Value and sustainability in technology-enabled care services: a case study from north-east England

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ABSTRACT

Technology-enabled care services (TECS) are primarily provided in the UK as a public service, using public funds and national systems of health and care. The delivery of such services, however, is increasingly market orientated and subject to many challenges. The authors draw on the literature and case study evidence, to explore the value propositions and value co-creation within TECS, highlighting the challenges and obstacles, as well as possible ways forward.

INTRODUCTION

The English NHS, along with local authorities (LAs), is facing an increasingly difficult set of challenges related to the effective planning, commissioning and provisioning of technology-enabled care services (TECS). Even before the Covid-19 pandemic, NHS England’s budget deficit was expected to reach £6 billion by 2020/21 (Gainsbury, 2016). Local authority budgets, which include the provision of social care including TECS, have been cut. For example between 2013/2014, and the end of 2019, Newcastle upon Tyne City Council (NCC) has faced cumulative budget cuts of £300 million (Harris, 2020b). These constrained budgetary challenges necessitate innovative strategies for more efficient 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 TECS (Telecare Services Association, 2017). TECS allow preventive and early interventions, potentially reducing the cost of care by shifting the focus of care delivery from institutional settings to more community-based and self-directed alternatives (Housing Learning and Improvement Network, 2013), and supporting people to remain independent and live in their own homes (Bardsley et al., 2011; Public Policy Projects, 2020).

During the past two decades, shifts in the UK government policies related to health and social care services have emphasised the importance of a person-centred approach anchored on principles of greater personalization, the maximization of choice and control by the patients (Ferguson, 2007; Department of Health, 2014). The potential of digital technology-based assisted living services, such as TECS, to address self-directed and complex care needs associated with long-term conditions, such as dementia, is widely acknowledged (Health Committee, 2014; Knapp et al., 2016). The Covid-19 pandemic affected all areas of public service delivery, making a convincing case for the accelerated adoption of digital technologies in delivering health and social care services (Agostino et al., 2021; Leite et al., 2020).

Within the context of the changing demographics related to the growing numbers of elderly people, and the associated increasing demand for coping with complex healthcare needs, current research argues that, despite the strategic visions and policy guidance conveyed in UK government publications, the full potential of TECS systems in transforming health and social care services has yet to be realized on a large scale (Barrett et al., 2015; May et al., 2011; Lennon et al., 2017). The evaluation of benefits, differing conceptions of value, and outcome-related effectiveness have often been cited as crucial factors affecting the widespread diffusion and adoption of TECS technologies (Barlow & Hendy, 2009; Beale et al., 2010; Public Policy Projects, 2020).

In the UK, while health and social care services are primarily provisioned as public services, using public funding and national systems of health and care (the NHS and LAs), the delivery of such services is getting increasingly market-oriented (Fotaki, 2011; Barron & West, 2017) within an economic landscape of ‘mixed-economy of supply’ (Rodrigues & Glendinning, 2015). There is also no single model for the provision of healthcare in the UK, with policies and implementation being dependent on centre–local or NHS–local government arrangements in the four nations. Our research focused on TECS in the English context, drawing on relevant policies and research as appropriate. The problem is increasingly viewed as one of the large-scale replication of successful pilots, as opposed to the continued development of localized innovations (PPP, 2020).

Furthermore, a lack of coherent and sustainable service business models has been perceived as one of the key
barriers to the large-scale adoption and implementations of TECS (May et al., 2011; Oderanti & Li, 2016; Barlow et al., 2012; Bhattacharyya, 2020). With this in mind, our aim in this article is to draw on theoretical insights, supported by empirical case study research evidence, to identify ways through which future designs of TECS models within England could be shaped.

This article outlines a new theoretical framework, developed in order to examine, interrogate and explain the phenomena of value creation and value realization within a TECS ecosystem. We use an interpretive case study-based approach to report the findings from a recent research study concerning a telecare service delivered by a major provider for social housing—Your Homes Newcastle (YHN). YHN is an ‘arm’s-length management organization’ (ALMO), which was separated from NCC through a management agreement and given the task of managing and improving the housing stock owned by the council (HousingCare, 2020). As part of the services that it manages, YHN also provides a community care alarm service (CCAS), branded as ‘Ostara’. To provide this service, YHN works collaboratively with a complex network of stakeholder organizations, including the NHS and its local telehealth provision.

**Conceptualizing TECS ecosystems**

A typical telecare system uses a range of electronic devices (with sensors) and a base unit installed in a user’s home (or worn by the user), which are connected to a remote monitoring centre through a telecommunications network—see Figure 1. These sensors monitor vital health/activity indicators for vulnerable users (such as falls) and also monitor the environment in 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 protocol established as part of the service agreement.

A similar technological configuration to telecare may also be used for telehealth systems—for remote home monitoring and diagnosis of vital health signs, patterns and health analytics. ‘TECS’ is a term is used to refer either to telecare or telehealth systems individually or, in more sophisticated cases, when they are used in some form of combination. The predominant communications technology used for telecare are analogue telephone network connections (pul cords, fall sensors, speakers and call centres), whereas telehealth may make greater use of digital technologies that are primarily mobile in character. Figure 2 illustrates a typical TECS delivery model for remote monitoring of health and wellbeing.

In addition to the TECS provider, the service delivery architecture potentially involves a wide range of stakeholder organizations:

- Commissioners of adult social care services (LAs).
- Commissioners of health services, i.e. NHS clinical commissioning groups (CCGs).
- 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 organizations, for example GPs, district nurses and hospitals.
- Partners and collaborators within the TECS industry such as vendors, solution providers and the Telecare Services Association (TSA).

TECS have 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. We argue that the TECS architecture may be better appreciated as a business and service ecosystem.

The metaphor of a ‘business ecosystem’ has been widely used in the academic literature to represent a loosely-bound community of interacting entities (actors) with varying roles and capabilities, with their relationships determining the overall effectiveness at an aggregated level (Iansiti & Levien, 2004; Moore, 1993). Such a metaphor provides a useful lens to adopt a systemic view when exploring issues related to participation, partnerships and collaboration within the broader business environment (Adner, 2017). It has been argued that investigating TECS requires the adoption of a systems thinking approach (Chughtai & Blanchet, 2017), to capture the complexity of relationships and interactions, and diversity of the loosely coupled communities of associated actors that are defined by their networks and affiliations, rather than being part of a rigid, hierarchical structure (Adner, 2017). Adopting an ecosystem approach provides a way of conceptualizing the complex healthcare landscape—see Figure 3—and allows new opportunities for the development and adoption of service models. In the next section, we argue that new perceptions and realizations of what constitutes value in the healthcare economy are critical to harnessing the potential of new technology-based care solutions and innovations to provide these new forms and types of value towards the development of user-centric care models.

As illustrated in Figure 3, a TECS ecosystem and infrastructure requires 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 (families and beneficiaries). Such collaboration will necessitate a value-driven approach when examining the TECS model, to ensure that the interests and incentives of all stakeholders are effectively accommodated and aligned.

It is important to note that TECS within the English health and social care context entail different objectives, separate funding mechanisms, and discrete organizational stakeholders. Telecare services are funded and provisioned as part of adult social care services by LAs, whereas telehealth services are funded and delivered by NHS England, primarily led by clinicians and health professionals. The current policy narrative around TECS (NHS England, 2014) promotes an integrated and holistic care agenda that aims to blur the boundaries between social care and healthcare, emphasising the need for ‘independent living technologies together with life-enhancing technologies’ (Turner & McGee-Lennon, 2013). In this article, the descriptions of TECS stakeholders are mostly restricted to telecare services and local government. Such a narrowing is largely because telehealth initiatives in the UK are still...
emerging and not widely adopted, and such services are restricted to clinical settings of NHS England.

A service business model for TECS

The contemporary literature on public management theory and practice highlights the experiential, collaborative and systemic nature of public service delivery (Radnor et al., 2014; Osborne et al., 2016). The critical role of relational capital-based social marketing practices to facilitate co-creation in public services has been increasingly acknowledged (McLaughlin et al., 2009). Accordingly, our research brings together two interdisciplinary and complementary theoretical frames, synthesizing the existing literature on business models and service innovation to propose a new conceptualization of value.

The conceptualization of a TECS ecosystem reflects a complex sociotechnical innovation (Sugarhood et al., 2014) where the sharing of risks and the alignment of interests and incentives across a diverse range of stakeholders is critical (Christensen & Remler, 2009). Therefore, a transformation agenda to harness the potential of technology-enabled care solutions and innovations needs to take a value-driven approach (Porter & Lee, 2013), in order to effectively capture the complexity of relationships and interactions, and the diversity of the connected social and economic actors (Lusch & Nambisan, 2015). Such an approach demands a new way of conceptualizing value propositions and opportunities for value co-creation for all the stakeholders within a service ecosystem.

Conventional business model based thinking espouses a narrow role for the customer in the value creation process and emphasises the realization of value, primarily in economic terms (Afuah & Tucci, 2001). While such monetization aspects are vital for designing sustainable TECS models, it remains equally important that these services follow a ‘public ethos’ (Boyne, 2002), with due attention being placed on intangible social benefits such as wellbeing and the quality of life (Lluch, 2013; Goodwin, 2010). This necessitates adopting a broader conceptualization of value, incorporating commercial self-interest, public interest and procedural interest as the fundamental bases of public value creation (Talbot, 2011).

A value-driven approach: business model based thinking

Business model driven thinking has predominantly been applied to ‘traditional’ commercial business sectors and digital businesses (Baden-Fuller & Haefliger, 2013; Zott et al., 2011). Business models are conceptualized as the underlying core economic logic and strategic choices that explain how an organization could create and deliver value to its customers and network of partners (Magretta, 2002; Chesbrough & Rosenbloom, 2002) and, importantly, can capture value within the ‘value network’ or ‘activity system’ of the business (Shafer et al., 2005; Zott & Amit, 2010). While there are divergent views on what constitutes a business model, in this article we adopt a framework developed by Al-Debei and Avison (2010), which identifies four components of a business model:

- **Value proposition**: how an organization creates value for its customers through customer-based products or service offerings (Osterwalder et al., 2005).
- **Value architecture**: physical resources, such as technology infrastructure and assets; organizational forms and practices, as well as human resources employee skills; a knowledge base that needs to be configured and organized in a manner to facilitate a competitive value proposition (Hedman & Kalling, 2003; George & Bock, 2011).
- **Value network**: those cross-organizational collaborations, partnerships, and relationships necessary to create and deliver value (Shafer et al., 2005; Tette, 2010).
- **Value realization**: the revenue-earning logic to be profitable (or sustainable) and the monetization aspects of a business model.

Re-conceptualizing value co-creation in TECS

‘Value’ is one of the most ill-defined and elusive concepts in the academic literature (Grönroos & Voima, 2013). Conventional business model based thinking emphasises the realization of value, primarily in economic terms of traditional, through a revenue logic that defines ‘how a company makes money’ (Afuah & Tucci, 2001). While such monetization aspects are integral to designing sustainable TECS models, a reconceptualization of value might be necessary to accommodate the non-financial, intangible elements linked with healthcare services. For instance, there would be a much greater emphasis on citizens’ wellbeing support for independent living and quality of life measures, as well as contributions to better ‘lived’ experience at social/society and community organization levels (Greenhalgh et al., 2013).

Traditionally, business model based thinking adopts a narrower role of customers in the value proposition and/or

![Figure 1](image.png)

**Figure 1.** Basic monitoring and response for telecare. Source: Adapted from Brownsell and Bradley (2003, p. 8).
value creation process that views customers ‘as part of a commercial segment’ (Chesbrough & Rosenbloom, 2002). The majority of TECS users are older adults with physical, cognitive, and sensory limitations; and perceiving such vulnerable people as being fully informed, empowered, and rational consumers could be problematic (Daly, 2012). Research on service innovation, grounded on service-dominant logic (Vargo & Lusch, 2004), would indicate there
are viable alternatives to financially orientated business model thinking. Service-dominant logic offers some useful insights that espouse a broader, systemic level of engagement with service users (and other stakeholders) in the co-creation of value that emphasises social as well as economic factors through the integration of stakeholder resources within the entire service ecosystem (Vargo & Lusch, 2008).

In pursuit of innovation in healthcare services, patient-centric care is considered as a major transformative goal (Berry & Bendapudi, 2007; Bitner & Brown, 2008). The themes of patient (or user) engagement and empowerment have drawn increasing attention in the academic literature (Badcott, 2005; Armstrong et al., 2013) and policy discourses, with advocacy emerging around ‘patient-centric care’ service design (NHS, 2014). Service innovation thinking and concepts could provide a complementary way to examine and develop new business models that embraces the ideas of user-centric, ‘co-production’ and value creation through ‘combinative resource configuration’ (Joiner & Lusch, 2016; McColl-Kennedy et al., 2012; Nambisan & Nambisan, 2009; Wherton et al., 2015). Such an integrated approach could potentially broaden the application possibilities of business model thinking in social care and healthcare services, through infusing service logic into designs of new TECS business models that are focused on the needs of users, other stakeholders, and are also adaptive to their organizational, social and political contexts (Greenhalgh et al., 2016).

Healthcare services often fail to achieve patient (user)-centric value creation owing to health policies that are focused on costs and efficiency improvements (Wildavsky, 1977; Wenzl et al., 2017). While business model based thinking focuses on the configuration of organizational resources to maximize efficiency gains, a customer- (user) centric and relational view of service logic is complementary by affirming the importance of achieving effectiveness over efficiency gains (Lusch & Vargo, 2014).

Following the above arguments, we bring together perspectives from two distinct, yet complementary, theoretical domains to develop a conceptual framework (Figure 4). The framework illustrates how different components of a TECS business model work together in proposing and co-creating value, as well as capturing part of the created value. We use this framework as the basis of a case study research of a social housing provider of telecare services, YHN, as outlined below.

**Methodology**

We used a single exploratory case study design, with an interpretive focus (Stake, 1995; Walsham, 2006) to investigate and analyse a TECS, embedded within its complex social, organizational, and technological contexts (Baker, 2011; Greenhalgh et al., 2016).

**The Case**

YHN, an ALMO, is a private company, limited by guarantee, wholly controlled by NCC. YHN acts as an umbrella organization for the delivery of TECS to around 3000 local residents, under the Ostara brand name through Abri Trading Ltd, which was constituted as a separate subsidiary company to facilitate the commercial activities undertaken in the business. YHN has published accounts stating an income of £36.3 million for the year to March 2019, with operating costs of £40.9 million producing losses of £5.76 million. YHN has a headcount of 678 FTEs.

Historically, Ostara was heavily reliant on the council’s financial support when delivering telecare services to the majority of its customers who were assessed by the council’s adult social care department as having an eligible care need for telecare and meeting a pre-defined financial eligibility criterion. Cuts in public funding, at both national and regional levels, affected Ostara’s budget for supporting adult social care services (Phillips & Simpson, 2017), with the LA’s 2016/17 budget proposal including a recommendation to remove funding support to Ostara, starting from the middle of 2016.

Ostara’s viability was perceived to be at risk by YHN management who needed to look for ways to keep the service both financially viable and self-sustaining. In 2017, the total operational expenditure, with full cost recovery, for Ostara was in the order of £1.6 million with an operational workforce of just over 20 FTE (full-time equivalent) staff. Service reviews estimated that due to cuts in government and council subsidies there would need to be a reduction in revenue headcount, as well as up to a 30% increase in the client base, if the service was to remain financially sustainable with adequate service level provision. This is set against an ageing Newcastle upon Tyne population. The current percentage of the population aged 65 or over is expected to rise by a third by 2030 from its current level of 15.6%, and the number of over 85-year-olds to rise to over 8000 by 2029 (Tewdwr-Jones et al., 2015).

Given the NHS and council’s budget and workforce pressure on local NHS and care services. This demographic and healthy living independently at home strategy is set against a massive funding reduction for NCC, which has borne over £300 million of government budget cuts between 2010 to 2020 with a further £45 million annual funding gap being forecast over the next three years to 2023 (Harris, 2020a). This gap has been further exacerbated by the Covid-19 pandemic.

These cuts stand in stark contrast to the aspirations of NCC. Newcastle and Gateshead’s CCG operational plan for 2019/2020 states that ‘prevention is key to reducing health inequalities and this prevention agenda runs through all themes’ (Newcastle Gateshead Clinical Commissioning Group, 2019), while the North East and North Cumbria Integrated Care System’s vision is ‘to transform health outcomes for people and help them to live longer, healthier and wealthier lives’. The Newcastle/Gateshead integrated care partnership covers a population of 498,261 people. Within this, the sustainability and transformation five-year plan to 2023 focuses on localities of 30,000 to 50,000 people where aspirations are for the integration of general practice, community services, social care and the voluntary sectors with enhanced partnerships working between the NHS and
local government. Health and wellbeing in Newcastle are caught in a cycle of inequality, in which ill-health combines with social-economic exclusion to undermine the productivity and growth of the city’s economy. Hence, there is an urgent need for new service models which are prevention orientated and person-centric to provide the adult population with independent and fulfilling lives. The anticipated patient/service-user benefit and impact would be that people are able to stay healthier longer in their own homes, thereby helping to avoid unnecessary hospital and care home admissions. In order to achieve this, it is forecast that, by 2030, the region will need an additional 15,000 staff at a cost of £550 million across the NHS North Cumbria and North East Integrated Care System (ICS). This despite a current ageing workforce in 2019/20, where 20% are over 55 and 50% are over 45 years of age.

Ostara employs a telecare technology infrastructure and management platform provided by Jontek. Answerlink connects a range of electronic devices (with sensors) including alarm units, pendants, fall detectors, bed occupancy sensors, medication dispensers, door exit sensors, and flood detectors, installed at the service user’s home to the Ostara control centre. The service aims to monitor vital health status (for example falls) for elderly community members and to monitor the environment at their home (for example smoke detection or gas leaks) to assist with the safe, secure and independent living of the people. Ostara is accredited by the UK Telecare Services Association (TSA) and follows their code of practice. Ostara’s processes are aligned with the TSA prescribed ‘Reference to Response’ (R2R) service model for telecare service providers. These processes cover five essential elements: handling referrals; assessment and provisioning; monitoring; response; and re-evaluation within the overall service delivery cycle—see Figure 5.

**Data collection and analysis**

We engaged with YHN during the early months of 2016 in order to conduct an empirical investigation of Ostara’s
services. Our collection of empirical data, both qualitative and quantitative, primarily comprised of interviews, documentary evidence and observational field notes—see Table 1.

Transcriptions of the interviews with Ostara staff members generated a large volume of data (approximately 200 pages of transcript). To analyse the large volume of interview data that potentially can be an ‘attractive nuisance’ (Miles, 1979), we used NVivo, primarily to organize the interview transcript text, and to supplement our interpretative processes followed by manual coding.

Findings and discussion

This section presents the key findings from the study. The analysis of data suggests the vital role of factors related to the organizational context in which Ostara is embedded. Contextual issues such as identity and culture, how Ostara is governed, and its relationship with the LA shape the management decisions around the provisioning and delivery of Ostara. The challenges to the financial viability of the service emerged as another central theme in the analysis. It is also interesting to note how the Ostara’s organizational dynamics affect the opportunities for growth and sustainability of the service.

Ostara delivers valuable assisted living support to over 3,000 elderly and vulnerable residents and is available 24 hours a day throughout the year. At the time of conducting this study, the leading priority for YHN management was to keep the service viable by putting in place short-term measures targeted at retaining its existing customers, acquiring new customers through promotions of the refashioned service brand, and reducing operational costs through efficiency gains. The challenges facing the service were multifaceted, and so too were the potential solutions to achieve future sustainability for the service.

In order to ensure the future sustainability for this service, the current service model needs to be developed to offer service packages that attract more self-funded customers. Such a transformation of the Ostara service model would demand that several issues are addressed: investment to upgrade the technology used; establish strategic collaborations and partnerships; and, cultural change within the organization to embrace a more commercial outlook. All these conditions require planning for future scenarios and making strategic decisions about the business, although the analysis of data suggests a perceived lack of independence and control for the Ostara service management. Therefore, the prospects of a transformation for the service could be considered low, given the prevailing complicated relationship between YHN and the LA and the harsh political landscape in which Ostara operates.

The empirical findings can be examined by using the key theoretical constructs of a service business model comprising value proposition, value co-creation and value realization. This highlights how TECS provider organizations may be able to reframe their value propositions and to co-produce value in a sustainable service ecosystem, through innovative configurations of their internal, as well as network, resources accessible via partnerships and collaborations.

Poor value propositions

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 to provide ‘peace of mind’ in the event of an emergency is not aiding customers’ value perception of the service (Johnson et al., 2008). Our analysis further suggests that the current range of service offerings are not addressing the 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 the vital role for social and relational marketing efforts in encouraging healthcare technology adoption (McGuire, 2012; Wright & Taylor, 2005), but this appears to be missing in our case. Due to a lack of integration among several disparate IT systems involved in the service—see Figure 6—there is a limited value proposition of the service to other stakeholders in the service ecosystem. For example, sharing of useful information about the users of the service (for example falls history) with the concerned GP and/or hospitals could provide the relevant stakeholders from the health system with critical insights into the risk profiles of their patients, enabling their assessment and determination of appropriate preventative and proactive actions. However, YHN’s heavy reliance on NCC for its technology infrastructure—IT system upgrades and skill development—presents a significant challenge amidst the council’s frequent budget cuts to its ICT infrastructure.

Missing opportunities for value co-creation in the service ecosystem

The literature on business models and service logic suggests that value co-creation in the service ecosystem happens through the integration of interactional resources (Akaka & Vargo, 2014). Such co-creation relates to all the participating actors in an ‘activity system’ (Zott & Amit, 2010) that forms a ‘value constellation’ (Normann & Ramirez, 1993). From a TECS provider’s standpoint, interactional resources (for example information infrastructure and governance, skills, and knowledge of the staff), business processes and policies, relationships with NCC and other partners are vital constituents of its value architecture (Al-Debei & Avison, 2010).
Our analysis found that Ostara has demonstrated only token interactions between the service provider and with the NHS or other health organizations. While the provider maintains mutually beneficial relationships with other public services—fire, ambulance, and housing services—the interactions mostly relate to reciprocal signposting /referrals and the absence of formal collaborative partnerships in the delivery of TECS. The lack of such collaboration points to a weak value network and challenges the co-creation of value in the service ecosystem. Future technology trends suggest the availability of a superior broadband infrastructure providing improved 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). Such a change could potentially alter the technological landscape for the TEC services through opportunities for innovative service designs and new value co-creation within the service ecosystem.

Several interviewees voiced a perceived need for more investment in IT infrastructure—both hardware (for example handheld tablet devices for field staff) and software upgrades—to facilitate better and faster information flows across the organizational network. The lack of integration among disjointed IT systems (see Figure 6) presents significant challenges to the YHN management’s aim of enhancing the productivity of its staff given the high volume of manual paperwork, and the effort spent in duplicating information across multiple IT systems. Furthermore, a robust information infrastructure with integrated IT systems could potentially enable the flow of vital information across YHN and facilitate strategic and operational decision-making processes, contributing to the success of Ostara (Collinge & Liu, 2009). On a broader service ecosystem level, an integrated IT infrastructure and effective information governance that supports interoperability, data sharing and integration of information systems, are critical to driving collaboration and partnerships across health and social care organizations (Waring & Wainwright, 2015).

Inadequate realization of value from the services

The literature on business models emphasises the monetization of value from services through various revenue streams (Osterwalder et al., 2005), as well as the importance of the role of profit or surplus generation to the growth and sustainability of the service (Johnson et al., 2008). Data from our case study suggests that organizational constraints such as a lack of commercial focus, and rigid procurement policies and guidance of LAs do not favour the telecare service providers in terms of maximizing their revenue sources and also, managing their cost structure to compete effectively in the market.

Our research demonstrates that a ‘lack of evidence’ remains one of the critical challenges in advocacy and acquiring appropriate funding from institutional authorities. Given that most of the evidence relies on anecdotal information, the absence of ‘hard’ financial and operational evidence on cost savings, the value proposition of TECS remains questionable (Henderson et al., 2014). The overall value created by TECS should not only be measured in tangible and economic measures but also in the form of long-term benefits that can be measured using intangible social measures such as the wellbeing of citizens, support for independent living and better quality of life (Schwamm, 2014; Lluch, 2013; Goodwin, 2010). However, the lack of effort in developing such measures can be attributed to several operational challenges for service providers such as their limited resources, inadequate infrastructure and lack of incentives. This calls for innovation in existing evidence collection methods, facilitated by education and training in evidence-based approaches to management and policy-making for relevant stakeholders (Wainwright et al., 2018).

Social business model designs, with a ‘profit with purpose’ mission (Osterwalder & Pigneur, 2011), need to accommodate a type of ‘social profit equation’ as well as an ‘economic profit equation’ (Yunus et al., 2010, p. 319). It can also be argued that social contributions could be a part of the demonstrable evidence base that offers additional value propositions to the commissioners and other institutions and facilitate

Figure 6. Ostara IT systems integration landscape.
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 (Nicholls et al., 2009; Millar & Hall, 2013). However, as Triantafillou (2020) noted, putting such value assessment systems demand considerable resources and can be cost prohibitive.

Conclusion

The contemporary discourse on innovation and transformation in public services, which includes healthcare, emphasises the need for value co-production through various forms of user participation and engagement in the service design and implementation processes (Osborne et al., 2016; Wherton et al., 2015). Shah et al. (2019), in their review of a project to enable the co-development of an integrated health and social care infrastructure, conclude that health and social care information is not only highly complex, but often socially and personally sensitive in ways that do not apply in other domains. This, therefore, requires a tailored inter-disciplinary and inter-sectoral approach to technology development. This directly applies to any future TECS systems and infrastructure design where information collection and sharing is integral for any successful operation.

We adopted an ecosystem approach to investigate the complex sociotechnical landscape of a TECS operating in north east England and to capture the complexity of relationships and interactions among a diverse set of stakeholders. Drawing on the conceptualizations of value from the literature (Al-Debei & Avison, 2010; Vargo & Lusch, 2004), we have developed an investigative framework to inform our field research. In the form of an exploratory case study, we analysed the challenges as well as opportunities for value propositions, co-creations and sustainability within a TECS ecosystem. Our findings reiterate the vital role played by collaborations and partnerships in a service ecosystem, in which relational, experiential, ethical and social aspects are accommodated by the aspirational role of technology designs (Flick et al., 2020).

The global Covid-19 pandemic created a new set of complex economic and social challenges for the delivery of health and social care services (Kimpen & Osnabrugge, 2020), in which the ‘new normal’ is anticipated to accelerate digital transformation of public services, especially in health and social care (Agostino et al., 2021; Leite et al., 2020; Public Policy Projects, 2020). Our research contributes towards the ongoing conversations and debates by suggesting how, derived from a value-centric analysis of a TECS ecosystem, changes are necessary to how services are provided through adopting a more creative and innovative approach to service provision (Cluley & Radnor, 2020).

While the findings from our case are context-bound, derived from a set of specific problems in north east England, it is possible that the insights gained from our investigation can be applied, with appropriate adjustments, to studying similar service models located elsewhere. These other settings will, however, be characterized by a mixed economy of service provisions.

Further research building on our analysis is possible. The boundary of TECS ecosystems can be expanded to include the regional and national health organizations (for example CCGs, GP practices and Public Health England) and TECS industry representatives. Amidst the overarching policy visions and national initiatives promoting collaborative working between health and social care (NHS England, 2017), our ecosystem approach emphasises the critical need for viewing telecare and telehealth together. Such a broadened scope of research will allow future studies to examine the barriers, as well as opportunities of widespread adoption, value co-creation and sustainability within the integrated care pathways (Chrysanthisaki et al., 2013), and how this can be embedded within the TECS ecosystems.

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