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Digital Telehealthcare Services: Exploring Future Designs of Innovative and Sustainable Service Business Models (35)

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Abstract

The rising elderly demographic in the UK represents a significant challenge in terms of planning for the efficient use of increasingly expensive and constrained health and care resources. Digital technology-enabled assistive living health and care (Telehealthcare) services could potentially serve to address the problem. Review of academic and practice literature suggests that one of the key barriers of large scale adoption of Telehealthcare technologies remains lack of evidence around 'business cases', creating enough value for all the stakeholders involved. Drawing perspectives from the literature on business model and service innovation, we adopt a value-driven approach that focuses around both value creation and value capture for key stakeholders and explores opportunities for value co-production with service users, network partners, collaborators and regulators to design future Telehealthcare service business models. Using a single case study with exploratory and interpretive focus, we empirically contextualise our value-driven investigative framework and present our findings that recognise critical needs for resource recombination and integration across the service ecosystem – such as the need for information flows and governance across the service ecosystem towards an integrated health and care information infrastructure.

Keywords: Business Model, Telehealth, Telecare, Telehealthcare, Service Innovation, Digital Healthcare

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Abstract

The rising elderly demographic in the UK represents a significant challenge in terms of planning for the efficient use of increasingly expensive and constrained health and care resources. Digital technology-enabled assistive living health and care (Telehealthcare) services could potentially serve to address the problem. Review of academic and practice literature suggests that one of the key barriers of large scale adoption of Telehealthcare technologies remains lack of evidence around 'business cases', creating enough value for all the stakeholders involved. Drawing perspectives from the literature on business model and service innovation, we adopt a value-driven approach that focuses around both value creation and value capture for key stakeholders and explores opportunities for value co-production with service users, network partners, collaborators and regulators to design future Telehealthcare service business models. Using a single case study with exploratory and interpretive focus, we empirically contextualise our value-driven investigative framework and present our findings that recognise critical needs for resource recombination and integration across the service ecosystem – such as the need for information flows and governance across the service ecosystem towards an integrated health and care information infrastructure.

Keywords: Business Model, Telehealth, Telecare, Telehealthcare, Service Innovation, Digital Healthcare

1.0 Introduction

In June 2013, the UK Government announced a major £3.8 billion healthcare initiative known as the Integration Transformation Fund, later to be renamed the Better Care Fund (Bennett and Humphries, 2014). This funding was intended to be used within local health and care systems to drive closer integration and improve outcomes for patients and people with care and support needs. One further issue around the Better Care Fund was that the government proposed to transfer nearly £2 billion of the English NHS funding to Social Care (where services are managed through Local Councils who hold the budget) in a bid to reduce hospital admissions, especially as a response to a worrying upward trend in acute Accident and Emergency (A&E) admissions, a growing elderly population with increased patient demand, and a lack of hospital acute care capacity.

The rising elderly demographic, coupled with increasing healthcare system costs, represents a significant challenge in terms of planning for the efficient use of increasingly expensive health care resources, especially when it concerns social care provision for the frail, infirm and elderly populations. Most City Councils in the UK have suffered very significant government cuts to local authority budgets, in typical cases at least in the order of £20 million. This has created a drive to develop new strategies for more efficient healthcare service delivery – especially focused on the provision of home telehealthcare services to take

advantage of new innovations in mobile technologies linked with care at home for patients who are frail and elderly or have significant disablement or disability. A key business driver for local Councils focused on the 'preventative' role of technology where services can be developed that augment existing 'face to face' care, for example through the use of 'smart' internet and telecommunications enabled technologies. There is also a need to push information to citizens about the availability of community based support and useful health and self-care information in order that they are able to manage their own health and wellbeing condition and live independently at home for longer.

This paper begins with a short overview of the evolving health and care landscape in England and the role of telehealthcare services as a means of introducing technology to meet many of the new efficiency and wellbeing challenges for the UK population. This is followed by a short review of current thinking related to the development of business and service orientated models as a mechanism for new business cases to justify the large-scale adoption of telehealthcare service innovations. This provides the context to identify the complex new health and care service strategic challenges and issues that Care organizations will face due to the complex problems associated with large-scale technology adoption in the home. The next section describes the research methodology that the researchers are using to explore the telehealthcare adoption challenges including a brief outline of a current project (strategic modelling of telehealthcare adoption), involving key stakeholders from a large social housing provider – an 'arms-length service organisation' (ALMO) for a City Council based in the North of England. This is followed by a summary description of key findings to date which are then discussed utilizing emerging theories based on research into business models and in particular the potential of service logics and a reconceptualization of value. The conclusions detail some early recommendations, and current implications for health and social care organizations. Finally, future research plans are outlined.

1.1 The evolving health and care landscape: The challenge for Telehealthcare

The publication of the UK National Health Service (NHS) "The Power of Information" Strategy (DoH, 2012a), accompanied by the "Digital First" (http://digital.innovation.nhs.uk/pg/dashboard) Digital Service delivery (DoH, 2012b) (http://digital.innovation.nhs.uk/dl/cv_content/32200) philosophy heralded a new strategic focus on local autonomy and greater control for health and social care organizations. New health information systems and technology projects have a renewed focus on providing support for healthcare workers out in the community. The traditional focus has been on the development of clinical records mainly for the benefit of hospital services and GPs. Patient

and citizen demand for home care that includes clinical and also social care support is growing rapidly. New models of integrated care aim to focus more on preventing ill health, support self-care, enhance primary and community care, provide care in people's homes and increase collaboration, coordination and joint commissioning between all stakeholder organisations involved in both the provision of health and care services and support. These new developments are taking place in a healthcare sector currently facing big challenges due to:

- Current UK demographics – an aging Population (approximately 11M people > 65 years)
- Prevalence of chronic health conditions such as Dementia, COPD etc. for the elderly
- Increasing pressure on secondary care / hospital admissions and readmissions
- Rising cost of healthcare delivery – NHS budget deficit expected to reach £20 billion by 2020
- While digital technology innovation-based assistive and preventive health and care solutions offer increased access, better efficiency and cost effectiveness, the adoption of technology is slow
- Policymakers advocate for new models of care that are patient (user) – centric and integrated across health and care pathways
- Access to high-speed broadband connectivity to homes and availability of affordable consumer-level self-care and well-being digital products offer opportunities for innovative designs of services
- Such new care models can drive self-empowerment and support independent living at home

Factors such as an aging population, prevalence of long term medical conditions and rising expectations on the quality of life and the level of service put increasing challenges to the UK National Health Service (NHS) in delivering high quality care and well-being services in a constrained funding landscape (Murray et al., 2011; LLuch, 2011).

In their recently published "Five Year Forward View" (NHS England, 2014), NHS leaders have recognised the critical need to adopt new care delivery options enabled by latest technology advancements and higher engagement of empowered local communities, focusing on the preventive and self-care services. Also, within the context of the Information Management and Technology (IM&T) strategy 2015-2019 of NHS (NHS England, 2014) and the recent Better Care Act (Government of the UK, 2014), a strategic agenda has arisen to develop innovative models of integrated health and social care services that aims to increase

citizen wellbeing while providing more effective levels of care in the community as opposed to over-use of increasingly stressed secondary care hospital services. Such transformational change calls for innovative 'out of the box' thinking, new forms of professional collaboration and interdisciplinary working, and an emphasis on empowering local regional stakeholders in the design of new and more innovative technology systems of wellbeing and care, such as telehealth and telecare (telehealthcare). A potential telehealthcare service delivery model for remote monitoring of health and wellbeing is shown in Figure 1.

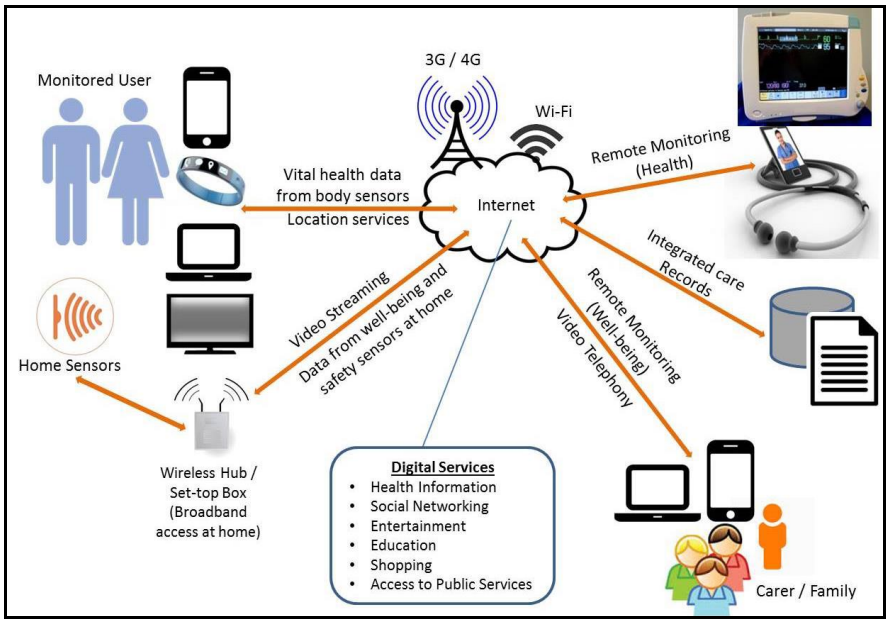

Figure 1. Remote Monitoring for Health and Wellbeing

Current research suggests however, that despite the strategic visions expressed in published UK government and policy guidance by the UK DOH and Digital NHS (https://www.digital.nhs.uk/), the full potential of telehealthcare systems in transforming healthcare services are yet to be realised on a large scale in the UK (Schwamm, 2014; May et al., 2011, Greenhalgh et al., 2012; Greenhalgh et al., 2013). There is a poor evidence base for such technology innovations in addressing issues such as integration between health and care providers. The evaluation of benefits and outcome-related effectiveness has often been cited as key factors affecting the wide-spread diffusion and adoption of integrated healthcare information, social care systems and technologies (Waring and Wainwright, 2015). An area, where there is a paucity of research concerning developing better cases for support (business cases) and value propositions (both financial and non-financial) is the role of business models and their application to healthcare technology adoption and diffusion. Most research in healthcare IT development and adoption to date has focused either on strategic and policy issues, or user acceptance amongst clinical and non-clinical healthcare professionals and patients including sociotechnical perspectives. Healthcare services in the UK are now being

seen by policy makers and stakeholders as increasingly market orientated and more controversially perhaps, moving to becoming increasingly privatised. This combined with technological innovation, especially related to mobile computing, telehealthcare and broadband adoption in the home, has exposed a need to for adopting theory and practice from the business community – especially digital businesses and their rapid development of new service business models for value creation and capture.

2.0 Meeting the adoption challenge: Connecting Business model and Service logic based thinking through a value-driven dialogue

2.1 Business Models

Over the last fifteen years, business models have increasingly gained the attention of academics and practitioners alike and the substantial volume of literature exemplifies such interests. This includes special issues published by prominent management journals such as edited by (Baden-Fuller and Haefliger, 2013). Different conceptualisations of the business model construct are possibly due to the varying contexts and scopes under which business models are studied (Zott et al, 2011). Business models are essentially stories that explain how enterprises work and answers Peter Drucker's age-old questions like: "Who is the customer? And what does the customer value? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?" (Magretta, 2002). Business models can also be understood as a blueprint for how a network of organizations co-operates in creating and capturing value from technological innovation (Chesbrough and Rosenbloom, 2002); or as a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network (Shafer et al., 2005); or as an 'activity system' that transcends the focal firm and spans its boundaries (Zott and Amit, 2010). Business models seek to explain both how the value gets created and gets captured to one or several segments of customers and its network of partners (Osterwalder and Pigneur, 2002; Teece 2010). The emphasis on a system level holistic approach involving activities orchestrated to create and capture value renders the business model concept to be a new and useful unit of analysis for examining how an organisation does business (Stähler, 2002; Zott et al., 2011).

As with the definition of business models, there are divergent views on what constitutes a business model and scholars have proposed various frameworks to describe the components of business models. We find the business model framework developed by (Al-Debei and Avison, 2010) useful in defining a reasonably complete ontological structure of the concept. In this paper, we adopt this framework in identifying the four primary business model

dimensions along with their constituent elements. Table 1 below presents the key dimensions and elements, with a summary of notable propositions on components of a business model from the literature.

BM Dimension	Key Components / Themes	Literature Reference
Value Proposition		
	Service Offering	Bouwman et al. (2008), Johnson et al. (2008) - 'Job-to-be-done', Mason & Spring (2011) - 'Market offering'
	Customer Segment	Chesbrough & Rosenbloom (2002)- 'market segment', Morris et al. (2005) - 'market factors', Shafer et al. (2005) - 'Target Market', Johnson et al. (2008) - 'Target Customer', Osterwalder & Pigneur (2010) - 'customer segments', Viljakainen et al.(2013) - 'Context of customers'
	Marketing	Timmers (1998) - 'Marketing Model', Rajala & Westerlund (2007)
Value Architecture		
	Resources & Capabilities	Johnson et al. (2008) - 'Key Resources', Viljakainen et al. (2013) - 'Own Ressources', Morris et al. (2005) -'Internal Capability Factors', Osterwalder (2004) – 'Core Capabilities'
	Technology	Weill & Vitale (2001) - IT Infrastructure, Bouwman et al. (2006), Alt & Zimmermann (2001), Mason & Spring (2011)
	Organisational Processes	Johnson et al. (2008) - 'Key Processes', Osterwalder & Pigneur (2010) - 'key activities'
	Culture & Organisation Design	Bock et al. (2012) - 'Creative Culture'
Value Network		
	Partnerships & Alliances	Osterwalder & Pigneur (2010) - 'Key Partnerships', Chesbrough & Rosenbloom (2002) - 'Structure of the value chain', Rajala & Westerlund (2007) - 'External Assets & Capabilities'
	Relationship with Customers /Service Users	Osterwalder (2004), Bouwman (2002), Shafer et al.(2005) - 'Customer Information' and 'Customer Relationship', Viljakainen et al.(2013) - 'Co-production Practices' , Dubosson-Torbay et al. (2002) - 'Relationship Capital with customer', Chesbrough and Schwartz (2007) - Co-
	Governance	Amit and Zott (2001), Nenonen & Storbacka (2010) - 'Management of exchange and interaction'
	Information Flows	Shafer et al. (2005), Timmers (1998)

BM Dimension	Key Components / Themes	Literature Reference
Value Realisation		
	Revenue	Linder & Cantrell (2000) - 'revenue model', Timmers (1998), Weill & Vitale(2001) - 'revenue sources', Osterwalder et al. (2005) - 'revenue streams', Johnson et al. (2008) - 'revenue model', Chesbrough (2006) - 'Architecture of the revenue'
	Cost Structure	Johnson et al. (2008), Linder & Cantrell (2000) - 'Pricing Model', Osterwalder et al. (2005) - 'Cost Structure', Shafer et al. (2005) – 'Cost'
	Profitability or Surplus Generation	Johnson et al. (2008)- 'Margin Model', Chatterjee (2013) -'Business-specific Profit Logic'
	Value Orientation	Osterwalder & Pigneur (2011), Thompson & MacMillan (2010), Dohrman et al.(2015), Seelos & Mair (2005), Yunus et al. (2010) - 'Social business model template with social profit equation and economic profit equation'

Table 1. Dimensions and Key components of a Business Model

In the vast 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). Scholars attempted in classifications of 'generic' business models as archetypes (Baden-Fuller and Morgan, 2010) or like 'patterns' used in architecture and software engineering designs (Seddon and Lewis, 2004; 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 2 below illustrates some of the well-known and successful business model patterns used in various industries.

Pattern Name	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

Pattern Name	Idea	Value Drivers	Example (s)
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

Table 2. Some Exemplar Business Model Design Patterns (adapted from Mettler and Eurich, 2012)

2.2 Perspectives from Service Innovation

Innovation, a term applied almost exclusively to products in the past, is increasingly used in relation to services (Miles 2000). The rising importance of services in global economy (OECD, 2005; Bitner and Brown, 2008) has drawn considerable attention on the phenomenon of service innovation from scholars and practitioners alike (Berry et al., 2006, Chesbrough and Spohrer, 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).

One of the key service innovation perspectives that may be particularly relevant for healthcare is service dominant logic or simply, S-D logic (Vargo and Lusch, 2004). S-D logic introduces 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 S-D logic makes distinctions between 'value-in-use' - co-created and phenomenologically determined by the service beneficiary) and 'value-in-exchange' - value proposition offered by the provider and the exchange value realised of the service in economic or other currencies (Vargo and Lusch, 2008). Another important theme of service logic based thinking manifests into the area of 'resource integration' that recognises vital importance of interactional and often intangible resources – labelled as 'operant resources' - such as skills and competences, technology and institutional norms (Lusch and Vargo, 2014). Technology conceptualised as an operant resource, rather than as a material artefact or an outcome of human actions, holds important potential in co-creating value and driving service innovation (Akaka and Vargo, 2014). Drawing on the structuration model of technology (Orlikowski, 1992; Orlikowski, 2010) and taking inspiration from the view that technology is an assemblage of practices and components as well as a means to fulfil a human purpose (Arthur, 2009), the authors present a new conceptualisation of technology (see Figure 2. below).

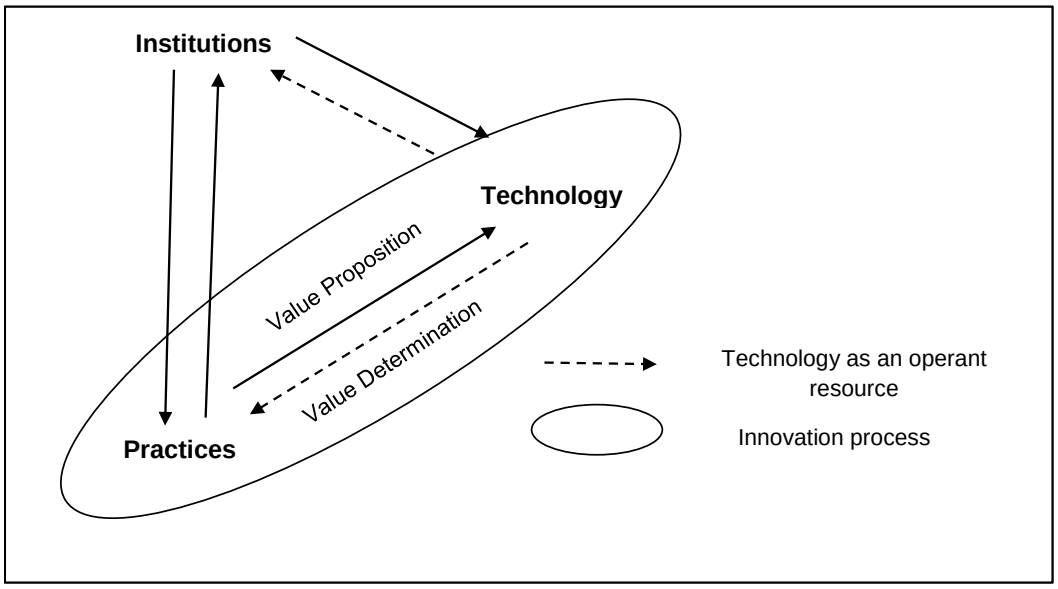

Figure 2. Role of Technology as a Resource in Service Innovation Space (Adapted from Akaka and Vargo, 2014)

Figure 2 identifies three primary components of a service innovation ecosystem – technology, practices and institutions – and depicts the relationships among them. Technology plays a dual role, both as operand and operant resources in this perspective. As an operand resource, technology is used as a value proposition tool by the provider organisations while as an operant resource, it influences the way value gets determined by the beneficiaries in a specific context. In other words, value co-creation occurs through both the design and use phases of technology and service innovation is driven by iterative processes of collaboration and learning between the service providers and the service beneficiaries. The development of

Information and Communication Technologies (ICT) has provided transformative opportunities to the services industries (Lusch and Nambisan, 2015). This view is supplemented well by the generative nature of digital technologies (Yoo et al., 2012) and potentially combinatorial role of resources in driving service innovation (Arthur, 2009).

2.3 Service Business Model for Telehealthcare: An Analysis Framework

So far, business model-driven thinking has predominantly extended to traditional business sectors and especially electronic trading and businesses. There is great potential therefore, to extend the models to new forms or patterns of healthcare service delivery. Still, business perspectives are under-represented in the healthcare literature (Mostaghel, 2016) and a lack of coherent and sustainable service business models remain one of the key barriers to implementation and integration of telecare systems (May et al.,2011). In the UK, healthcare is provisioned and delivered primarily through public investment and national systems of health and care (NHS and Local Authorities). Such non-commercial and public nature of healthcare services can be construed as a counterargument to the business model based thinking. Following Chesbrough (2007), it can be argued that "every company has a business model, whether they articulate it or not" and the construct is equally applicable to all forms of organisations, including public, non-profit and social enterprises (Osterwalder and Pigneur, 2011; Thompson & MacMillan, 2010; Yunus et al., 2010). In healthcare context, the concept of 'value' may have to be defined and expressed more clearly with respect to non-financial factors which are more prevalent in healthcare organisational cultures and discourse. For instance, there would be a much greater emphasis on patient wellbeing (equated to consumer or customer satisfaction perhaps) or quality of life measures, as well as contributions to better 'lived' experience at society and community organisation levels (Greenhalgh et al., 2013). In pursuit of innovation in healthcare services, patient-centric care is considered as a major transformative goal (Berry et al., 2003; Bitner and Brown, 2008). Service innovation thinking and concepts may then be a complementary way to examine and develop new business models that embraces the themes of user-centeredness, 'co-production' and value creation through 'combinative resource configuration' (Joiner and Lusch, 2016; McColl-Kennedy et al., 2012; Nambisan and Nambisan, 2009). Such approach could help in designing new service delivery models that are focused around needs of users' and other stakeholders (and also adaptive to their organisational, social and political contexts (Greenhalgh et al., 2016). Drawing inspirations from the service logic based thinking, several contemporary researchers propose frameworks for designing co-creative business models – with specific considerations and focus around interactions to integrate resources in enhancing networked value creation

and capture (Viljakainen et al.,2013; Storbacka and Nenonen, 2012; Chew, 2014; Carida et al., 2017).

Based on current research and thinking as discussed in the literature, and grounded on the theories of organisational knowledge creation, innovation management and community governance, we therefore propose a theoretical framework (see Figure 3. Below) that examines how healthcare organisations may be able to reframe their value propositions and to co-produce a sustainable value ecosystem, platform and infrastructure through innovative configurations of their internal as well as network (partnership and collaboration) resources. Following (Osterwalder and Pigneur, 2004; Al-Debei and Avison, 2010), we conceptually position the service business model as an intermediate construct between two conceptual layers - the strategic objectives and goals and business processes (operations) of an organisation. This investigative framework is being used as the basis of current case and participant observational study research in a Social Housing provider of telecare services, as outlined in the following section.

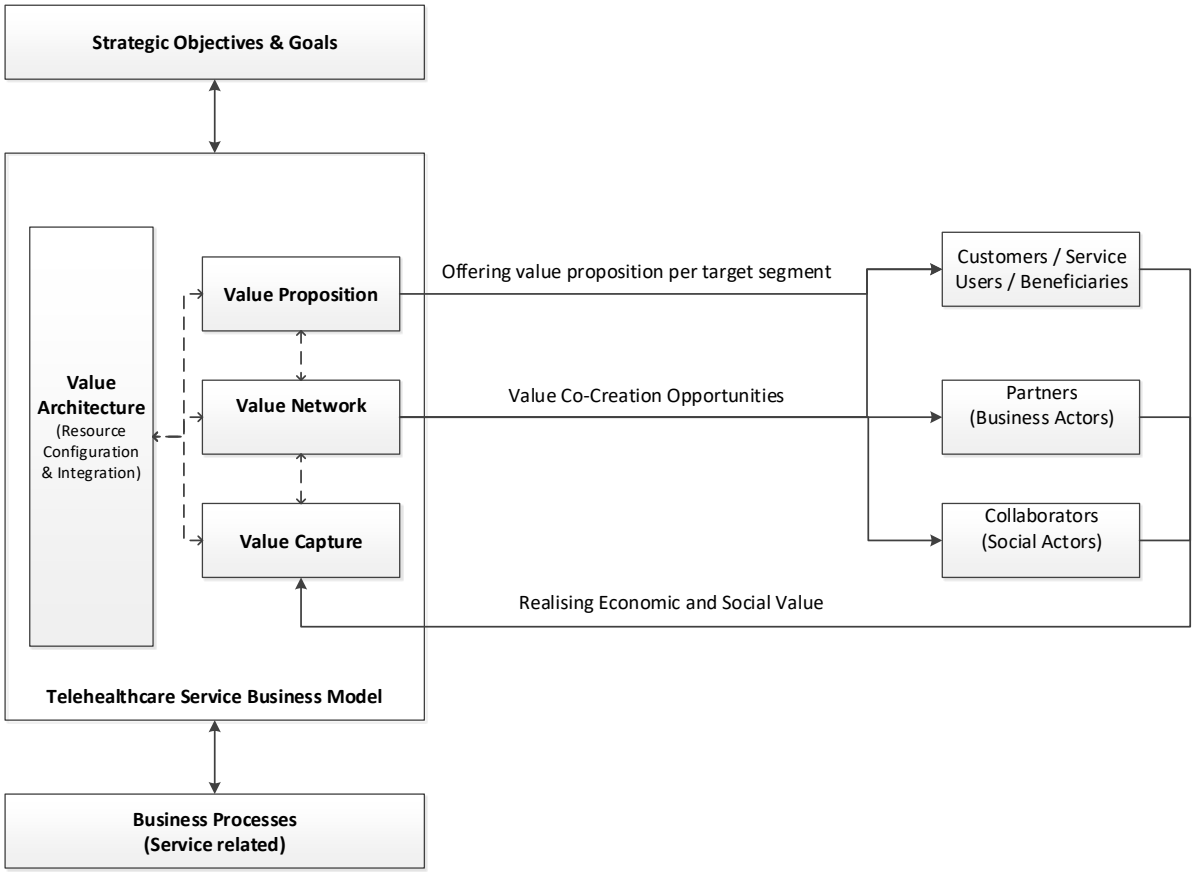

Figure 3. Investigative Framework: Service Business Model Value Analysis

3.0 Methodology

3.1 Research Design

Our research follows a multiple-case study design; although for the purpose of this paper we only focus on one selected case as an exploratory study. An interpretive focus in the case study (Stake, 1995; Walsham, 1995; Walsham, 2006) is adopted to investigate and analyse the complex phenomenon of delivery and adoption of telehealthcare services within their natural settings (Lincoln and Guba, 1985) and real-world context (Yin, 1994). Interpretive approaches in 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), we argue that field studies using interpretive approach have potential to generate deep insights into information systems 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). For healthcare case study research, access remains a central consideration (Crowe et al., 2011) and for our case selection, we leverage a research collaboration with a large city council organisation, formed during of a previous study focussing on the challenge of information integration between health and care services, by members of the current research team (Waring & Wainwright, 2015).

3.2 The Case Organisation: Northern Social Housing Association (NSHA), Telecare Services

NSHA Community Care Alarm Service (CCAS) is essentially a Telecare infrastructure and system that uses a range of electronic devices (with sensors) connected through Information and Communication Technology (ICT). The service aims to monitor vital health status (such as falls) for elderly community members and to monitor the environment at their home (such as detection of flooding, gas leaks, smoke or fire) in order to provide assistance to safe, secure and independent living of the people. NSHA offers this service to their client members, based on an assessment made by NSHA telecare consultants and a subscription-based service agreement. Currently, NSHA offers following two levels of service:

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

For qualifying clients (aged over 85 and resident of the city), the service comes free of charge for a six month's trial period (and with a nominal charge afterwards). NSHA Telecare service

covers a wide range of assistive living equipment including Alarm unit, Pendant, Fall Detector, Bed Occupancy Sensor, Care Sensor, Pill Dispenser, Door Exit Sensor and Flood Detectors.

3.3 Data Collection and Analysis Strategy

During the course of our first case study in NSHA, we conducted in-depth face-to-face interviews with eight employees over a period of one and a half months. The participants were chosen across the organisational hierarchy in a way that represents variety of roles performed them in relation to the service and draws perspectives of both managerial and field-level employees (see Table A. in Appendix for the interviewee profiles). We adopted a semi-structured interview style for this study to carefully balance between excessive passivity and over-direction (Walsham, 1995), maintaining openness in accommodating participants' free expressions while remaining focused on the research questions. Each interview lasted between forty-five and seventy-five minutes and audio recorded after securing participants' consents. Our research collaboration agreement with NSHA also allowed us a privileged access to observe its employees performing various service delivery activities. This opportunity helped us in gaining deeper understanding of the business processes involved in design and implementation of the CCAS and also, supplementing the interview data with participant observational and relevant secondary data, such as annual reports and minutes of the internal meetings.

To analyse the large volume of interview data that potentially can be an 'attractive nuisance' (Miles, 1979), we adopted a template analysis approach (King, 1998; Crabtree and Miller, 1999). In health and care related research, the application of template analysis is gaining credibility (King 2004; Waring and Wainwright, 2008). We took an explorative approach by starting template analysis of interview transcripts with only a few predefined codes to allow emergence of relevant themes from the data and to avoid blinkering of analysis with a theoretical bias (King, 2004). The purpose of the top level a priori codes, derived out of the investigative theoretical framework discussed earlier (Figure 3.) is to guide the analysis of the rich and voluminous qualitative data. Close interactions during a recursive cycle of reviewing the transcript data helped us to exploit peer reflexivity and to maintain logical consistency in the analysis.

4.0 Findings from the Case

Our research seeks to understand the challenges of designing telehealthcare services that are value-creating and sustainable. In our study, we employ a business model-led theoretical lens that investigates the issues of service design from both value creation and value capture

perspectives. From the interview data analysis, and linked to our investigative framework, Figure 3, we identify and categorise our findings under four key conceptual blocks of value proposition: value architecture, value network and value realisation.

4.1 Value Proposition

4.1.1 Customer segments and service offerings

Affiliation with the local city council helps NSHA to maintain a good balance between the social and commercial aspects and a social identity enhances the value proposition of its care service offerings, as one member (Interviewee 7) observed: *"…you wouldn't get the same buy-in from health and social care if you were a true commercial organisation*". Most of the telecare services offer call centre based response to risk alerts generated from telecare equipment, 24 x7 mobile warden response service component (physical visit to clients' homes to investigate the issue and taking necessary action in emergency situations) remains the unique value proposition for NSHA.

A typical profile of a customer for NSHA is a low to medium income tenant of a city council housing estate - sometimes a pensioner, unemployed or on benefits. Even the basic telecare subscription costs are perceived to be substantial - *"…actually it is a lot of money"*, as one case participant (Interviewee 6) commented. The Telecare service is currently offered as an insurance against the risk of accidental events (such as falls for elderly people) which does not address many real needs of the users such as social isolation and loneliness or support with lifestyle activities at home. Existence of demand for a wider range of services is apparent in one of our study participant's (Interviewee 7) view: *"…often people want to pay for that incorporates wider services than 'if you fall, we'll pick you up'"*. There are customer segments such as young people with learning disabilities, for which NSHA does not have a targeted offering at this point of time. The need for identifying high-value customers is clear one manager's statement: *"We're trying to get into the areas of … 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."*

4.1.2 Promotion and Marketing

Our case participants felt that awareness of telecare services remains low and underscored an immediate need for promotion and marketing of the services, both at local and national levels. Some of the innovative ideas that came out of our interviewees include locally organised initiatives such as roadshows, 'Sunday Church Hall' or 'Open Day' sessions with demonstrations of how the service works with telecare units.

4.2 Value Architecture

4.2.1 Identity and Culture

Historically, NSHA has been reliant upon the funding support from local authority but recent public funding cuts on services have raised serious questions on the sustainability of the CCAS. In pursuit of financial sustainability of services, as NSHA seeks to embrace more commercial orientation, a tension between the commercial and the social objectives of the organisation is observed in some of our case participants' accounts:

Interviewee 6: *"It's a not for profit organisation but it has an element of social enterprise because of the business really"*

Interviewee 3: *"…it's hard to change people's mind-set that we need the business…"*

As employees of an organisation with social purpose, there is also a sense of frustration among the staff members that any discontinuation or downgrade of the service will badly impact the well-being and independent living aspirations of vulnerable people.

4.2.2 Resources, Capabilities and Processes

As an accredited member of the Telecare Service Association (TSA) (https://www.tsa-voice.org.uk/), NSHA CCAS delivery processes are closely aligned to TSA 'Reference to Response (R2R) service model for UK telecare providers. The organisation has sound infrastructure, in terms of physical resources and employee skills and competences to deliver the service at scale. There is a perceived need to invest more in IT infrastructure – both hardware, such as handheld tablet devices for the field staff and software upgrade or addition – to drive better and faster information flows across the organisational network. Lack of integration among disjointed IT systems does not fully support higher staff productivity aims (high volume of manual entries/ paperwork) and faster managerial decision making targets for NSHA. With its limited presence in online and social media channels, the organisation is currently missing valuable opportunities for communication and interactions with its customers and business partners.

4.2.3 Technology Infrastructure for Service Delivery

NSHA uses PSTN (fixed telephone line) based telecare service that lacks the superior performance and flexibility of digital broadband network. An upgrade to digital technology should enable the organisation into tapping opportunities for more premium services and integration with other digital solutions such as 'smart home', home security, home communication etc. However, interoperability issues are foreseen as key challenges towards upgrading NSHA technology platforms.

4.3 Value Network

4.3.1 Partnerships and Collaborations

Currently, NSHA has very limited conversation with health organisations as evident from the account of one managerial level participant (Interviewee 5):

"(we) aren't involved enough with the social care and health talks"

"…the health service is incredibly difficult to crack, a) it's complex, b) it's fragmented and c) we've no clout as … to get them to engage, it's all about persuasion and what's in it for them"

Some participants felt that adoption of telecare could be higher if the use of telecare is promoted by health bodies as preventive measure. Besides health sector, NSHA finds lack of collaboration with other service agencies also a big challenge towards a value-creating service network. One interviewee observed that *"it will be until there's a crisis and even then the ambulance service wouldn't engage with us, that's what's difficult."*

4.3.2 Value Co-creation with Customers

NSHA performs a detailed assessment of its customers' telecare needs before the service is provisioned. Such assessment is done in-person at the service user's home, and involves understanding customer's unique situation, health and other perceived risks and collecting specific information for evaluating telecare support needs. The fragmented nature of the care delivery system is aptly noted by one respondent *"…all services are delivering bits and pieces, but not the whole package"*. The need for custom service designs that focus on individual user's needs is advocated by one interviewee: *"Make it a person-centred approach. 'What do you want'? Not what likes of Homecare private agencies"*. Fear of complex technology is found to be an inhibitor for adoption of telecare, particularly with elderly people having cognitive challenges (like dementia). As one respondent suggested, simple and easy-to-use telecare device design can yield 'high impact at low cost'.

4.4 Value Realisation

4.4.1 Revenue Streams and Cost Structure

NSHA relies mostly on the service referrals from the city council's adult social care group for its core revenue earnings. In absence of value-creating (and revenue sharing) partnerships and due to low volume of subscriptions to the premium service offering, NSHA finds difficulty in meeting its revenue targets. While management attention is diverted to optimising the cost of service delivery and operations, a lack of 'economies of scale' often results in poor utilisation (idle hours) of the organisational resources, such as idle hours spent during night shifts for the 24 x 7 response service rendered by mobile warden staffs.

4.4.2 Challenges in Capturing Value

Current local authority driven procurement and commissioning culture as well as practices hold little incentives for entrepreneurial risk taking and innovative pricing - impacting value capture from telecare services. One of the field staff interviewed by us (Interviewee 1) mentioned: *"You're going to keep your prices low because you want word of mouth to get recommendations to get more work. Right...Because tradesmen do that to get more work, it's all word of mouth. But in this culture it's more of ...a bidding process ... A tender, where you put a tender in to get something. So everything is costed before".* In absence of number-based 'hard' evidence on cost savings, the benefits of telecare are often questioned (Henderson et al., 2013). Similar view gets echoed by one of the respondents (Interviewee 3) *"...what one of the things that came back from the ambulance services is if they've never seen the cost so we're doing all of this work but they've never seen this cost so 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".*

5.0 Discussion

In this section, we discuss the implications of our case findings in designing value-creating and sustainable service business models. We focus primarily on three important thematic areas for service design - enhanced value propositions for the customers or service beneficiaries; opportunities for value co-production and higher value capture for key stakeholders; and the information flows and governance across the service ecosystem, as critical enablers for the system-level collaborative value creation. In addition to current scale-based, 'one-size-fits-all" telehealthcare solutions ("bus" model), custom offerings could possibly make higher value propositions to specific customer segments ("taxi" model) (Baden-Fuller and Haefliger, 2013). Business model archetype such as two-sided hybrid model (ibid), can provide useful guidance in designing value propositions for payers (who pay for the service but are not necessarily the users) and the service users (or beneficiaries). Services designed around the principle of "Freemium" (or "free") business model (Osterwalder & Pigneur, 2010) can offer free service to a segment of vulnerable people who cannot afford to pay for the service, while maintaining the sustainability of the service through premium offerings to the high-value customers. New service innovations that think beyond the 'peace of mind' service goal and espouse personalised comfort, convenience, security and the lifestyle needs of the users can create new value propositions in the assistive living space. Partnerships, alliances and collaborations across organisations can be forged through open business models (ibid). Tailored offerings targeted to specific customer

segment such as people with conditions can develop niche markets for such services (Berry et al., 2006). Designing location tracking based assistive technology services for people with dementia can be an example for such a new service (Robinson et al., 2012).

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. Telecare equipment vendors and service providers can engage with their users through 'open innovation' approach (Chesbrough, 2006) - using cultural probes (Wherton et al., 2012) and bringing design thinking (Brown, 2008) into the development of more user-centric services. Such co-production of value would necessitate upskilling of service professionals and service users alike in digital technology skills (Lennon et al., 2017). Assistive technology solutions such as telehealthcare involves a complex and unique sociotechnical "user system" and sharing of risks, alignments of incentives (Arrow, 1963; Christensen and Remler, 2009) and interests across a wide range of stakeholders remains vital yet challenging (Sugrahood et al., 2014). The collaborations or partnerships present value co-creation opportunities to all the concerned entities and are vital for the formation of effective "activity system" (Zott and Amit, 2010) or a "value constellation" (Normann and Ramirez, 1993). Stakeholders such as NHS, Local Authorities, service providers and industry bodies like TSA can come together and promote the value of telecare, through collaboratively planned and organised 'awareness sessions' and roadshows. This could also involve launching new telehealthcare services in collaboration with health bodies to offer free trails to the users – following a "Bait and Hook" business model pattern (Osterwalder & Pigneur, 2010). There is also difficulty in building relationships with other care related services such as the ambulance service, even though telecare can potentially support ambulance service providers in reducing wasted ambulance dispatches triggered by false alarm calls.

In its current form, telecare in UK is mostly restricted to community care alarm / social alarm systems, covering about 1.7 million users. The technology primarily uses PSTN (fixed telephone line) that lacks the superior performance and flexibility of digital broadband network. 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. A strong IT infrastructure, backed up by effective information governance to support interoperability, data sharing and integration of information systems is critical to drive collaboration across traditional health and social care organisations (Waring and Wainwright, 2015). We argue that collaboration with GPs and health authorities for service referral should promote better

user adoption whereas exchange of care data with health systems will create value through timely and proactive clinical interventions, reducing unnecessary A&E admissions. This view is supplemented by recent research by (Lennon et al., 2017) that recommends investment in IT infrastructure and incentivising to promote technical and service interoperability across health and care sectors.

Regulatory and institutional constraints remain one of the key challenges for the development of business models in the healthcare sector (Hwang and Chirstensen, 2008; Pourabdollahian and Copani, 2014). However, the overall value created by telecare 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 to independent living and better quality of life (Schwamm, 2014; Lluch, 2011; Goodwin, 2010). Frameworks such as social return on investment (SROI) that allow capturing and reporting tangible economic, as well as intangible social benefit value can be an effective mechanism for evaluating performance and benchmarking non-profits / social enterprises (Ryan and Lyne, 2008; Millar and Hall, 2013; Nicholls, 2009). While arguably 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 organisations' contribution towards social responsibility.

6.0 Conclusions

This paper has provided a review and an overview of the evolving health and care landscape in UK based northern city and highlights the role of telehealthcare services as a means of introducing technology to meet many of the new efficiency and wellbeing challenges for the UK population. The evaluation of benefits and outcome-related effectiveness has often been cited as key factors affecting the wide-spread diffusion and adoption of integrated healthcare information, social care systems and technologies. While the need for developing better cases for support (business cases) and value propositions are cited to be critical, the role of business models and their application to healthcare technology adoption and diffusion remains largely unexplored and under-represented in the extant healthcare technology and policy research literature.

The access, affordance, connectivity and efficiency provided by technological innovation, especially related to mobile computing, telehealthcare and broadband adoption in the home, has exposed a need for adopting theory and practice from the business community – especially digital businesses and their rapid development of new service business models for

value creation and capture. Increasing financial and resource constraints for the UK health and social care system calls for new strategies to enable more efficient healthcare service delivery such as the provision of home telehealthcare services to take advantage of new innovations in digital technologies – supporting elderly and frail populations – often with long term conditions or disabilities – to live independently at home and providing 'preventative' care to supplement existing 'face to face' delivery models.

These new and urgent challenges require a new way of conceptualising the complex healthcare landscape, Figure 4, and the need to adopt systemic thinking; appreciating the system as a type of healthcare ecosystem that provides new opportunities for development and adoption of business models and service dominant logic. New perceptions and realisations of what constitutes value in the healthcare economy is critical to harnessing the potential of new technology-based care solutions and innovation to provide these new forms and types of value towards the development of user-centric care models.

As illustrated in Figure 4, the new telehealthcare ecosystem and infrastructure will require a much deeper level and richness of collaboration between key stakeholders such as policy makers, service providers, commissioners, regulators, technology vendors, service users and carers that include families and beneficiaries. Service business models will have to be reconceptualised, adapted, or created to facilitate these new developments if they are to be financially viable, deliver greater efficiencies and higher quality, and culturally sustainable.

Our research to date points primarily to three important thematic areas – a value-driven approach, focusing around both value creation and value capture for key stakeholders; opportunities for value co-production with service users, network partners, collaborators and regulators; and the need for information flows and governance across the service ecosystem, towards an integrated health and care information infrastructure.

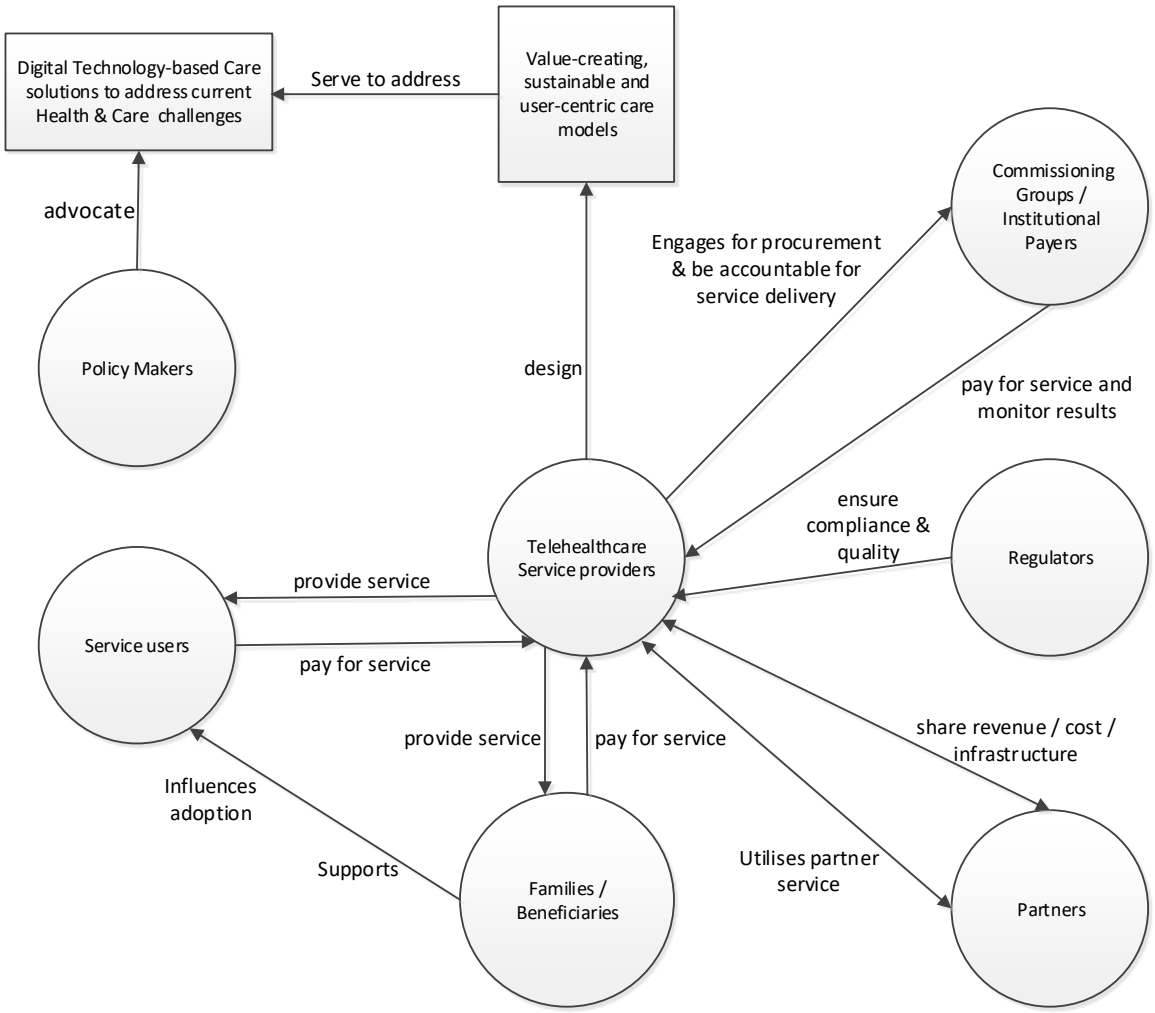

Figure 4. Telehealthcare Service Ecosystem View

Our findings also highlight the need for continued research in this direction that further explores the business cases based on a value-driven dialogue, leading to innovative telehealthcare service designs and sustainable business models to meet the growing healthcare demographic challenge. The next phase of our telehealthcare research, including a second case study, will provide the opportunity to research and report on progress towards developing these new care models.

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Appendix

Table A. List of NSHA interviewees with organisational roles

Interviewee Id	Role in NSHA	Nature of Role (Strategic/Managerial or Operational/Field-level)
1	Mobile Warden	Operational
2	Business Support Manager	Operational
3	Telecare Lead Officer	Strategic
4	IT Services Partner	Operational
5	Head - Support and Care	Strategic
6	Mobile Warden	Operational
7	Care Services Manager	Strategic
8	Coordinator	Operational