved from POPPI System (www.poppi.org.uk) on 21/01/2016.

Falls					
Location	Age Category	2015	2020	2025	2030
Newcastle	65-69	2642	2542	2834	3044
	70-74	2129	2800	2686	3022
	75-79	1880	1864	2427	2362
	80-84	1996	2095	2123	2835
	85+	2580	2924	3354	3784
Newcastle Total		11227	12225	13424	15047

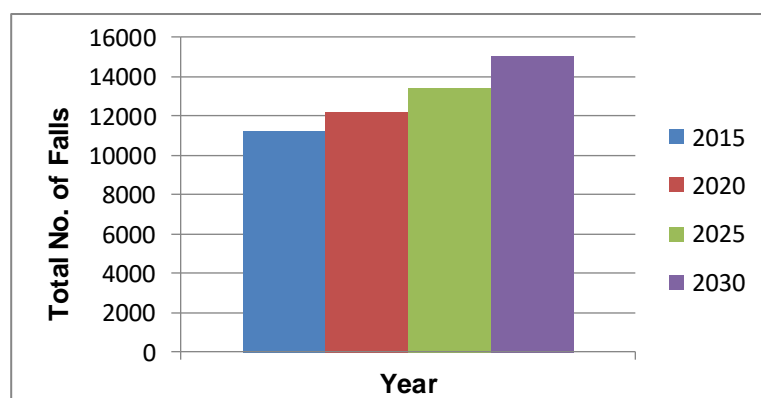


Figure: Projected fall incidents data for Newcastle

Falls- Admissions					
Location	Age Category	2015	2020	2025	2030
Newcastle	65-69	68	64	72	77
	70-74	83	109	104	118
	75+	740	776	913	1019
Newcastle Total		891	949	1089	1214

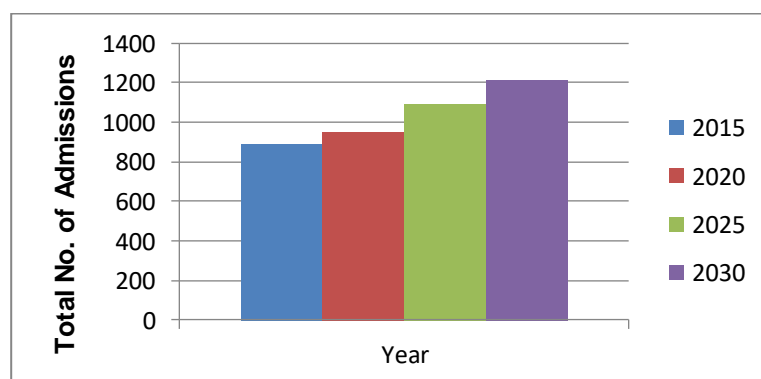


Figure: Projected hospital admission data due to falls in Newcastle

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