

Technology for Disabled Adults in Care: A Realist Review and Evaluation

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Declaration

I declare that none of the work contained within this thesis is submitted for any other degree at any other university. The contents of this thesis are entirely the work of the candidate, Julie Eshleman, for the degree of Doctor of Philosophy in Sociology and Social Policy from the University of Stirling. The General University Ethics Panel approved this project on 10 December 2021, with an approved amendment for the survey approved on 25 August 2022. Approval notification letters are in Appendices A and B.

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Abstract

Introduction

Technology is increasingly used as a tool to close the gap in unmet support needs for disabled adults in residential care settings (RCS). While previously used to streamline and empower the workforce, more precise information was needed for technology to be a successful tool for disabled people to use themselves. Disabled technology users identified independence, autonomy, social inclusion, and wellbeing and satisfaction as key outcomes to describe in detail.

Methods

This research employed a critical realist disability studies methodology to understand how disabled people were experiencing technology while living in RCSs. In a realist review and evaluation, evidence from 193 academic and grey papers was synthesised with data from five focus groups and 22 interviews for a total of 75 participants to generate four causal context-mechanism-outcome configurations (CMOCs), statements describing the precise context elements that generate positive technology outcomes.

Results

Critical foundations in physical infrastructure, financial pathways, leadership, and technology knowledge and skills underpinned all positive technology outcomes studied. Independence was enhanced through compatible assistive technology and access methods, alongside a shared understanding of independence. Technology enabled autonomy by empowering people with independent control combined with support that incorporated opportunities for using technology rather than relying on person-delivered support. The inclusion of leisure activities in support plans facilitated social inclusion by enabling people to pursue interests and control their engagement. Effective utilisation of well-suited assistive technology fostered increased fluency, resulting in the accomplishment of complex goals and enhanced overall wellbeing and satisfaction.

Conclusion

This research underscored the transformative potential of technology as a tool to fill unmet support needs when used by disabled people. It described the conditions for success which should be considered and invested in in policymaking, organisational technology delivery and integration planning, and in the practice of providing professional support services for disabled people.

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Chapter One: Introduction

The social care sector in the United Kingdom is undergoing a quiet revolution. In the midst of the Fourth Industrial Revolution, technology is rapidly reshaping the landscape of adult social care. Nevertheless, within this technological advancement, a growing paradox is apparent. The relentless pace of innovation, with its potential for transformative impact, is exceeding professionals' capacity to effectively evaluate its consequences for disabled adults. This paradox is especially apparent when examining assistive technology projects, as the ability to forecast or prepare for favourable outcomes has posed challenges due to notable discrepancies between living sites. The existence of divergences in staff, residents, values, and norms at each specific site adds layers of intricacy, presenting a formidable challenge in replicating implementation processes and achieving similar outcomes (Hassan, 2020; Lorenz et al., 2019; Wild et al., 2016). Explanations for why technology is embraced by some people while being discarded or rejected by others remain elusive. This adds to the uncertainty surrounding the connections between contextual factors, individual responses to technology, and the resulting outcomes. Over the past eight years, I have been immersed in the adult social care sector as a technology project consultant, witnessing first-hand the urgent need for research on the factors that produce how disabled adults experience technology in residential care settings (RCSs). This thesis delves into this intriguing paradox, exploring the intersection of technology, adult social care, and the quest for positive outcomes in the lives of disabled adults in the United Kingdom.

With these lessons rooted in practical experience as a foundation, I aimed to gain an understanding of the interplay between contextual elements and actions that led to positive outcomes for disabled people through the use of technology. My focus was on understanding the ways in which technology could be utilised by disabled people to build the lives they wanted within a residential care setting (RCS). The emphasis on technology utilisation traditionally revolved around workforce enhancements (e.g., e-care planning systems, electronic record-keeping systems for efficient resource deployment, and monitoring systems for remote or on-demand support). I was particularly interested in non-specialist technologies that were widely available to consumers and were most commonly being used by disabled people in RCSs. They

included daily living digital technology; mainstream devices such as smartphones, smart speakers, and smart home devices; and single-function devices such as augmentative and adaptive communication (AAC) devices.

1.1 Aim and Flow of the Thesis

It is essential that support organisations develop a comprehensive understanding of their role in promoting the use of technology among disabled people within their settings, as well as the causal determinants of favourable outcomes. My research aim was to understand not only how disabled people used technology, but how disabled people experienced the processes organisations implemented to increase knowledge, access, and support of technology. Research in this area has focused on using technology in a rehabilitative function or for empowering the workforce supporting disabled adults. My purpose was to carefully understand disabled technology users themselves and how they saw technology in their own lives. I then sought to describe the specific elements and circumstances that caused positive outcomes. These element descriptions will equip organisations with the knowledge necessary to cultivate the conditions under which positive technology outcomes occur. This knowledge will enable practitioners, social care leaders, and technology professionals to produce a more resource-efficient, streamlined technology integration framework for residential care settings.

I organised this thesis in seven chapters to articulate the preparation for and processes of this research, the findings, and discussion. In Chapter Two, I outline the empirical background for this work with the aims and current research questions. Next, in Chapter Three, I describe the critical realist disability studies methodology used for this work, followed by my research methods in Chapter Four. I use Chapters Five and Six to outline my findings and analysis from my survey and final theories in context-mechanism-outcome configurations (CMOCs). In Chapter Seven, I present discussion and applications of the findings, reflections on the research process, and final takeaway points.

1.2 Language

In the following sections, I describe some intentional language choices used throughout the rest of the thesis, justifying why I selected each term to illustrate the concepts. Language choice is crucial in disability research, affecting how others perceive power balances and treat disabled people (Bouman et al., 2017; Ślebioda, 2013; Żuchowska-Skiba, 2020). Terminology reflects ways of thinking about disability, disabled people, technology, and RCSs. Each language choice encompassed a spectrum of opinions and perspectives to articulate the opinions and sentiments toward these ideas (Shakespeare, 2018). These language choices reflect my relationship to this work and the stakeholders represented. I describe some terms as isolated concepts here; others are justified and discussed in context throughout the thesis.

1.2.1 Disability

Language around disability has evolved, reflecting how society responded to disabled people. The understanding of disability is progressive beyond the binary discussions in the social and medical models, acknowledging the role of both individual and extrinsic factors (Shakespeare, 2013a). *Disability* was not only a function of individual impairments but was created when impairments interacted with the environment (Thomas, 2007; Shakespeare, 2013a). Disability described a complex and dynamic relationship between impairment and how social barriers activated impairment in a way that disabled people (Shakespeare, 2018). Power dynamics, social norms, and discriminatory practices created the disability experience. I used the term *disability* to refer to the lived and socially constructed experiences of having any impairment or difference activated under certain social, political, economic, and built environment conditions (WHO, 2011). This use of the term was in keeping with the importance of context to provide more accurate and in-depth understanding of experiences and events.

1.2.2 Disabled People

Both disabled people and scholars have debated the values signalled with the selection of 'person-first' (*people with disabilities*) versus 'identity-first' (*disabled*

people) terminology (Ślebioda, 2013). The ‘People First’ movement began in the 1970s with advocates seeking to emphasise humanity rather than impairment (Best et al., 2022). Those who chose person-first language argued that it highlighted personhood before disability, indicating that disability did not define or comprise an entire personal identity and, therefore, should be linguistically separated (Ferrigon and Tucker, 2019). This language permitted people to disassociate from the disability label as a defining or primary characteristic. Person-first language was also used to signal a distinct lexical break away from previously used terms (handicapped, crippled, retarded), now considered stigmatising and offensive (Watson and Vehmas, 2019).

The countermovement to person-first language was identity-first language, which placed disability first in the description of a person. Using identity-first language challenged the idea that disability was something to be ashamed of or hidden (Watson and Vehmas, 2019). Historically, identity-first language signalled the belief that disability was an inherent characteristic of the person, not an accessory (Best et al., 2022). Identity-first language recognised that disability was a culture seeking to promote autonomy, agency, and control over one’s destiny (Best et al., 2022). While person-first language was the preference in North America and the Convention on the Rights of Persons with Disabilities from the United Nations, many disabled people and advocates found that person-first language perpetuated the idea that disability was a negative characteristic and should be separated from a person and their identity as a matter of respect (Titchkosky, 2000; Ferrigon and Tucker, 2019). Under the social and critical disability studies models of disability, this language signalled that disability was not a personal characteristic of individual people, but a product of societal structures and attitudes (Oliver, 2013). Disability was not solely a product of impairment but was constructed when a person with differences encountered barriers. I selected identity-first language because it was overwhelmingly the terminology preference of disabled tech users, and it was the commonly selected terminology used by people in the United Kingdom (Shakespeare, 2018).

1.2.3 Care Home / Residential Care Setting

Terminology regarding the various configurations of support and care differed throughout the literature. These care and support systems had various names depending on the geographic region, the authors who produced the evidence, and the values and perspectives of the authors at the time of writing. When I used the term *residential care setting* (RCS), I was referring to a long-term living setting which combined and shared accommodation and support. Here, disabled adults (usually age 20 and older) lived in a shared space with paid support staff providing daily support both with and without nursing care (Dalley, 2000). This term encompassed an array of living arrangements beyond traditional care homes and recognised that there were different residential settings, such as supported living arrangements, group homes, or shared housing, that provided both accommodation and support for disabled adults (NHS, 2022). Including these different settings and support arrangements was critical to the applicability of this work; I aimed for the insights to be generalisable and applicable across different complex spaces. This language choice also acknowledged a need for more inclusive, person-centred, and community-based approaches to care and support (NHS, 2022). Most often, organisations provided both accommodation and support. An example was a home where several people lived and paid rent for their living space and a shared staff of support workers was managed and paid by a company.

1.2.4 Support Workers

I used the term *support workers* to describe professional workers who provided paid support to a disabled person. This support often took place in a residential care setting or in a disabled person's own home, enabling them to create the lives and experiences they wanted. Most frequently, I referred to a staff of people who worked for an organisation that supported disabled people with activities of daily living and were paid by that organisation and provided support to multiple people across the course of each support shift. Because of the focus on the organisational arrangement of support, I did not include family or unpaid carers in this term because they were not as affected by the values and beliefs of individual residential care systems as paid workers in that organisation. The term *support workers* also emphasised a focus on collaboratively supporting people rather than 'doing care to

them', included a broader range of support activities than what most people thought of when the word 'care' was used, and reduced the stigmatisation which may have been associated with using support (Robinson et al., 2021; Beadle-Brown et al., 2012; Becker, 2020). This terminology shifted the focus from hierarchical relationships, recognising the importance and dignity of the worker and the disabled person using their support.

1.2.5 Assistive Technology vs. Technology

I began by using the term 'assistive technology' (or AT) to describe technologies that people used as daily support. However, most of my interviews with key people focused on smart homes and mainstream technology (widely available technology such as Amazon Alexa and smart plugs/accessories). Including the term 'assistive' made literature searching difficult, returning a disproportionate amount of irrelevant literature. The term also implied more specialist, adapted devices, which excluded the mainstream generalist devices necessary for this research. The word 'assistive' indicated a disabled person engaging with the device when, in the reality of a residential care setting, numerous people engaged with devices. Therefore, I chose the term *technology* to encompass both specialist and non-specialist technologies, which disabled or non-disabled people may use to build the lives and experiences they wanted. The term 'assistive' was still utilised where it was used in referenced evidence and literature and in response to participants' comfort with that term, which often depended on the specialty of the specific tool being referenced.

1.2.6 Assistive Technology Professionals / Experts

I started by calling the inaugural participant group *Assistive Technology Professional Experts* to describe them as active practitioners engaged in the assistive technology space as paid experts. During interviews with disabled technology users and professionals in the field, we all agreed that referring to non-disabled participants as 'experts' suggested that disabled technology users were not seen as expert users. I determined that the previous term choice de-valued the input and expertise of the disabled technology users, necessitating the updated terminology of Assistive Technology Professionals (and shortened versions like AT Professionals). This better described the people who engaged with assistive technology sales,

installation, support, delivery, and integration, or in other ways facilitated technology use by disabled adults to build the lives they wanted as a profession. This terminology also aligned more closely with how this participant group self-identified. The inclusion of the word 'assistive' differentiated their more specialist technology sales, delivery, and support model from large technology sales companies (e.g., Curry's or John Lewis).

1.2.7 Disabled Technology Users

The name of this stakeholder group shifted across the course of this research as their preferred terminology evolved through discussions about assumptions associated with the previous terms. I called this group Assistive Technology Users or 'AT Users,' even as I began referring more to general than specialist technology. I also discussed why general technology was referred to as 'assistive' simply when disabled people used it, as in practice both disabled people and those who supported them engaged with these technology ecosystems. A small group of early participants recommended I refer to this group as 'disabled technology users' if it was necessary to distinguish between the professionals and those using the ecosystems to build the lives they wanted. When I used the term *disabled technology user*, I was referring to disabled people living in a residential care setting who used some technologies daily.

1.2.8 Independence and Interdependence

The concept of independence came up again and again in this work. The broadly used term in disability support was *independence*, used to refer to the aim that disabled people be entirely reliant on others (Morris, 1993). But especially in RCSs with round-the-clock support on-site, numerous participants felt it was a term that failed to adequately describe how they constructed their lives. Critical realist disability studies challenged the idea of independence and the perception that it was the ideal condition for disabled people to aspire to in intensive support settings (Kittay, 2011). Judy Heumann, an influential founder of the Independent Living Movement, wrote, 'independence does not mean doing things physically alone. It means making independent decisions' (Stoddard, 1978). Interdependence was also used by some practitioners, specifying that control over interdependence (a disabled

person deciding when they wanted to use person- or tool-delivered support) may be the most practical way to describe this complex interaction between people, their environments, and their supports. This language recognised that no one (not even non-disabled adults) was truly 'independent,' but that many non-disabled people had more control over when they depended on something or someone and when they did not (Kittay, 2011). The term interdependence more accurately described the reciprocal and relational nature of providing and using support and removed the responsibility for independence from the disabled person alone. While I recognised a distinction in what these terms meant, I used the term *independence* throughout this research as it was the more familiar term to most people in RCSs and people working in those spaces. In this work, I defined *independence* to disabled technology users as 'moments when you can do things for yourself when you would like to, even when you use care and support for other parts of your day and activities.' To assistive technology professionals, the term meant 'opportunities for moments when a disabled person can do things for themselves when they would like to, even when they use care and support for other parts of their day and activities.'

The choice of language in this research project significantly influenced the content and interpretation of my process and the findings, thereby shaping the narrative and overall direction of the study. I adopted language which was agreed as meaningful to all stakeholder groups to ensure I produced the most applicable analysis for multiple stakeholders. In the next chapter, I will give background summaries related to the relevant fields of work and a review of applicable literature.

1.3 Summary

Chapter One offered a comprehensive introduction to the thesis document, outlining the objectives and structure of the remaining chapters. I clarified the language which will be used throughout the thesis, including terms such as disability, disabled people, care homes or RCSs, support workers, Assistive Technology versus technology, Assistive Technology professionals versus experts, disabled technology users, and independence versus interdependence. By defining these terms, I established a foundation for the subsequent chapters and set the context for the research I conducted.

In Chapter Two, I will describe the background of the fields of disability and social care research specific to disabled people and technology use. This description will include sections on the history of disability in the United Kingdom, Critical Disability Studies, Residential Care Settings (RCSs), technology in RCSs, the impact of technology for disabled people in RCSs, and the gap in the literature which I will satisfy with the forthcoming research plan.

Chapter Two: Background and Review of Literature

My research sought to understand how disabled people were experiencing technology as a tool to build the lives and experiences they wanted while living in residential care settings. In this chapter, I will review portions of literature and the theories which influenced my pursuit of this research project. I highlight the gaps in our knowledge of the conditions under which disabled people living in RCSs benefit from the best use of their technology. I start with section 2.1, History of Disability in the UK, to describe the changes in the treatment and support for disabled people since the medieval era, including a discussion of disability models which have dominated more recent times. Next, I explore the theoretical frameworks of realism and critical realist disability studies, which influenced this research in section 2.2 Critical Disability Studies. In section 2.3 Residential Care Settings, I describe how RCSs started and what they have developed into today. In section 2.4 Technology in Residential Care Settings, I explore how technology has been used to empower the workforce and support disabled people in RCSs. In section 2.5, Impact of Technology for Disabled People in Residential Care Settings, I explain how technology has impacted disabled technology users themselves. Finally, in section 2.6, I justify the urgent need for this research to address gaps in the existing literature before stating the research questions for this investigation.

2.1 History of Disability in the United Kingdom

The history of disability through the United Kingdom followed significant political and social shifts related to disabled voices and broader societal views of disability and participation. Over the centuries, attitudes toward disabled people and participation have evolved through influences from social, cultural, and political changes. In the following sections, I will discuss what were once the two dominant models of disability inquiry, leading to the theoretical framework I used for this research.

In the medieval era in the United Kingdom, disability was associated with divine punishment or attributed to some supernatural phenomena (Turner, 2012; Shakespeare, 2013a). People viewed disabled people as outcasts and attributed their conditions to an individual moral failing. There was a long-held belief that

disabled people could not contribute to society and were excluded from participating—a negative perception that persisted into the early modern period.

During the Industrial Revolution in the 18th and 19th centuries, societal attitudes toward disability shifted as agrarian communities transitioned to more capitalist economic structures. In these new structures, disabled people hindered industrial productivity (Shakespeare, 2018). As this industrial change unfolded, many family members who were previously caregivers in their communities redirected their efforts to paid work, leaving disabled people without community-based support and driving them into institutions (Shakespeare, 2018). Alongside the Poor Laws, communities left disabled people without enough support to contribute or participate, leading to their confinement in workhouses or institutions. Society began to view disability as a burden during these changing times in communities (Walmsley, 2005).

The early twentieth century saw the emergence of a social preference to eliminate characteristics and traits deemed 'undesirable' from the population (Shildrick, 2009). Disabled people became targets of eugenic politics, a period which had a lasting impact on the belief in able-bodied superiority and justified the marginalisation of disabled people (Shakespeare, 2018; Kerr and Shakespeare, 2007). A significant change in perspective came at the end of World War I when disabled war veterans began returning home, demanding that society confront the challenges they faced after sustaining injuries and mental health impacts from their service (Turner, 2012). Veteran advocacy efforts achieved significant improvements to their rights, such as the Disabled Persons Employment Act of 1944 (Floyd and Curtis, 2000). These improvements provided opportunities for training and employment and forced steps toward disability inclusion.

Perhaps the most critical point in disability development was the establishment of the National Health Service in 1948, a crucial step in providing medical healthcare and support to disabled people (Oliver, 1998). Additional social welfare reforms throughout the twentieth century created disability benefits and housing to facilitate better integration in society (Oliver, 1998). This medicalisation of disability support contributed to the further entrenchment of power imbalances. It exacerbated the risk of disability being solely regarded as a medical challenge rather than a social

dilemma that required attention (Oliver and Barnes, 2012). I will describe the medical model of disability in further detail in section 2.1.1.

The disability rights movement gained momentum in the 1970s and 1980s, with disabled people challenging the social and political systems perpetuating their discrimination and exclusion (Degener, 2016). Disabled people demanded rights equal to non-disabled people, access to social and built structures, and recognition of the shared social (rather than individual or personal) responsibility for the impacts of disability (Barnes, 2019). These ideas made up the social model of disability, which I will elaborate on in section 2.1.2.

2.1.1 Medical Model of Disability

After the Second World War, the medical model of disability in the United Kingdom developed as public concern shifted to the reintegration and support needs of disabled veterans (Shakespeare, 2018). This shift in focus transpired in parallel with a systemic increase in the power of the medical sciences. Across the twentieth century, medical control governed areas of life previously free of its influence, such as childbirth, lifestyle choices, and the ‘management’ of disabled children and adults (Thomas, 2007: 31). As science and modern medicinal treatment practices developed, methods for treating or improving mortality and the physical condition were revered, especially when disabled veterans returned home with injuries and trauma. The availability of remedies for medical ailments (e.g., polio, tuberculosis, and other life-threatening conditions) was a turning point for life expectancy (Blaxter, 1981).

In this evolving landscape, a fundamental assumption of the medical model emerged: medical authority. People created societal structures which positioned medical professionals as gatekeepers to healing and improved life experience. Medical knowledge and interventions were seen as the main solution for disabled peoples’ needs (Oliver, 1998). Further advancements in rehabilitative and health sciences permitted communities to transition focus from vital life-saving interventions to less-critical ‘comfort’ interventions for disability treatment (Blaxter, 1981; Egner, 2016; Bury, 2010; Shakespeare and Watson, 2001). With a distinct emphasis on alleviating the suffering assumed to accompany any illness or impairment, disabled

people and their families began to feel the impacts of this rise of less critical interventions (Schumm and Stoltzfus, 2007; Thomas, 2004). Any physical or mental impairment, disease, chronic illness, or function which deviated from 'the norm' was viewed as a personal tragedy. Medical professionals positioned themselves to improve the bodily condition with treatment to lessen corporeal abnormalities (Blaxter, 1981; Egner, 2016; Bury, 2010; Shakespeare and Watson, 2001). The role of medicine, therapists, and professionals was to distribute resources that would 'fix' abnormal function (Berghs et al., 2016: 26). These perceptions became the individual deficit perspective and positioned disability as a deviation from the norm in need of correction (LoBianco and Sheppard-Jones, 2007).

Another assumption in the medical model was that all experience of disability was terrible and should be prevented or removed wherever possible, a position created with sparse input from people with lived experience of disability and impairment. This assumption pathologised any difference and directed effort and resources toward restoring bodies to states of normality, invalidating the personhood of people who did not conform (Loja et al., 2013). This model of disability was attractive for resource planning in residential care organisations, allowing for the quantification of potential support needs based on impairment and chronic illness. However, this perspective failed to consider the priorities and desires of the disabled people themselves (Berghs et al., 2016). The model was predicated on an ableist view and left no opportunities for a disabled person to lead in designing and managing how they were to be supported.

Divergence from the medical model was a reaction to concerns about societal focus, social barriers, and paternalistic attitudes. First, disabled scholars such as Finkelstein, Hunt, and Oliver disagreed with the notion that something was wrong with them and other disabled people, or that they should be considered 'broken' or less able to participate in society's social and economic fabric (Finkelstein, 2001a). By considering disability as an individual pathology, critical social, cultural, and environmental contexts as factors shaping the experiences of disabled people were ignored (LoBianco and Sheppard-Jones, 2007). This perspective overlooked the embodied aspects of disability, or how the lived experience of disability could not be adequately explained by a medical condition or impairment but must account for the

broader social, cultural, and environmental factors which were vital to understanding disability (LoBianco and Sheppard-Jones, 2007).

Embodiment played a significant role in the lived experience of disability as not only a matter of the physical body or mind but an experience encompassing the interactions between people and their circumstances (Thomas, 2007). Embodiment referred to how people experienced, perceived, and interpreted the world around them. It involved the physical, sensory, and emotional aspects of these interactions between a person and their environment (MacLachlan, 2004). Society's expectations and attitudes contributed to notions shaping a person's bodily experiences, self-perception, and identity in ways left unexplained by medical treatment or reduced impacts from impairment (Shakespeare, 2006). Embodiment and the importance of these subjective experiences of disability moved society closer to a critical understanding of disability, which was better recognised in the developing social model. Second, many disabled people did not view the barriers they faced as inherently individual; they felt less disabled by their bodies and minds and more by the environments in which they wished to participate (Thomas, 2007; Hunt and Mesquita, 2006). This idea gave rise to the social model notion that the elimination of social and environmental barriers would reduce the disadvantage of impairment (Shakespeare, 2013c).

In the medical model of disability, technology for disabled people in RCSs sat as a tool for rehabilitation and a functional return to normalcy. Experts with competence and authority over impairment and loss of function from impairment provided technology to restore bodies and daily lives to maximum function. These experts were still considered key stakeholders in the experience of disability. However, for the current research, this rehabilitative application was not a suitable role for technology, as disabled people were recognised as experts in their own lives and priorities and had the autonomy to control how they were supported and which tools they may choose. An improved role for technology might be barrier removal. The social model of disability offered an improved function for technology as a tool to improve access to the lives disabled people wanted.

2.1.2 Social Model of Disability

The social model of disability was first described by Oliver in 1983 based on the work of Hunt and Finkelstein in the 1970s. Oliver suggested views of disability needed a shift to a 'clear focus on the economic, environmental, and cultural barriers encountered by people viewed by others as having some form of impairment—whether physical, mental or intellectual' (Oliver, 1990). He initially proposed the social model to shift away from the medical model, consider the social construction of disability, distinguish disability from impairment, address societal barriers, understand the power relations and social inequality, and promote collective action for social change. The social construction of disability challenged the assumption that disability was an individual issue, emphasising how disability was shaped by societal attitudes, norms, and built and symbolic structures (Shakespeare, 2018; Barnes, 2019). This school of thought postulated that people were more disabled by society than by their bodies and impairments.

One significant distinction of the social model was the separation of bodily function from social restrictions or exclusion for people with impairments (Thomas, 2004; Carter, 2018). The Union of the Physically Impaired Against Segregation (UPIAS) proposed this socio-political definition of disability, with *impairment* meaning "lacking part or all of a limb or having a defective limb or mechanism of the body" and *disability* meaning "the disadvantage or restriction of activity caused by a contemporary social organisation taking little or no account of people who had physical impairments and thus excludes them from participation in the mainstream of social activities" (Barnes, 2019: 16). Later, the distinction of 'physical' impairments was dropped to include physical, sensory, and cognitive impairments which may have had adverse physical or psychological implications in a society which excluded people (Barnes, 2019). This notion further emphasised disability as a complex interaction between socially constructed ideas of participation imposed upon people with impairments.

Building from this distinction, the new social model of disability was concerned with limits placed on people by society regardless of illness, impairment, or disability, arguing that disability and impairment did not exclude each other; one could be disabled without impairment, and one could have an impairment and not be disabled

by it (Oliver, 2004). Oliver described the social model as a reaction to the medical disability model, shifting the focus from pitying and fixing the person to building more inclusive attitudes and structures (Oliver, 2013). While the shift from individual fault to social barriers was a welcome change, the social model failed to consider the impact of personal experiences of pain, mental health, and discomfort associated with chronic illnesses and impairment. The challenge to the social model in explaining these issues was that no amount of external barrier reduction could eliminate all forms of disability or chronic illness; a person with impaired vision could not see a sunset, despite society's best efforts to remove barriers (Shakespeare and Watson, 2001; Vehmas, 2010). Finkelstein and Hunt demanded that those experiencing impairment fall silent regarding their personal struggles with disability, asserting that their individual experiences distracted from the overall social model message that society was responsible for both creating and addressing disabling barriers excluding disabled people (Finkelstein, 2001a; Finkelstein, 2001b).

Physical, psychological, and external barriers impacted disabled people, and a more comprehensive, pragmatic approach to addressing these barriers was necessary to respond to the challenge of disability. Disabled people existed across a broad spectrum of experiences, and there was a real risk of oversimplification by observing the phenomena of disability from only one perspective. Those who saw disability as a tragedy that should be eliminated, treated, and prevented in all circumstances (medical model) would likely see only the most severely impacted people. Those who viewed disability as a matter of societal awakening and barrier removal (social models) were often looking at examples of disability which were not as noticeably impactful to people (Shakespeare, 2013b). Seeing disability from only one perspective missed critical nuance and detail which adversely affected how we could respond to disability. To grapple with these complexities and perspectives, I needed a more flexible, multifaceted approach that contemplated the value of different perspectives and priorities.

2.2 Critical Disability Studies

There existed a need to change how we used current theories of disability to approach research and knowledge development in disability research. Both disabled

people and their advocates agreed we should adopt a more flexible approach in using existing theories of disability to conduct research and generate knowledge. This approach should acknowledge and reflect the complexity of the spaces in which knowledge about disability and society was gathered and analysed (Goodley et al., 2019; Walmsley, 2004). Critical disability studies (CDS) combined components from previous disability disciplines including humanities, psychology, sociology, health care, education, technology, and engineering/design (Watson and Vehmas, 2019). This synthesis of fields was a rational evolution of thought by disabled people and their allies, opening the boundaries of reflective analysis for better and more comprehensive understandings of the complexities which encompassed the disabled experience. CDS acknowledged the importance of personal experience of interactions with society whilst balancing power distribution across perspectives (Goodley, 2020). This ideology suggested that 'normality' was a misguided goal and that a disability category was not a suitable starting point for inquiry. Work in this area needed to be multi-directional (Mankoff et al., 2010). The focus could not only be on 'fixing' disabled people or 'fixing' access and inclusion issues in society but rather on the relationships between these factors that produced changes to improve conditions for disabled people (Mankoff et al., 2010).

Critical disability studies valued understanding the complex views and experiences of disabled people, notions of autonomy and capacity, and the influence of culture and systems in their lives (Goodley, 2016). Within RCSs, the CDS methodology enabled disabled people and research allies to understand a fuller context of how people were experiencing disability and accessing the resources they wanted. Disabled peoples' experiences were constructed by each person, organisations, individual relationships, families, and local communities. Each stakeholder entered the space with their ambitions and influences over the disabled person's life, including often divergent ideas for using resources to build their experiences. CDS offered flexibility in capturing and scrutinising the values, goals, culture, and context of all relevant stakeholders interested and invested in the state of disability (Goodley et al., 2018). This framing allowed movement away from surface-level approaches to explain disability and understand the interconnected and overlapping factors which combined to create the experience of disability in more depth.

Critical disability studies offered the opportunity to question current assumptions, explore all connections between people, circumstances, and experience, and welcomed challenging and reflective thought. CDS was well-suited for research about experiences of disabled people using technology within complex spaces for this reason. With multiple interested stakeholders (disabled people, organisational care providers, families, friends, and academic allies) who often had conflicting motivations, values, and perspectives, CDS provided space to explore and equalise the value of different contributions. The interdependence between disabled people, non-disabled people, and complex systems of support was a significant focus for CDS. Their area of interest was the complexity of these entanglements. These intricacies were acknowledged and celebrated as phenomena with the potential to enhance our understanding of the disability experience and how society was structured and functioning for its citizens (Bennett et al., 2018).

2.2.1 Realism

Realism as an ontological perspective acknowledged an external, objective reality independent of our subjective experiences and interpretations (Pawson and Tilley, 1997a). In disability research, applying this perspective meant recognising that disability was a nuanced social phenomenon with material consequences (Pawson and Tilley, 1997b). It suggested that there was a reality with properties, entities, interdependencies, and causal relationships that existed regardless of our awareness of it (Emmel et al., 2018). It was possible through realist research to acquire objective knowledge of this world through empirical observation, scientific inquiry, and rigorous investigation. Realism supported that we could validate and confirm knowledge through systematic and reliable methods of inquiry (Watson, 2010). As an epistemological stance, realism influenced how researchers approached exploration of specific experiences, such as how disabled people used technology in RCSs. It emphasised the existence of an objective reality that could be studied and understood through empirical observation and investigation, interpretation, and triangulation of perspectives and evidence (Pawson, 2013). In researching technology used by disabled people, realism shaped the objectivity, contextual understanding, causal explanations, and practical implications of research and findings.

Contextual understanding in realism referred to the recognition that reality was complex and multifaceted and that contextual factors influenced our understanding (Pawson and Tilley, 1997a). Broader social, cultural, historical, and situational contexts in which phenomena of interest occurred had to be acknowledged and considered to produce a comprehensive understanding of reality. Realism emphasised understanding how entities, objects, and phenomena interacted within specific contexts, recognising that it was the relationships and connections between entities that generated and shaped experience (Pawson and Tilley, 1997b). Realism shifted the research and explanatory focus from ‘what is working?’ to ‘what works, for whom, in what circumstances, and why?’ (Pawson and Tilley, 1997a). This focus drew attention to the role of context and its impact on outcomes for stakeholders.

Given the complexity of RCSs, research had to go beyond reported observations and current evidence to effectively utilise tools such as technology. Researchers had to use both what was reported and what was not explicitly reported to establish causal connections and details about the circumstances of those connections to explain different (and sometimes unrelated) evidence in a field of study. This evidence allowed for a greater understanding and analysis of the process of transformative changes being studied rather than identifying whether an intervention led to desired results. This shift in analysis took inquiry beyond ‘did it work?’ to ‘how and why did the changes work the way they did?’ (Pawson and Tilley, 1997a). Realism sought to identify the underlying causes (behind and beyond surface-level descriptions) to uncover deeper mechanisms and processes producing outcomes of interest (Pawson and Tilley, 1997a). This emphasis on processes, structures, and interactions mediating and creating results allowed researchers to see how context and mechanisms linked directly to their effects. Because we knew outcomes were impacted by social, cultural, economic, historical, emotional, and physical conditions, realist researchers sought to uncover how context may have shaped and modified these causal relationships to produce outcomes. Structuring inquiry and evidence by focusing on cause and context gave predictive and explanatory power to why and how outcomes were being produced under different conditions. The realist framework supported the identification of patterns in evidence which could help explain and predict outcomes, which was incredibly useful for project delivery in

spaces with constrained resources, such as technology delivery in RCSs. A more in-depth discussion of realism is in Chapter Three as the methodology for this research.

Finally, realism placed significant emphasis on practicality, producing a way of understanding the world that directly guided practical application (Pawson and Tilley, 1997b). Realism focused on problem-solving and understanding realistic challenges in context in order for insights to be crafted into solutions that effectively improved lives. Applied research used realism to develop policy and professional practice by providing evidence-based guidance to improve the effectiveness of policy and modifications to practice (Emmel et al., 2018). The evidence on health and residential care was “epistemologically complex and methodologically diverse,” making it difficult to capture its core principles using other methods (Pawson et al., 2005: S1:21). This difficulty in transferring findings meant it was more problematic to rely on evidence to ensure changes would have the desired impact in such intricate and multidimensional environments. In spaces such as RCSs with minimal resources and increasing insistence on evidence-based practice, one could appreciate the challenges when evidence could not be easily replicated in different settings. These challenges hindered decision-makers from effectively utilising evidence and applying knowledge to allocate resources for positive outcomes. The critical components of realist methodology included context, mechanisms, and outcomes as the items for analysis—collectively referred to as CMO configurations described in further detail in the section below and in Chapter Three (Pawson and Tilley, 1997b). Understanding these elements was crucial for maximising the generalisable impact of research findings, as it allowed for a comprehensive interpretation and application in diverse settings and scenarios.

2.2.2 Critical Realist Disability Studies

Critical realist disability studies (CRDS) was an approach to understanding disability which emphasised the importance of unpicking the underlying mechanisms that shaped disability experience (Shakespeare, 2018). CRDS integrated ideas from critical realism and disability studies to understand the underlying causal mechanisms producing disability experience (Watson, 2010). This perspective allowed for the consideration of a multi-layered and iterative conceptualisation of disability to examine how technologies worked across all layers to shape the

experience of disability (Shakespeare, 2018). The roots of CRDS arose from dissatisfaction with how society treated disabled people and the stark opportunity landscape available to them (Watson, 2013). It brought the biological body back into focus, multi-directionally related the disabled person to society, and allowed us to “rethink questions of identity, difference, and the ethics of care through a commitment to real bodies and real selves, real lives, and real worlds” (Williams et al., 2018; Williams, 1999: 797). Notably, the development of knowledge relied on the voice of disabled technology users. Considering their perspectives helped technology implementers understand that there may not have been ‘problems to solve’ or ‘solutions’ to offer, but simply more options for the disabled person to choose the best tools (Frauenberger, 2015; Shakespeare, 2018).

In realist research, the objects of interest were the underlying forces that caused change. These changes were referred to as ‘interventions’ to describe modifications or treatments that were implemented and caused outcomes for those involved. CRDS asserted that ‘intervention’ was not the correct term, as the concept of intervening in the lives and personal affairs of disabled people did not strike the right power balance between stakeholders.

The concept led to the direct applicability of the Context-Mechanism-Outcome configuration (or CMOC) framework referred to in the previous section and further explained in Chapter Three. Each element of the framework ensured different complexities were accounted for, examined, and tied together to accurately describe how and why a program of change worked. Pawson and Tilley described *context* as any pre-existing conditions or norms in a setting or with people with whom a change was being implemented. These conditions included knowledge and skills of key participants; relationships between people, materials, and new behaviours; institutional culture, norms, and collective behaviours and values; and relevant broader context such as national policies, social rules, and individual or group priorities in the community (Pawson and Tilley, 1997b). The next component, *mechanisms*, helped explain how people responded to a transformative action or what people did with the resources available that generated outcomes of interest. According to Pawson and Tilley (1997b), mechanisms demonstrated how different micro- and macro-processes combined to create a program of change and showed

how observed outputs were created from stakeholder responses to the resources introduced. Finally, *outcomes* were the entire range of intended and unintended consequences of a program of change which emerged from the interactions between contexts and mechanisms. Combining contexts, mechanisms, and outcomes enabled these carefully identified elements collectively to produce statements about what worked, for whom, in what circumstances, and why. Each of these was a critical element when seeking to produce knowledge to be used in complex and distinctly different spaces such as RCSs. For organisations looking to ensure disabled people had tools to build the lives they wanted, this balance of detailed generalisability enabled the planning of more efficient and effective programs of change.

2.2.3 Epistemology of Technology

There was ample evidence for using technology with and for disabled people related to improved quality of life and desired increases in independence in activities of daily living (Frauenberger, 2015). Technology was used as a rehabilitative tool (as in the medical model) or to facilitate access and reduce barriers (as in the social model). In a more nuanced role, technology enabled people to take positive action to enhance their self-esteem and confidence and changed how they perceived themselves (Shakespeare, 2013b). This nuanced enabling and enhancing function was the role that technology served under CRDS and in this research – as a tool to empower people to take more control over their time, spaces, and daily lives.

The critical realist disability studies methodology added value by allowing me to unpick what happened when context and mechanisms translated into outcomes. I applied these principles, rather than exact transformative actions, to increase the likelihood of replicating the same or similar positive outcomes. Without knowing these underlying mechanisms and interdependent processes in descriptions of different transformative actions and outcomes, “it was impossible to understand what programs worked and how best to replicate them” (Masterton et al., 2020: 1). The identification and analysis of these interdependencies ensured that research findings had practical, rather than strictly theoretical, relevance and application (Shakespeare, 2013b).

Transformative actions (such as technology) in entangled social spaces involved multiple components and relied on factors such as staff support, clear expectations, and effective resource allocation (Frauenberger, 2015). All this complexity meant that identifying the causal mechanisms — why a transformative action led to the reported outcomes — was challenging. Transformative actions based on evidence did not always translate into anticipated outcomes because of these less easily identifiable contextual factors. Research could not account for all complexities in context, delivery, application of transformative actions. The different outcomes across participants increased the complexity for disentangling which transformative actions with positive outcomes in health and residential care research were replicable in target environments and would produce the same results. Knowing *what worked* was not always enough to choose a transformative action and feel confident the results would repeat in the target environment.

2.3 Residential Care Settings

Residential care settings in the United Kingdom offered unique challenges to making changes, such as assistive technology delivery and implementation. These challenges included the diversity of residents and their needs, limited resources available, the physical environment, and the culture of RCSs. In the following sections, I give a brief background account of RCSs in the United Kingdom, building on the need for a better understanding of technology for disabled adults to have control over their spaces and lives in RCSs.

2.3.1 History of Residential Care Settings

The development of disability exclusion was rooted in social ideas of fear, disgust, pity, and charity, all of which increased the distance between disabled and non-disabled people (Watson, 2013). These views constructed where disabled people fit into social and economic spaces. They influenced ideas on impactful supports for disabled people in social, education, and employment spaces which were not designed for a spectrum of participation. The medical and social models were inadequate to account for the complexity of the degree of the inclusion or exclusion of disabled people and what the causes of in/exclusion were. In the following sections, I discuss how changes and support systems for disabled people in the

United Kingdom arose, along with the model best suited for exploring the disability and technology experience.

The trajectory of the inclusion and exclusion of disabled people tracked alongside sweeping changes in communities and economies. Industrial efficiency and production of scale changed insular and separate communities into more organised and specialised labour forces (Thane, 2009; Shakespeare, 2018). This change altered the nature of the contributions required from community members as opportunities for a spectrum of participation shifted. Those who could not contribute in the way necessary to meet business production needs were left out of the rising paid workforce and thus the bulk of community activity (Thane, 2009; Shakespeare, 2018). Not only were disabled people left without ways to participate in these more formalised community roles, but those who had been collectively supporting them had reduced flexibility to provide support alongside more formal participation in a paid workforce, leaving disabled people without daily informal support at home (Thane, 2009; Shakespeare, 2018).

Left without the previous support structures, disabled people who were deemed unable to work (considered 'deserving poor') were supported by local authorities through the Poor Law of 1601, which funded a family member or local informal carer to provide accommodation and support (Thane, 2009). This 'relief' payment was minimal, and the quality of accommodation and support it gave access to varied by location. Local authorities established workhouses to provide those living in poverty with shelter, food, and paid work, but these were intentionally unattractive options to avoid abuse of the support systems. These workhouses were adjusted over time, eventually separating disabled or 'not able-bodied' people from other members of the community, sometimes into slightly more comfortable living conditions (Thane, 2009).

In the late nineteenth and early twentieth centuries, these workhouses became the earlier versions of RCSs. Segmentation continued and specialisations emerged aligned with disability diagnoses and physical or mental health conditions. As early funding fell short of covering support and living expenses for disabled people, charities stepped in to provide support services, education, training, and employment opportunities (McLaughlin, 2019). This perpetuated the idea that providing care for

disabled people was literally a 'charitable act' and that disability support was provided as a matter of gratuitous kindness and not as a matter of investment in a well-functioning community (McLaughlin, 2019: 484). Evolving policies, funding, and social expectations led to residential care provision in different arrangements, including respite care (temporary, short-term), daytime activity centres, training and occupational centres, financial support services, and RCSs (Lunsky et al., 2014). Most effective support models relied on short-term charitable funding and were historically under-funded to meet the quality expectations at the statutory level (Social Care Institute for Excellence, 2018).

2.3.2 Residential Care Settings Today

In CRDS, residential care settings were not the preferred format for supporting disabled adults, but there were circumstances under which this format of support was necessary. In the following sections, I will describe how RCSs provided support for people with complex needs, filled a gap where there were limited alternatives, how they were a practical response to funding and resource limitations, and the challenges with RCSs which served as an opportunity for intentional and informed application of technology.

Arranging support for disabled adults could be complex, requiring substantial learned skills to navigate and administer. If a person did not live in their home or a family home, these supports also required accessible and affordable accommodation, adding complexity to the management of resources and coordination of supports. Learning disabled adults were the most likely of any group of disabled people to rely on shared housing and support accommodations. The nature of their disability meant they did not always have the skills required to navigate the support payment systems and recruitment and management of personal support workers (Bigby and Beadle-Brown, 2016). This skill gap left disabled people to rely on organisations which provided supports to build the lives they wanted (Brown, 2018; Hatton, 2017). Here, there was some benefit to RCSs - the increased number of residents in one place meant support organisations often found they needed more - and more specialised - staff to provide the ideal supports (Amado et al., 2013; Bigby and Beadle-Brown, 2016). RCSs with larger capacities and more complex staffing teams began to attract residents with more complex medical and daily support needs (Allan, 2022).

These configurations were different ways in which support could be accessed and arranged. Still, accessible living facilities became another matter to coordinate with limited funding. Without support settings that combined affordable housing with a spectrum of support offerings, disabled adults were left to cobble together and hire support workers, which was a complicated undertaking to manage without said necessary supports (Dalley, 2000). Particularly during times of austerity, disabled people seeking both affordable housing and personal support often found that shared, supported accommodation settings (also called domiciliary care, residential care, or nursing care) were still the dominant option available (Bigby and Beadle-Brown, 2018; Bigby et al., 2020; McConkey et al., 2011). While RCSs could be a more straightforward system to navigate for families and disabled people (but not necessarily easier to access, as spaces were limited and 'postcode lottery' in nature), evidence has shown that it was not the ideal way for disabled adults to stay engaged in their local communities and experience meaningful social inclusion (Brown, 2018). In this way, RCSs could become a disabling barrier to community inclusion and contribute to experiences of social isolation of disabled adults (Macdonald et al., 2018).

Disabled people opted to live in RCSs when they better matched a family's circumstances and support networks. Some families chose RCSs because these specialist supports were not easily available elsewhere (Pollock et al., 2021). They often believed these specialist supports improved daily life experiences for their disabled family member. Disabled people often lacked sufficient assistance when coordinating support on their own, leading to either inadequate support or being referred to overly supportive RCSs because of local resource availability (Peckham et al., 2021; SCIE, 2017). Disabled people in RCSs lacked the ability to choose their neighbours, resulting in challenges in building a peer community due to communication and relational difficulties (Bloomfield and Ruiz de Villa, 2021; McConkey et al., 2011). Despite similar support and living circumstances, disabled adults in these settings often felt isolated and lonely without self-selected peers (Bigby and Beadle-Brown, 2018; Bigby et al., 2017; Macdonald et al., 2018; Bigby and Beadle-Brown, 2016).

This evidence revealed an opportunity for the residential care sector and disabled adults to work together to find more tools to build the lives they wanted to live, even in resource-constrained times and settings. Technology showed promise in being one of these critical tools for disabled people and, indeed, was identified as a way to address the UK's 'crisis of social care' (Hamblin, 2020: 116).

2.4 Technology in Residential Care Settings

The residential care sector already emphasised the need to innovate and leverage technology to enable support workers to perform their jobs efficiently and at a high standard of quality while ensuring disabled people had all the supports and tools they wanted to construct their daily lives (National Academies of Sciences, 2019; Scales, 2019; Sheikh et al., 2021; Hamblin, 2020). Technology-enabled care (such as telehealth) has played an increasing role in adult social care in England for several decades and has primarily referred to equipment, software, and tools to enable care organisations and support workers to streamline the processes and administration of providing care services by making daily tasks easier to perform and document (Hamblin, 2020). Residential care organisations were conducting small technology projects to identify the technology needs of disabled people and their support workers (Baker and Richards, 2020; Holloway et al., 2021; Wright et al., 2020). Many of these projects focused on reporting the results of technology implementation, making it difficult to use the insights to plan changes that would be effective across multiple sites.

2.4.1 *Technology for the Workforce*

Telehealth and tele-care systems were increasingly being used in RCSs to simplify workflows (Gerdes et al., 2015; Tan et al., 2024), conduct the organisational management of a support workforce (Gerdes et al., 2015; Groom et al., 2021), and for the administration and record-keeping of support workflows (Gerdes et al., 2015; Groom et al., 2021; Heratanti et al., 2021; Tan et al., 2024). These systems offered remote specialist support when physical presence was not required (such as managing medication or a long-term health condition), reducing costs to organisations (Tan et al., 2024). The benefits to disabled people were touted as improved quality of care and better patient health outcomes (reported mostly by

support workers (Heratanti et al., 2021) and medical professionals (Groom et al., 2021)), as technology reduced effort, cost, and accessibility barriers (Driessen et al., 2018).

Organisations used e-care technology to streamline and enhance support delivery, improve efficiency, and enhance communication for better health outcomes (Brittain, 2020; Norton et al., 2022). They used these systems for support documentation and recording, facilitating handover and shift notes to communicate across teams (Huber et al., 2018; Shiells et al., 2019), enhancing supports such as medication management, and reporting compliance tasks (Huber et al., 2018; Norton et al., 2022; Shiells et al., 2019).

There were challenges to the 'magic bullet' of telehealth and electronic care planning systems in reducing costs and improving disability support. The workforce has not historically needed technology skills to support disabled adults. This integration has had challenges which were being investigated (Shiells et al., 2019). Hamblin and colleagues did extensive research on the skill needs of the support workforce to deliver care this way (Hamblin, 2016; Hamblin, 2020). As a result, several organisations made proposals and training plans to improve the assistive technology knowledge and skills of the entire supporting and care workforce to better ensure that tools such as technology could be used well (Wouters et al., 2021; Wild et al., 2016; Blake et al., 2021). In the framework of CRDS, the systems that enhanced the workforce to simplify work, reduce costs, and improve efficiency were not addressing the complete equation. While these systems helped streamline support, there was a real risk that disability became re-medicalised with categories and labels assigned to people to assist with navigating record keeping and using decision tools to determine support requirements. Some of these systems facilitated the communication required to enhance person-centred support, but disabled people about whom the notes were made were not given access to their own data, or the data being collected about them and their supports.

Technology being over-relied upon, and the disabled person being (inadvertently or otherwise) squeezed out of decision-making opportunities and discussions of their own supports posed another risk to the increased use of telehealth and e-care planning systems. This concern further inflamed already complex power imbalances

within RCSs. If not managed carefully, this construction of support could have a long-term impact on autonomy and control by disabled people over the kinds of lives they built with their paid support. As CRDS accepted complexity and intersectionality in interdependent settings such as RCSs, tools such as these must be counterbalanced and supplemented with tools to give disabled people improved control and autonomy and equip them to participate in the construction of their own supports.

Recently, people recognised mainstream technologies as potential tools for disabled people in daily life, not exclusively for carers or rehabilitation. These technologies included smartphones, smart speakers, wearables, and other personal electronics devices (Wouters et al., 2021; Adolfsson et al., 2015; Adya et al., 2012; Akyurek et al., 2017; Taber-Doughty et al., 2010; Mistry, 2020).

2.4.2 Technology in Dementia Support

The utilisation of mainstream and specialised technologies, ranging from environmental control systems to enhancing accessories, has long been employed to facilitate tasks and improve efficiency. For the disabled population, making more tasks possible was especially impactful to supplement and enrich support provided by other people to increase their independence, autonomy, and quality of life.

Assistive technologies showed promise in supporting people living with dementia and those who supported them. In a 2019 symposium, Maslow and discussants presented research on technology for people with challenges from dementia. The studies examined caregiver technology and satisfaction but neglected adequate integration of perspectives from people living with dementia themselves (Maslow et al., 2019). The inadequate representation of the views of all stakeholders at once was a common theme in research.

A team of researchers in the United Kingdom noted this glaring challenge as well, indicating that the exclusion of people with dementia from technology design research has meant that user experience research has not adequately explored how people living with dementia may themselves use common technologies in daily life (Gibson et al., 2019a). They further discussed commonly used technologies in gerontology research, GPS technologies for safety monitoring, and telecare for

healthcare supports—tools most often used by caregivers and supporters to support people living with dementia, not by the people living with dementia themselves (Gibson et al., 2019a). In previous research, Gibson and colleagues (2015) reported that the most commonly supplied assistive technology from social care services included: community alarms, telecare, GPS location, and monitoring equipment—all items that directly benefited people living with dementia but currently used by the people providing support. Another category of devices they researched, ‘off the shelf AT,’ included dementia-friendly versions of everyday electronics such as clocks, telephones, and remote controls—each of which was focused on use by the person living with dementia for a specific scope of their daily needs and activities (Gibson et al., 2015).

In more recent person-centred approaches to assistive technology used by people living with dementia, Gibson and colleagues (2019b) focused on how people living with dementia and those who supported them used a variety of mainstream and specialist assistive technologies to improve the management of supporting tasks. They described the most successful applications of technologies as the more unconventional uses of the tools (e.g., simplifying a microwave by obscuring or covering access to unnecessary features to streamline the operation, or a GPS system only placed on the person when they leave the house rather than at all times) (Gibson et al., 2019c). These unconventional uses of mainstream and specialist tools have made it more difficult to gain support and funding to provide them through existing statutory services (Gibson et al., 2019c).

The research indicated that technology played a critical role in supporting people living with dementia, primarily benefiting the caregivers. The distribution of technology used with people living with dementia was heavily centred on technologies used *on* or *for* them. But it was worth mentioning that the utilisation of technologies by caregivers to enhance safety and facilitate independent schedule and meal management has undeniably benefited people living with dementia (Gibson et al., 2016). However, a key component of these studies was the interaction of multiple complex systems of support and resources.

Clear evidence existed demonstrating that technology used by people living with dementia depended heavily on the amount of engagement and support they

received from their systems of supporters. While people living with dementia are only a portion of the disabled people who use support for daily living, this evidence emphasises the importance of understanding the causal connections in complex systems of support. People living with dementia were not the only population for whom technology was used to improve or change how supports were delivered or consumed. The following section describes how technology was used by and for learning-disabled people.

2.4.3 Technology for Learning-Disabled People

Research on technology used by learning-disabled people had a slightly different focus than the research on technology with people living with dementia. Much more research had been conducted related to specific assistive technology devices themselves, such as augmentative and adaptive communication (AAC) devices (Satterfield et al., 2021; Bircanin et al., 2019; Waller, 2019; Waller, 2021), devices for reading supports and text simplification (Cerga-Pashoja et al., 2019; Fabio et al., 2023; Säuberli et al., 2023), and specialist learning curricula or software (Ismaili and Ibrahim, 2017; Maor et al., 2016; Perelmutter et al., 2017).

Perhaps because of the nature of learning disabilities, there was more focus on assistive technology in education settings and, therefore featured much younger assistive technology users. The World Health Organization reported that learning-disabled people (or people with intellectual disabilities) used fewer assistive products compared with other disability groups (WHO, 2018). In a systematic review, researchers discovered that a lack of awareness and limited availability of assessments for assistive technology recommendations posed significant obstacles to access. This was particularly true for learning-disabled adults who did not have contact with educational environments where assistive technology was more commonly considered as a supportive tool (Boot et al., 2018). A core idea covered in research literature related to learning-disabled people and technology was ethics and the challenges of technology access and safety for learning-disabled people (Boot et al., 2019a). While many studies showed that people supporting learning-disabled people recognised the benefits of technology access, such as improved social inclusion and independence (Clifford Simpican et al., 2018; Barnard and Beyer, 2009), there was broader paternalistic concern from supporters related to

safety and opportunity for risky behaviours which accompanied access to technology (Balasuriya et al., 2022; Mortenson et al., 2018).

Söderstrom and colleagues studied how seven learning-disabled adults used a memo planner as a cognitive support device in a community-based home care service (Söderström et al., 2021). This was one of the few qualitative studies that featured the experiences of learning-disabled people using assistive technology for an activity of daily living unrelated to education or employment. The research team reported on how learning-disabled people used these devices to influence decisions which impacted them. Still, influence depended highly on their support team—a noticeable confirmation of context and the power and importance of systems. They continued this research with a deeper examination of the reflexive nature of cognitive assistive technology and how their use in home-based services influenced the professional practice of support workers (Söderström et al., 2023). Based on qualitative group interviews with eight support workers and seven residents, these researchers found that while there were broadly acknowledged benefits to the technologies implemented, they also were made to change how they worked in response to altered power dynamics with the technology users (Söderström et al., 2023). This evidence emphasised the significance of practice changes to both realise and maximise benefits of technology.

In summary, there was more focus on technology use by learning-disabled people to access specific (mainly educational) activities. Research on how learning-disabled people used technology to build their daily lives in RCSs was relatively scarce. This focus may be explained by the low rate of learning-disabled people living in large RCSs, more often with their families or in smaller shared accommodation and support arrangements such as independent or supported living. The most commonly reported benefits to technology use were improved or increased autonomy, independence, and wellbeing of learning-disabled technology users, while barriers included the introduction of complexity for the supporting staff members and organisations. Research on learning-disabled peoples' use of disability category-specific assistive technology was the first set of literature to openly grapple with these interdependencies.

2.4.4 Technology for Physically Disabled People

Finally, RCSs used assistive technology to help support the independence and quality of life of physically disabled people. Most literature on assistive technology and physically disabled people focused on specific assistive devices for mobility, technology which improved or provided adapted access, and rehabilitative technologies which maintained or improved bodily function following an injury or medical procedure.

Research on mobility assistive technology devices such as wheelchairs, walkers, and canes showed increased independence and improved quality of life for many users. Carver and colleagues (2016) selected participants with spinal cord injuries for a mixed methods study to understand the impact of mobility assistive technology devices on participation. Those researchers found that the quantitative measurements showed participant satisfaction with outcomes such as independence and participation. Conversely, their qualitative analysis revealed that the absence of assessment questions led to an inadequate alignment between the device and the needs of disabled people (Carver et al., 2016). Other research teams studied the low-tech cane as a mobility device and found that user convenience made it the mobility device of choice for many users (Arefin et al., 2020; McDonald, 2020). Both studies were unique compared to many other areas of assistive technology research in their inclusion of the qualitative experiences of those using the devices under investigation. These were examples of the critical nature of carefully understanding the broader context beyond a simple explanation of the evidence as to whether or not technology ‘worked’ for someone.

Nevertheless, numerous research teams have actively explored methods to enhance conventional mobility devices by integrating supplementary technologies and features into current tools. For example, Rao and colleagues added a mechanical control device via Bluetooth to turn a person’s movement into wheelchair control (Rao et al., 2022). Another team used a device which turned voice commands or bodily movement into wheeled device control. Their work was especially useful for visually impaired people who were also physically disabled to have safe control using their independent movements (Sathish et al., 2016). Morbidi and colleagues (2023) developed a smart powered wheelchair with additional sensors which

detected obstacles and a virtual reality training platform for testing wheelchair control access configurations. Another team reviewed the landscape of assistive intelligent robotic wheelchairs, sharing technologies that made mobility devices even more accessible and user-friendly (Ktistakis and Bourbakis, 2017).

Investigators conducted more research on devices that supported specific sensory disabilities, empowering disabled people to navigate their communities or preferred environments safely and independently. Haptic technologies to support Deaf, blind, and Deaf-blind people have been developed to communicate and increase their experiences and opportunities for connection with those around them. One team reviewed the literature and found that haptic aids mitigated a loss of other sensory feedback (Sorgini et al., 2018). Other researchers evaluated a system that enabled blind people to navigate and perceive the environment through audio and haptic feedback (Dascalu et al., 2017). As of 2020, the landscape of these assistive devices (those that sought to remap sensory input to suit the user) found substantial adaptability and trustworthiness issues having a negative impact on users and adoption (Patel and Parmar, 2022).

While not an assistive technology specific to disabled people (it was first used for wealthy people to give their homes advanced technological convenience features), smart home technologies were considered an essential way of supporting disabled people to live in their own spaces for longer, or have more control of the space in which they lived (Gibson, 2021; Gibson et al., 2015; Sponselee, 2021; Stojmenski et al., 2016; Turjamaa et al., 2019). Ghoul (2021) reviewed how home automation and smart technology provided security, comfort, and social connection for disabled people by giving them access to and control of their living space. Stojmenski and colleagues (2016) developed and tested a smart home system with voice and gesture (facial expression) controls for users to manage environmental features with non-standard access methods. Jamwal and team conducted a scoping review of the literature as of 2022. They found that across 21 studies, smart home and communications technologies improved independence, participation, and quality of life for disabled people described as having complex needs (Jamwal et al., 2022). A key insight was that while smart home technologies improved outcomes, many factors impacted the successful implementation and adoption of technology,

including personalisation, ongoing support, and flexibility – meaning context had a significant impact on outcomes (Jamwal et al., 2022). This evidence again demonstrated how critical a full exploration of causal factors was for repeating positive technology outcomes.

Much of the reviewed literature on assistive technology discussed the topic in more medical terms and more often focused on different technologies or devices and their impacts on rehabilitative outcomes or participation in rehabilitation activities (Tejas et al., 2018; Martinez-Martin and Cazorla, 2019; Adya et al., 2012). Adya and colleagues highlighted the fragmented evidence base regarding the impact of theoretical frameworks on rehabilitative assistive technologies (2012). The team claimed that in order for assistive technology to close the gap between a person and their environment, several critical assistive technology delivery models better accounted for disabled persons' experiences (Adya et al., 2012). Tejas and team (2018) developed an Internet of Things (IoT) device for patients staying in hospital to have the tools to alert nurses or assistants when they needed help. Martínez-Martín and colleagues reviewed how different assistive technologies in hospital and home settings provided more comprehensive rehabilitation, reducing costs and increasing access with a focus on disabled people achieving “the highest level of functional independence” (Martinez-Martin and Cazorla, 2019: 1). Still more researchers conducted a qualitative study with ten people to explore perceptions of assistive technology in inpatient rehabilitation (Fager and Burnfield, 2014). The study emphasised the importance of durable, reliable, and intuitive assistive technology, as well as integrating mainstream devices to support access options (Fager and Burnfield, 2014). While assistive technology was considered a key component of rehabilitation, a survey found that 237 rehabilitation counsellors felt ill-prepared to provide assistive technology in a way that avoided abandonment by users (Kuo and Kosciulek, 2023). This work had little discussion of patient and disabled technology user experience. It focused on how rehabilitation professionals could engage with patients differently to support them to use assistive technologies for rehabilitation—not an ideal discussion to have without disabled people.

In summary, there was substantial research related to assistive technology and disabled adults, and even research including the perspectives of disabled people

themselves. But assistive technology use was overwhelmingly focused on ‘fixing’ people and bodies rather than for cultivating improved quality of life and wellbeing which was not necessarily connected to body function.

2.5 Impact of Technology for Disabled People in Residential Care Settings

Literature showed that assistive technology had the potential to significantly impact disabled adults in RCSs. Key benefits mentioned throughout the literature included increased independence, improved autonomy, better social participation and inclusion, and enhanced wellbeing and satisfaction. In the following sections, I will describe some key studies focused on each domain, laying the groundwork for my research plans.

2.5.1 Independence

Morris (1993) often defined independence as the aim for disabled people not to be entirely reliant on others, which was a slightly more nuanced definition than ‘do everything for yourself.’ However, this definition failed to align with the way the lives of disabled people were structured. CRDS challenges the idea of independence in such intensive support settings, as well as the myth that independence might be the ‘ideal state’ that disabled people should strive for (Kittay, 2011). This literature search defined independence as the ability to control one's space, schedule, and activities.

In a residential care setting, independence was a particularly challenging concept for disabled people because they often had limited control over their environment and their support schedules, and therefore, their daily lives. They also faced power imbalances, discrimination, and prejudice from others, which further limited their independence.

Technology played a role in supporting the independence of disabled people in RCSs. Agree (2014) argued that assistive and smart technologies helped disabled people meet their needs and live more independently, filling the unmet needs gap between available support and resources. A systematic review of the impact of electronic assistive technology in RCSs found that telecare systems were still

broadly viewed as the way to support disabled people to be more independent (Daly Lynn et al., 2019). These technologies were believed to enhance privacy and independence for users, despite not actually being used by disabled people themselves (Daly Lynn et al., 2019). A more recent systematic review focused on identifying evidence of the link between assistive living technologies and independence for people in RCSs (van Dam et al., 2024). This review found that assistive technologies increased disabled peoples' choice, control, and participation (van Dam et al., 2024). Most of the studies in the review focused on environmental control systems for spinal cord injury recovery, with technology delivering alternate access methods to control spaces.

But independence in such complex spaces often felt like an irrational binary. Many felt that someone who used nearly continuous support to go about their day should not be called *independent*. Achieving any outcome required reciprocity and engagement from the network of supporters as well, not just between a person and their tool of choice (Rummary and Fine, 2012). Considering the experiences of assistive technology selection by supporters, a mixed methods clinical trial found that assistive technologies that reduced the stress of the support team (by providing monitoring analytics or increased safety) were more likely to result in improved independence of the disabled person (Mortenson et al., 2018).

A widespread consensus persisted that relying solely on assistive technology did not lead to independence for disabled people – especially in RCSs where obstacles to technology utilisation and assistance were prevalent. Aslanzadeh and Keating (2016) argued that, while self-service technologies enhanced independence and quality of life for physically disabled people, professionals always needed to facilitate their use. This facilitation by support workers required buy-in and certain attitudes toward the role of technology. In a meta-synthesis of 40 participating studies, support network and societal barriers were seen as the most substantial barriers to technology supporting independence. Specifically, attitudes and engagement toward assistive technology and general ideas about what independence looked like for disabled adults in RCSs caused substantial interference with positive outcomes (Howard et al., 2022).

In summary, the literature demonstrated that assistive technology holds promise for promoting improved independence of disabled people living in RCSs. However, for technology to be effective, users needed support and engagement from their complex support systems to use these technologies to their full potential. Many considered independence a necessary building block for control and autonomy in the use of assistive technology (Brennan et al., 2016; Khalili et al., 2022; O'Brolcháin, 2018).

2.5.2 Autonomy

Autonomy was the ability to make choices and decisions and act on those choices (Boyle, 2008; Ells, 2001; Rodgers and Neville, 2007). Welford and colleagues conducted a conceptual analysis using a literature search to describe attributes of autonomy for people in RCSs, seeking details, antecedents, and consequences to autonomy (Welford et al., 2010). They found that involvement in decision-making, delegating support needs based on the right to self-determination, negotiated care planning, and including families when the person was cognitively impaired all contributed to the development of autonomy (Welford et al., 2010). Additionally, they found that achieving autonomy in RCSs required flexibility, respect, and meaningful relationships with motivated staff (Welford et al., 2010). Each of these contributing factors impacted how disabled people experienced technology beyond a straightforward positive or negative outcome. Many people viewed autonomy as a critical component of independence and wellbeing. Indeed, a person would require some independence to advocate for themselves in a way that achieved autonomy. In the context of CRDS methodology, researchers understood autonomy as a complex and multifaceted concept. It could not be defined or measured, but rather, people experienced and negotiated autonomy in different ways (O'Brolcháin, 2018; Brennan et al., 2016). For disabled people in RCSs, autonomy was particularly challenging, as many had limited control over their environment and daily lives. They also faced some discrimination and prejudice from others due to residual power structures in RCSs, which further limited their autonomy (Boyle, 2008). With these findings, the potential role of technology in facilitating autonomy was clear. When technology provided decision-making, communication, and control functions that supported

delegating care needs, it was more likely to facilitate improved autonomy for disabled people in RCSs.

Assistive technologies such as digital assistants (Morte et al., 2020), smart home devices (Blocker et al., 2019), and telemonitoring systems (Miralles et al., 2015) promoted autonomy by enabling disabled people to engage in daily activities on their own. Miralles (2015) found that telemonitoring allowed disabled people to live independently in the community after leaving a short-term RCS. Blocker (2019) suggested that smart home technologies, such as digital assistants, supported ageing in place for mobility-impaired older adults if they identified useful functions for it in daily life.

However, the rapid adoption and implementation of technology also introduced (perhaps expected) challenges to autonomy. Morte (2020) argued that health monitoring technology threatened privacy, identity, and data protection, which harmed autonomy. Ragot (2013) and Moyà-Köhler and Doménech (2022) noted that, while technology promised greater autonomy, disability activists distrusted approaches that risked leaving disabled people without person-delivered support. Especially given the conclusions from Welford and colleagues, close human connections were crucial in achieving autonomy, technologically supported or otherwise (Welford et al., 2010). Noorlandt et al. (2023) discovered that staff and institutional rules and processes restricted the autonomy of learning-disabled people. This evidence showed the impact of broader organisational systems on how technology enabled autonomy.

Some papers suggested ways to maximise the benefits and minimise technology costs for autonomy. Pennick (2014) proposed developing accessible user interfaces for smart home ecosystems tailored specifically to disabled users. Wehmeyer (2020) reviewed how ‘applied cognitive technologies’ supported autonomy for learning-disabled people when appropriately designed. They also argued that access to usable technology was no longer a convenience in a tech-dependent world but was necessary to support autonomy. Morte and colleagues (2020) recommended evaluating and monitoring how technology impacted autonomy through data protection impact assessments. Ultimately, fear or lack of support for technology for

disabled users as a means of autonomy risked leaving a large population in RCSs without life-changing tools (Serpa et al., 2023).

2.5.3 Social Activities and Participation

Juul et al (2019) described technology as a vital tool that enhanced meaningful engagement for disabled adults in RCSs by facilitating access to activities or reducing activity limitations (Jamwal et al., 2022), transforming social communication and interactions (Kyung and Park, 2020), and increasing available activities (Remillard et al., 2019).

Technology improved social activities and participation by enhancing access to devices or activities. Through qualitative ethnographic fieldwork, Juul and colleagues found that touch screen technologies improved engagement with interactive activities. However, the improvements also depended on environmental, organisational, and management-related factors (Juul et al., 2019). One research team found that technology gave disabled people with severe motor limitations improved accuracy, efficiency, and reduced fatigue for more extended access to activities they enjoyed (Koch Fager et al., 2019). Indeed, much of the research and work on accessible gaming has shown that the proper access methods and technologies supported nearly any interested users to do almost anything they wanted to do in a virtual activity space. Sousa and colleagues (2022) conducted participatory action research with disabled adults to develop accessibility improvements to games, allowing for developments and improvements to both game design and access tools.

Other ways technology improved social activities and participation was by transforming communication opportunities and increasing interactions through the use of information communication technology (ICT). ICT use increased social participation by reducing isolation and loneliness through improved connections with other people (Srivastava and Panigrahi, 2019), but staff support was sometimes lacking (Ramsten and Blomberg, 2019). These findings demonstrated how important it was to understand the interactions between people, tools, and their environment to plan for positive technology outcomes.

Finally, technology increased the activities and connection opportunities available to disabled adults in RCSs. Remillard and colleagues (2019) found that the use of smart technologies and teleconferencing tools allowed disabled adults to participate in tai chi lessons from their homes. These lessons resulted in several participants forming friend groups with other participants in the virtual space, which continued beyond the scope of the tele-wellness tai chi project (Mitzner, 2020).

2.5.4 Wellbeing and Satisfaction

Researchers focused much of their inquiry on technology that enabled better management of support workflows and services, aiming to improve wellbeing and satisfaction of disabled people through service improvement. Technology improved disabled adults' wellbeing in RCSs through access to knowledge and resources, connection with others, and streamlined support services such as telehealth and e-care planning. However, the benefits depended on the right contextual implementation of technologies in RCSs or within support structures. As previous sections covered technology to empower the supporting workforce, this section will focus on technology used by disabled people themselves.

Bobillier-Chaumon and colleagues (2014) conducted a qualitative study with seventeen elderly residents. They found that information and communication technologies (ICT) were instrumental in interconnectedness and social stimulation, which impacted wellbeing and happiness. A review of 54 articles found that ICTs reduced loneliness and enhanced wellbeing, promoting connectedness and satisfaction by facilitating more and better conversations (Petersen et al., 2023). The team also found that factors such as training, self-esteem, autonomy, and design or features of devices contributed toward these connections between ICT and wellbeing (Petersen et al., 2023). Juul and colleagues (2019) found that new technologies enhanced quality of life and facilitated meaningful engagement. However, the integration of technologies into daily routines and social relationships determined the extent of the improvements to quality of life.

In this research, the discussion revolved around both the communication and entertainment functions of technologies in supporting wellbeing and satisfaction. Chiu and Wu (2019) conducted a group randomised trial with 54 older disabled

adults to determine whether any improvements in wellbeing came from ICT's communication or the entertainment function. They found that the entertainment aspect of ICT, not the communication aspect, significantly improved the quality of life, social support, and happiness and reduced depression among users (Chiu and Wu, 2019).

Some studies suggested that technology may even have a negative impact on wellbeing if not implemented properly. Aslanzadeh (2016) argued that technology saved organisational costs for support providers but reduced customised support (and quality of life) if not tailored for disabled users. Marston (2019) noted that the lack of access to technology and the digital world already risked marginalising many disabled and older adults. Based on these studies, technologies significantly improved the wellbeing and satisfaction of disabled adults in RCSs when used for entertainment and social connection and tailored to individual needs and access requirements. But technology had limited or even a negative impact if not thoughtfully integrated into daily life, tailored to each user, and fortified throughout an organisation with training, and ongoing support.

The evidence I described above suggested the importance of understanding what proper implementation and access must look like for technology to positively impact independence, autonomy, social activities and participation, and wellbeing and satisfaction.

2.6 Current Research Project

Based on project reports and conversations with other professionals, organisations encountered challenges in predicting or planning for positive outcomes because of the differences across residences. The challenge lay in replicating results due to the inclusion of diverse staff teams, social norms, values, and disabled adults across different settings. Researchers did not know WHY technology worked when it did. They did not fully understand the causal links between different contextual factors, how people involved in these complex settings responded to resources when technology was provided, or how these elements combined to produce the different outcomes they observed.

Inclusion issues have necessitated a new social science lens on technology's role for disabled people without replacing or removing the current supports they use. We should not view technology to replace or reduce person-delivered care and support, but instead should consider it a tool for disabled people to exercise more choice and control over their environment and experiences as and when they desired (Papoutsis et al., 2021). For some disabled people, technology was critical in connecting them with family and friends through social media and video calling features. For others, technology, such as smart speakers, gave access to new leisure and entertainment activities, such as trivia quizzes and playing audiobooks, which users reported made a tremendous difference in their moods and feelings of wellbeing.

Based on these practice-based learnings, I sought to understand the interactions and combinations which led to positive outcomes for disabled people using technology in RCSs. While much of the adult social care sector focused on ways to scale up use of technology for the workforce, I pursued a fuller understanding of how disabled people used technology as a tool to build the lives they wanted in a disability support environment with limited staffing and general under-resourcing. The technologies of particular interest to me were widely available and included daily living digital technology, mainstream devices such as smartphones, smart speakers, and smart home devices, and specialist or single-function devices such as augmentative and adaptive communication (AAC) devices.

With these possibilities and the varied and sometimes difficult-to-anticipate outcomes for different disabled people in RCSs, disabled people should have technology included as one of the support options to build the lives they wanted. For technology to be well-applied and consistently considered as one critical component of daily support, care organisations must understand how disabled people experienced not only technology but the processes by which technology was acquired and used. Organisations must equip RCSs to understand, support, and facilitate practical uses of technology. These process changes supported disabled people to achieve the lives they wanted, thanks to the variety of available support tools at their disposal. It was essential that we learned more about how technology could be used whilst being aware of genuine fear from support teams that technology was being integrated to reduce their essential human roles in support (Scales, 2019). With

more evidence of what kinds of technologies worked, for what types of users, and the specifics of the circumstances which produced positive outcomes for disabled adults, organisations could then focus on cultivating critical contexts and activation mechanisms to brand technology as an integral tool for disabled people and support teams.

The focus of my research was to understand the role of technology in the lives of disabled people living in RCSs, and to identify and explore the contexts and mechanism configurations which played causal roles in the outcomes regarding the use of technology. To explore this topic well while accounting for the various invested stakeholders (residential care organisation leaders, residential care professionals, disabled technology users, assistive technology professionals), I felt that Burghardt's description of "the tension between advocating on others' behalf, and the need to leave room, socially and politically, for self-autonomy and self-determination, all without the larger project of building a better world" was an accurate description of this research space (Burghardt, 2011: 6).

To understand how technology worked, for whom, in what circumstances, and why, my research used qualitative and quantitative data gathered from existing literature and mixed methods primary data from focus groups and interviews to capture the rich experiences of both disabled technology users and other key stakeholders. The realist orientation for this research allowed for the use of a variety of methods which helped answer the research questions, and the methods selected depended on the research question being asked. The study sought to understand technology in residential care as it was interpreted by those experiencing and using it (Ormston et al., 2014).

To meet these aims, I explored the following research questions:

1. How were disabled people in residential care settings using and experiencing technology daily?
2. What contexts and mechanisms of change led to positive outcomes for disabled technology users within residential care settings?

The CRDS approach was a well-suited methodology for understanding the complex interactions between people, spaces, values, disability, and technology. Critical theory challenged cultural discursive institutions which undergirded visible practices of exclusion and misrepresentation, and thus offered a map toward greater understanding and informed challenge (Burghardt, 2011). CRDS endeavoured to spark action in material practices related to how disabled people accessed and used technology by identifying critical elements in interdependent layers of support and culture that significantly impacted people in RCSs (Hall, 2019). That the intended subject of research in itself was controversial was precisely what made CRDS the perfect methodological fit for exploring this topic - how disabled people were experiencing daily technology use through the power relationships and layers of interdependencies and influence that were often still in place in RCSs (Shakespeare and Erickson, 2000; Hall, 2019). It allowed for exploring and exposing the hidden origins of social and political culture and institutions (Hall, 2019). It challenged institutions and equipped me as a researcher to unpick the complexities in dynamic and interdependent spaces.

A realist review and evaluation were the most appropriate methods to investigate complex programs in a highly layered and contextually varied area, such as technology in RCSs. My research started with initial rough program theories developed using professional experience, pilot searches through the literature, and discussion with other involved stakeholders. These early theory statements were in the form of 'if-then-because' statements to describe how technology functioned in RCSs for disabled people. I used these initial rough program theories as a framework for an iterative realist review and evaluation to produce refined theories, which were tested and evaluated with interviews, focus groups, existing literature, and survey data. Chapter Three describes the methodological approach to this research and the precise methods I used to provide rich context around technology use in RCSs for an improved impact on disabled technology users.

2.7 Summary

The examination of the history of disability in the UK delved into the contrasting approaches of the medical model which focused on utilising technology to address

bodily impairments, and the social model which prioritised removing barriers for disabled people to participate fully. The faults in these perspectives called for a more nuanced conceptualisation of disability, as highlighted in critical disability studies. The Critical Disability Studies section incorporated a depiction of realism as an ontological viewpoint, asserting the existence of an objective reality that could be verified through systematic inquiry methods. Critical realist disability studies was an approach that comprehensively examined disability by acknowledging the complexity of reality and utilising multiple perspectives. This acknowledgement made CRDS the most suitable epistemological stance for leveraging technology as an empowering tool for disabled people. In the Residential Care Settings section, I incorporated a comprehensive discussion of the evolution of RCS, tracing its roots from community-based care to its present-day configurations. In the Residential Care Settings section, I predominantly discussed technology in relation to its utilisation for the workforce, as a support for caregivers of people living with dementia, in educational settings for learning disabled people, and rehabilitation for physically disabled people. In the section dedicated to the Impact of Technology for disabled people in RCS, I provided a comprehensive description of how technology promoted independence, autonomy, social activities, participation, and ultimately contributed to improved wellbeing and satisfaction.

The research gap in the field pertains to the limited focus on disabled peoples' usage of technology in RCSs. Most existing studies centred on technology used on disabled people rather than by them, or concentrated on specific disability types or technology devices. The present research aimed to examine not only the utilisation of technology by disabled people themselves, but also to explore diverse perspectives on these phenomena in order to generate robust findings that could be applied to various stakeholder groups.

In Chapter Three, I will further explain the methodological and theoretical framework for my research, highlighting the key perspectives which led to the selection of Critical Realist Disability Studies for this investigation. I will describe realism and realist research and how it relates with critical disability studies. In the later sections of Chapter Three, I will detail how this methodology relates to the methods selected, which will then be discussed in more detail in Chapter Four.

Chapter Three: Methodology

In this chapter, I will describe how Critical Disability Studies and Realist Methodology provided the framework to answer the current research questions to explore how disabled adults used technology to build the experiences they wanted in RCSs:

- 1) How were disabled people in care settings using and experiencing technology in daily life?, and
- 2) What contexts and mechanisms of change led to positive outcomes for disabled technology users in residential care and other support settings?

This chapter will focus on the methodology and process of realist research, thus the term ‘researchers’ is used rather than ‘I.’ As part of the descriptions of the disability studies and realist methodologies, it was useful for me to include some examples of how I applied the described method in my research for clarification. In Chapter Four, I will describe the exact methods I used to conduct this investigation in more detail.

3.1 Methodology

3.1.1 Critical Disability Studies

Scholars in Critical Disability Studies explored how disability was constructed, experienced, and challenged in society. It was an interdisciplinary approach which challenged dominant models of disability by examining how institutions, communities, and relationships shaped the lived experience of disability (Mankoff et al., 2010). This approach aimed to understand the factors that shaped our perceptions of disability and how this understanding empowered multiple stakeholders to enact meaningful and purposeful changes (Galis, 2011). The movement of Critical Realist Disability Studies brought together valuable components of previous disability theories while integrating knowledge and inquiry methods from various disciplines such as humanities, psychology, sociology, healthcare, education, technology, engineering, and design (Watson and Vehmas, 2019).

Garland-Thomson argued that the necessity of taking a critical approach to knowledge production was a vital tenet of the epistemology of critical disability studies. She argued that we must challenge the prevailing notions of knowledge and recognise how power dynamics, cultural standards, and societal attitudes towards disabled people influenced knowledge acquisition (Garland-Thomson, 2017). Garland-Thomson (2017) emphasised the importance of engaging with diverse perspectives and experiences of disabled people, especially for producing truly relevant knowledge. While the focus of the current research was not to explore the nature of disability itself, the ontology of critical disability studies and how disability was defined, conceptualised, and experienced as a social construct was crucial in disentangling the complexity of the interrelated components of technology use by disabled people in RCSs.

Research on improving the lives of disabled adults in RCSs through technology required a Critical Disability Studies approach. This approach entailed recognising that 'normality' was a misguided goal and that a disability category certainly was not a suitable starting place for inquiry. It was essential to consider the perspectives and needs of various stakeholders, including prominently those of disabled people themselves (Mankoff et al., 2010). Additionally, disabled people themselves should define disability as core stakeholders, rather than it being defined by technologists, project managers, support workers, or leaders in care organisations. By focusing on the experiences and viewpoints of disabled people, researchers could identify factors that contributed to their experiences and work towards dismantling them. Critical Disability Studies encouraged the exploration of intricate perspectives on autonomy, capacity, culture, and systems that impacted the lives of disabled people (Watson, 2010). By requiring the continuous revision of ideas and theories, CDS offered an exploratory framework for viewing disability. This framework surfaced as multiple perspectives and experiences were triangulated to understand all inputs and interactions, ultimately creating the outcome of interest. To comprehend the objectives and values of each stakeholder group, research had to be open to exploring the complete context that shaped their values and scrutinising them until mutually beneficial commonalities emerged. Any tools such as assistive technology must receive cultural support, motivation, 'buy-in,' and behaviour changes from all parties to truly be useful in achieving positive outcomes (Straus and Brown, 2021).

3.1.2 Realism and Realist Research

Residential care settings were complex spaces that involved various relationships and values among staff, disabled technology users, leadership teams, and available resources. Academic literature often failed to capture the nuances of the context and actions that led to reported outcomes from technology implementation initiatives. Empirical evidence often focused on *whether* the technology ‘worked,’ instead of exploring reasons and methods for successful implementation. Understanding the *why* and *how* of technology delivery was crucial if we hoped to move beyond ‘pilotitis’ and use technology as a valuable tool for disabled people (Hamblin et al., 2017). To optimise the use of technology in RCSs, research investigated the causal connections and circumstances behind reported evidence, which may explain the diverse and sometimes unrelated evidence in this field of study. Realist research was best for explaining complex social phenomena where causality was not straightforward, the insights were context-dependent, and for developing implementation frameworks rather than processes to be replicated. In RCSs, each site was different enough that an experimental or controlled trial methodology was not sufficient to explain why and how outcomes were caused. As these variations were the core reason for this investigation (to find a way to deliver assistive technologies in many very different RCSs), it was crucial to use a methodology that allowed me to unpick complexities and externalities that would undoubtedly impact findings.

Realism was a philosophical stance that occupied a middle ground between positivism and relativism. At its core, realism posited that there existed an independent and objective reality that we captured through our senses, cognitive faculties, language, experiences, and cultural context (Bhaskar, 1975; Wong et al., 2013b). This approach to understanding the world and generating knowledge had practical applications and was beneficial in many ways. However, the process by which elements caused and produced change was sometimes referred to as the ‘black box’ of social interventions—it was difficult to observe and empirically capture all elements that contributed to the produced outcomes or, indeed, to unpick the *related* but possibly not *causal* elements which should not be included in future iterations (Mukumbang, 2023). As such, researchers must carefully consider and

analyse the elements involved in any intervention to maximise effectiveness and ensure approaches were well-tailored to the specific application context.

Realism asserted that reality was 'real' but was not all observable in one place, time, and perspective (Westhorp, 2018: 43). Reality was a complex and stratified structure of the world that existed independently of our perceptions (Emmel et al., 2018). The layers consisted of the empirical, the actual, and the real. The empirical layer was the observable and experienced layer of reality which included the phenomena studied in empirical research (Haigh et al., 2019). The actual layer comprised events and behaviours that occurred whether or not we observed them, including all events that have happened, are happening, or will happen. The deepest layer of reality, known as the real layer, encompassed the fundamental structures and mechanisms responsible for causing the events occurring at the actual layer. These mechanisms, while not always directly observable, had effects which could be seen in the actual and empirical layers (Emmel et al., 2018; Haigh et al., 2019). To address this multi-layered reality, researchers considered that empirical evidence was only one piece of the 'causal puzzle' and only revealed one aspect of our view of reality (Jagosh et al., 2014). Researchers combined the pieces with elements of reality that were not amenable to empirical capture to uncover a larger view of these interactions. When studying how outcomes were achieved for disabled technology users in RCSs, it was not enough to focus solely on the equipment delivered and delivery processes. This approach failed to explain why disabled adults quickly adopted technology in some settings and completely ignored it in others.

Realist research shifted the research and explanatory focus from 'what is working?' to 'what works, for whom, in what circumstances, and why?' (Pawson and Tilley, 1997a). This approach was based on the principles of realism, which recognised that:

- 1) 'There was a social reality which cannot be measured (as it was mediated through each of our thoughts, language and culture), but can be known indirectly;'
- 2) Complex social interventions and programs changed the social context (resources, opportunities) of participants, which changed all context and impacts, and

- 3) 'To understand the relationship between context and outcome, realism used the concept of mechanisms (the underlying entities and processes of social structures which operated in particular contexts to generate outcomes of interest)' (Wong et al., 2013a: 2).

Regarding technology interventions for disabled people, it was essential to understand that the technology itself did not solely determine the outcomes. Instead, the reactions of leadership, staff, and users to the resources and opportunities presented by the intervention played a crucial role in determining outcomes. Unpacking the cultural and social factors that contributed to more engaged behaviours helped researchers better understand how to achieve desired technology outcomes. Some RCSs may be more receptive to using iPads than others, depending on their values, cultural elements, and social norms. By more carefully understanding these factors, researchers could create conditions that maximised the chances of success (Wong et al., 2013b).

3.1.3 Critical Disability Studies and Realist Research of Technology

Critical Disability Studies sought to explore the idea of disability as a fundamental aspect of human growth and development – it likely impacted every person at some point. This perspective involved examining how disability effected interactions with various entities, including technology, people, and social structures. Realist and critical disability perspectives allowed for a nuanced understanding of how technology shaped disability experiences across different layers of reality (Shildrick, 2020). Empowering disabled people to make choices about the tools they used to enhance their lives was crucial (Frauenberger, 2015). We better understood how technology impacted their daily experiences by considering their voices and insights. This approach recognised the significance of valuing disabled people as individuals with unique needs and perspectives rather than as mere problems to solve.

Addressing social issues with technology and other interventions often involved multiple components. It required the support of various contextual factors such as staff agreement, resource allocation, and consumer engagement. However, this complexity made it challenging to identify the causal mechanisms behind successful interventions and predict their effectiveness with different people or in new

environments. Even interventions with a proven track record of success could not guarantee success without considering these less easily discernible factors. Choosing an intervention and expecting similar results in a new environment was challenging despite evidence of positive outcomes in health and residential care literature.

These tasks aligned seamlessly with realism and critical disability studies. The approach of realism involved delving into complexities to understand how evidence and reasoning determined whether a technological change benefited people. It sought to identify the specific conditions under which such outcomes occurred and explain why this was the case (Pawson and Tilley, 1997b). Rather than avoiding complexity, realism and Critical Disability Studies embraced it, aiming to provide causal explanations for the various elements involved in producing these outcomes. By carefully analysing these complex interactions, researchers generated a ‘family of answers’ that captured the richness and depth required to create practical and useful applications in the field (Pawson and Tilley, 1997b).

3.2 Key Concepts for Realist Research

Realist research sought to explain the underlying mechanisms that drove the social world and how and why it worked the way it did (Greenhalgh et al., 2017a). This explanation-seeking involved thoroughly analysing the relationships between significant factors to understand the subject in sufficient detail. The aim was to understand the effective components of an intervention, who stood to benefit from it, and the conditions which produced the desired results. In realist research, scholars commonly described these conditions as ‘what works, for whom, under what circumstances, and why/how’ (Pawson and Tilley, 1997b). In the subsequent sections, I will explore the interactions between key components comprising the produced unit of analysis, the context-mechanism-outcome configuration (also called the CMOC). This realist review and evaluation concentrated on the use of technology by disabled adults in RCSs and explored the context and mechanism factors that led to technology adoption outcomes.

3.2.1 Social Programs or Systems

In realism, all researchers endeavoured to understand links and relationships within a space that caused changes. This research methodology was unique because it acknowledged the influence of external factors that could not be manipulated in a traditional experimental approach. Moreover, important variables were challenging to quantify but significantly impacted the results of any changes implemented. Theories or sets of theories described what was working in open, complex systems with variables that could not be controlled, forming social programs. Glouberman and Zimmerman (Glouberman and Zimmerman, 2002) discussed the differences in complicated and complex problems. Complicated problems were those which contained subsets of simple problems, had solutions which were replicable or generalisable, and provided a high degree of certainty of outcome. Complex systems *included* complicated systems but could not be *reduced down to* them and included special requirements such as a deep understanding of individual local contexts and conditions (Glouberman and Zimmerman, 2002). RCSs were considered complex systems because implementing a process in one place did not necessarily guarantee success implementing the same process somewhere else (Glouberman and Zimmerman, 2002). In realist research, researchers sought to explain the interdependencies happening in these complex environments to understand the impact of changes or interventions (Pawson and Tilley, 1997b).

In the current research, I examined technology use and engagement in RCSs as a social system to explain what was working, for whom, under what conditions, and how. Many realist researchers viewed social programs as interventions or changes introduced in a complex environment such as health care or education settings. Realist research best supported unpicking complex interdependencies and tracing causal pathways through myriad factors and interactions. From this project, I developed a set of theories to describe where and why technology worked for disabled technology users in complex systems such as RCSs.

3.2.2 Involvement of Key Stakeholders

The involvement of key stakeholders characterised realist research in shaping research questions and providing their expertise as investigations progress. When

examining complex programs such as technology adoption and change in RCSs, the perspectives of various stakeholders were crucial to understanding the systems and processes at play (Griffiths et al., 2022). These synthesised perspectives generated research findings that were more comprehensive and inclusive. By carefully gathering these diverse perspectives, researchers developed a more complete picture of the interactions and interdependencies that contributed to program outcomes, allowing them to 'see the dark side of the moon.' In this study, disabled technology users, social policymakers, residential care organisational leadership, service managers, support workers, and technology professionals all had a vested interest in understanding what contributed to positive changes in technology adoption and use in RCSs. Disabled technology users wanted supportive systems that enabled them to learn about, acquire, and use technologies to build the lives and experiences they wanted. Social policymakers were interested in how the decisions they made and policies they implemented contributed to and impacted systems, access, and outcomes for disabled technology users. Residential care organisational leaders were looking to run efficient and effective service organisations to provide care and support services that local authorities and potential service users were happy with. Residential care service managers carefully managed their resources and time to meet regulatory requirements and keep the people they supported satisfied and safe. Support workers aimed to improve lives and produce changes for positive impact for the people they supported. Professionals who developed, delivered, trained, or supported assistive technologies for RCSs wanted to ensure their processes supported the best possible outcomes for their customers. It was clear that having this many perspectives of a set phenomenon would better ensure that realist researchers understood how people experienced the best technology outcomes in care and support settings. This improved understanding made it more likely that researchers focused on areas of common interest, producing findings that were relevant and useful for a large set of interested stakeholders. Throughout realist research, these important stakeholders were involved in several stages. They guided the direction of the study, ensured the inclusion of all relevant information, provided feedback on theory development, and shared their experiences and expertise to refine and support theories.

3.3 Context, Mechanism, Outcome Configurations – The Unit of Analysis

To understand the complex social spaces in which technology interventions were implemented, researchers examined the critical elements of context, mechanisms, and outcome patterns. These elements (described in more detail below) interacted in specific ways, forming context-mechanism-outcome configurations (CMOCs) essential for developing and understanding interventions. It was only by holding these elements together as an interactive formula that researchers could understand what was producing change. CMOCs acted as a “hypothesis that the program worked (outcome) because of the action of some underlying mechanism(s) (M), which only came into operation in particular contexts (C)” (Pawson, 2013: 22). These configurations included multiple contexts, mechanisms, and sometimes outcomes, depending on how many elements were causally related and needed to be present to produce outcomes. These configurations were found at different layers of the social world (e.g., individual, organisational, societal), creating hierarchical patterns of CMOCs, which activated to produce outcomes. This research focused on the CMOCs necessary for technology interventions to achieve desired outcomes in RCSs.

3.3.1 Causality in Realist Research

To explain the causes of observed empirical evidence and contextualise what it meant for theories, researchers used inferencing, logic, and hunches, which produced a deeper ontological understanding (Jagosh, 2020). In successionist causation models, the social world was assessed with variables and explained through observed relationships between elements manipulated in an experimental format, such as randomised control trials (Greenhalgh et al., 2017c). Realism held that outcomes arose from interconnected events, actions, and resources, where each relied on other components to activate or trigger the outcome patterns of interest (Williams, 2018). Within this generative view of causality in realist research, mechanisms were crucial in explaining how and why change happened in interventions and how they activated within specific elements of context to produce outcome patterns. This perspective contrasted with the belief that we could not

directly observe causality and could only note a sequence of events, which allowed researchers to infer some degree of causal influence (Williams, 2018).

To gain insight into how disabled adults experienced technology in various settings, realist researchers used generative mechanisms to identify the unique actions and outcomes that occurred in different environments. By studying the contextual elements that influenced decision-making among various stakeholders, researchers better understood why specific outcomes occurred. Interventions in complex spaces introduced (and sometimes removed) resources that impacted those in that space, including technology devices and social, emotional, and political ideas. Mechanisms were the interactions between these resources and the participants in the space, which shed light on why some RCSs embraced new devices while others did not (Greenhalgh et al., 2017c). This highlighted how I could begin to describe why some RCSs immediately opened and start charging new devices (different context conditions which may have set the groundwork for activating different reactions to those resources) while others left them unopened in the shipping box. For example, in RCSs that embedded technology into daily workflows (electronic timekeeping systems, electronic medication management or support task tracking), technology was more likely to be engaged with and embraced because it felt 'normal.' Including technology in daily workflows was an element of context that interacted with behaviours (mechanisms) to produce and cause outcomes. Often referred to as 'underlying' or hidden mechanisms, they captured the idea that to explain how something worked, we often had to go below the observable surface to find the inner workings (Pawson and Tilley, 1997a). Mechanisms were further described as interplays between people and institutions, agency and structure, and individual and social processes (Westhorp, 2018).

3.3.2 Mechanisms

Various mechanisms brought about changes in connection with contextual elements. Researchers have categorised these mechanisms into powers and liabilities, forces, interactions, processes, and reasoning and resources (Westhorp, 2018). Powers and liability mechanisms only existed with activation, such as a staff member who knew how to set up an Alexa but refrained because of lack of leadership support. Force mechanisms applied pressure in certain circumstances but not in others; for

example, a service manager who chose not to provide technology training to staff because regulations prioritised other topics. Interaction mechanisms explained how people and resources interacted and how these interactions influenced elements of an intervention. For example, a user's adoption of a new technology altered how their support workers assisted them throughout the day. Process mechanisms delved into complex chains of actions and events which were iterative. Each event in the chain depended on the previous one and informed what happened next. An example of these mechanisms was a support network showing interest in a user's new technology, which increased motivation to engage with the tool more, which increased their fluency and confidence with the device. If any of these mechanisms changed, each subsequent built step changed (Westhorp, 2018). Reasoning and resource mechanisms examined how people responded to the introduction of new resources in an intervention or program and how their individual and group reasoning shaped outcomes. This kind of mechanism included staff members re-working how they supported a technology user to schedule a GP appointment to integrate a new voice-dialling feature that gave them increased control.

3.3.3 Context

In realist research, context was fundamental to understanding how and why social phenomena occurred. Context in realist research referred to the conditions, settings, or circumstances in which mechanisms operated and influenced outcomes. It included the broader environmental, social, cultural, and historical factors that surrounded and potentially influenced a particular intervention or program (Wong et al., 2013b). While context operated at all levels in systems, realist research focused on capturing elements of context that created the conditions under which mechanisms activated and caused the outcomes of interest (Greenhalgh et al., 2017d).

Context interacted with mechanisms and outcome patterns dynamically. Realist research assumed that interventions did not cause outcomes, but outcomes resulted from mechanisms triggered by interventions in specific contexts. Context influenced the activation, operation, and effectiveness of these mechanisms. Researchers sought to uncover causal pathways and patterns that explained why and how interventions worked in some contexts but not others. Realist researchers study the

interplay between context, mechanism, and outcomes to explain intervention effectiveness in context.

Pawson, a prominent figure in realist evaluation, offered some parameters for identifying potential context elements with 'the four Is':

- Individual context – the characteristics of people who were part of an intervention or program. It included their beliefs, values, attitudes, and behaviours. Personal context played a role in triggering mechanisms and shaped how people experienced outcomes.
- Interpersonal context – this dimension pertained to the social relationships and interactions among people involved in the interventions. It examined how social dynamics and group norms influenced outcomes, including interactions between leadership, site management, staff teams, and disabled technology users.
- Institutional context - related to the cultures, norms, routines, and social rules in a local setting or intervention. It explored what kinds of outcomes were seen as necessary, the perceived role of technology in care and support, and what kinds of support were seen as 'support tasks.' It explored how these institutional factors facilitated or hindered the operation of mechanisms and the achievement of outcomes.
- Infrastructure dimension - focused on the broader societal, economic, and cultural factors that shaped the context in which the intervention occurred. It included economic conditions, cultural norms, legal frameworks, and other external influences that impacted mechanisms and outcomes.

Realist researchers systematically analysed these context dimensions alongside mechanisms and outcomes to generate CMOCs that provided a nuanced understanding of why interventions worked in specific contexts and how to adapt or improve to achieve desired outcomes in different settings. In this case, technology delivery in RCSs became part of the context because as organisations delivered interventions, the resources and training became part of the environment, creating the conditions for mechanisms to activate (or not). The technology offered in RCSs often came with staff training and ownership assignments for delivery or kit setup/maintenance, disrupting previously familiar routines. As people became

acquainted with novel concepts, the intervention elements linked to them became ingrained within the environmental conditions that triggered reactions and behaviours leading to desired results. The intervention components were constantly changing, enabling researchers to scrutinise the circumstances under which modifications occurred and their reasons, thus enhancing our comprehension of the amalgamation of factors responsible for generating effects.

3.3.4 Outcome Patterns

The term outcomes in realist research referred to the intended and unintended consequences of the interaction(s) between context and mechanism within an intervention (Pawson, 2013). Outcomes were often observable and measurable and resulted from an activated mechanism in context. Interventions produced outcomes that followed specific patterns, where certain contexts activated mechanisms, producing certain outcomes with some regularity despite variations in the open social systems of RCSs (Pawson, 2006b). Realist research assumed that nothing worked everywhere and for everyone. Researchers referred to outcomes as ‘outcome patterns’ in different settings because it was unlikely that the same contexts activated the exact mechanisms to produce identical outcomes. However, researchers could map these outcomes and group them for the description and organisation of ideas (Westthorp, 2014). Realist research aimed to explore at a practical level of abstraction for maximum applicability. They focused on the key elements of context and mechanism that produced the main patterns of outcomes rather than capturing all outcomes and comprehensive causal pathways. Understanding outcomes was fundamental because it went beyond a simple cause-and-effect relationship. It aimed to unearth the generative mechanisms that produced specific outcomes along with the contextual factors that influenced these mechanisms.

When examining how disabled people experienced technology in RCSs, outcomes became critical. Realist research helped uncover why some disabled people benefitted from certain technologies while others did not. Realist research provided valuable insights for policymakers, care providers, and technology developers by exploring the mechanisms and contexts underlying outcomes. Outcomes played a

pivotal role in realist research by facilitating a deeper understanding of how to improve the lives of disabled people by using technology in RCSs.

3.4 Theory Development in Realist Research

In realist research, theory development was a systematic and iterative process aimed at uncovering the underlying mechanisms and contextual factors that drove outcomes in complex social phenomena. Researchers began the theory development process by creating abstract description statements that described the elements of an intervention and how they were expected to work in producing outcome patterns (Pawson, 2002; Wong et al., 2013b). Gathering evidence about the beliefs and experiences of the stakeholders involved in an intervention was essential to develop these theories. This evidence was then used to create theories which capture the different perspectives and causal pathways of an intervention with precision (Astbury, 2018). Realist researchers iteratively developed these theories through evidence collection and synthesis cycles, taking the form of Context-Mechanism-Outcome configurations (or CMOCs). In the following sections, I will describe the stages of theory development, from initial rough program theories to increasingly refined program theories. Program theories mapped out critical components of an intervention, intended and unintended outcomes generated by the intervention, and how distinct elements contributed to other outcomes (Wong et al., 2013b).

Program theories were crucial in organising review findings by linking various types of evidence to program components. This comprehensive approach drew on a wide range of sources to support, refine, or challenge program theories. While data collection methods varied, researchers typically developed program theories through targeted exploratory research, literature reviews, and synthesising qualitative and quantitative primary and secondary data.

However, theory development in realist research was far from linear. It unfolded as an ongoing, dynamic narrative of evidence-gathering and analysis activities. As data collection and analysis commenced, researchers constantly revisited and refined initial theories, with each piece of empirical evidence used to either strengthen, alter, or reposition elements of each theory.

3.4.1 Building Initial Rough Program Theories

The initial rough program theory (IRPT) was the beginning stage in an iterative, theory-driven inquiry cycle in realist research. One could think of IRPTs as the blueprints of a building, which were used to set the foundational plan for constructing the rest of the knowledge. Researchers then formed these theories through an exploratory review of relevant white and grey literature, discussions with key stakeholders in the space of interest (such as disabled technology users, AT project managers and residential care managers), and professional experience and 'hunches' (Marchal et al., 2018; Booth et al., 2018). These preliminary theories helped to hypothesise how an intervention was working and what the causal elements were, which then allowed for more targeted seeking and use of evidence to confirm, refute, or adjust the theories until they accurately explained what was happening in an intervention (Pawson and Tilley, 1997b). They represented the initial understanding of how a particular intervention or program operated within a complex social context.

Once a researcher articulated these theories, they formed a framework to direct further evidence collection. This framework was then used to search for specific elements and additional context through literature, interviews, observation, or other sources of evidence to inform the complete picture. They served as the starting guide for inquiry to uncover the hidden mechanisms and contextual factors that shaped understanding of how interventions and programs impacted the world. In this case, the initial rough program theories were my starting point for keywords, concepts, and ideas that needed exploring to explain how people experienced technology in RCSs.

3.4.2 Refining Rough Program Theories to CMOCs

Refining program theories was a pivotal step in the realist research inquiry cycle. It involved moving iteratively between building, revising, and evaluating the initial rough program theories to articulate more nuanced descriptions of how interventions worked (Shearn et al., 2017). The initial rough program theories served as the starting point. Researchers then refined these theories based on evidence that revealed new context and mechanism elements contributing to building outcome

patterns. Incorporating additional explanatory evidence allowed for further refinement of the program theories and directed the inquiry process towards gathering additional evidence for the increasingly detailed CMOC statements. This process also involved investigating the specific mechanisms and activating contexts that produced the outcome patterns of interest.

During the realist research process, theories both expanded and contracted. This meant that as more evidence was gathered, the number of program theories expanded to accommodate and synthesise all the information. Still, as larger patterns emerged, some theories were synthesised and reduced down to fewer core pathways (Booth et al., 2018). The level of abstraction in theories fluctuated as they became more generalised to describe causal pathways while providing enough practical detail to guide implementation in different contexts.

3.4.3 Finalised and Evidenced Program Theories

While theories were never final in realist research, they could be referred to as ‘final’ when they fully explained the area of inquiry and answered the research questions based on the evidence within their time constraints. I referred to refined theories as snapshots that drew causal conclusions based on the evidence found and the logic used to interpret and apply that evidence. These theories were always unfinished and open to change if additional evidence was introduced. They were the culmination of the rigorous and iterative process to understand the details which described complex social programs. Saturation of concepts or comprehensiveness in coverage were not indicators of a theories’ ‘stopping point.’ Instead, the value came in how thoroughly the theories described and provided evidence for the causal pathways to a sufficient level of abstraction to explain why the intervention worked differently in other environments (Jagosh, 2020). The realism approach focused on the logic and the moments of success within a project, rather than the frequency of observations of different elements (Vichitvanichphong et al., 2014). The point was not to find ideas that were most prevalent in evidence, but those which explained causal connections and answered the research questions. Finalised program theories provided a coherent and evidence-based narrative that explained the causal pathways within the programs of change. These finalised theories not only shed light on what worked, for whom, and under what conditions but also offered insights into

the complexities of social interventions. The theories represented the culmination of a time-bound research journey, translating evidence into actionable knowledge to inform policy, practice, and further research in the field.

3.4.4 Developing Middle Range Theories

Program theories carefully described a desired goal and gave precise instructions at a detailed level of abstraction for action needed to achieve that goal in a defined context. Program theories were more specific and tightly context-bound, designed to explain how a particular intervention or program worked in a specific context. These theories were relatively concrete and linked directly to a particular program's components. Program theories were also narrow in scope, focusing on specific programs or interventions to explain the mechanisms and outcomes of a particular program in a specific context. Because program theories were context-specific, it was difficult to transfer them to other settings or programs. Instead, researchers tailored initial rough program theories to the unique features of the programs they aimed to explain (Emmel et al., 2018: 83). Program theories differed from middle range theories in their level of abstraction, scope, generalisability, and overall purpose.

Middle range theories (or MRT) sat between high-level, abstract grand theories and low-level, specific empirical observations (Merton, 1968). They offered a mid-level framework for understanding causal mechanisms within a specific context. Researchers using middle range theories developed several testable propositions from a small set of ideas. These propositions were not too abstract for practical application, but also not too detailed to replicate across multiple circumstances (Pawson and Tilley, 1997b). MRTs were broader in scope, aiming to explain a range of phenomena within a certain category or domain, such as technology used by disabled people in RCSs. They provided a framework to apply to various situations, aiming to identify patterns and principles which held across multiple instances, making these theories more generalisable. They sought to explain how mechanisms operated in different contexts for a level of abstraction helpful for program evaluation and improvement.

To explain how disabled people experienced technology in RCSs, middle range theories described the broader conditions within which the theories found through this research were situated. The descriptions here were more general than program theories. These more generalised descriptions meant that middle range theories guided implementation of similar interventions (such as technology delivery) across more diverse settings. This generalisability made middle range an appropriate level of abstraction to describe causal pathways which laid the groundwork for outcomes for technology in RCSs (Hunter et al., 2022). The middle range theories in this research were more abstract and focused on the causal descriptions of the organisation-level elements which had to be in place for user-level outcome patterns to be described. These middle range frameworks helped me to understand technology delivery and experience processes in RCSs, enabling targeted action to address social problems.

For the current research, many initial rough program theories began at the program level of abstraction. These theories described in significant detail the specifics of technology delivery in different contexts to explain potential causal pathways and were most closely informed by data from disabled technology users. As I built these program level theories and refined them with further evidence, they synthesised into more abstract pattern descriptions. Rather than having a lengthy list of extremely specific (and potentially ungeneralisable) principles or program theories, the findings in this research moved to a level of abstraction which was more likely to describe the causal pathway in many settings while still giving practical guidance for cultivating and facilitating these causal pathways. Thus, the final theories should be considered middle range theories, as they were more abstract than direct empirical observation but less abstract than grand theories, bridging the gap between abstract theoretical concepts and direct observation.

3.5 Method Selection in Realist Research

Academic journals often revealed intervention effectiveness but not specifics of their underlying causes. For disabled technology users in RCSs, they did not provide a detailed understanding of the underlying causes for success. To address this challenge, realist research utilised multiple sources of evidence to develop and refine

theory statements in CMOCs (context, mechanism, and outcome configurations). Then, these CMOCs were evaluated against the experiences of disabled technology users, using a realist review of evidence to guide the iterative theory development and evaluation cycles. For this research, I collected data from various sources, including disabled technology user expert groups, interviews, academic literature, grey literature, and professional assistive technology professional stakeholder groups. These data collection methods are described in more detail in Chapter Four and are mentioned throughout Chapter Three to demonstrate concrete examples of the application of CRDS methodology.

3.5.1 Realist Review and Evaluation

Realist review was a method for interpreting literature and evidence, extracting ideas and evidence, and conducting analysis and synthesis. The primary objective was to uncover what worked, for whom, in what circumstances, how, and why within complex interventions in open social systems (Emmel et al., 2018; Pawson and Tilley, 1997b). This approach involved reviewing both primary and secondary evidence from the literature. It recognised that the outcomes of interventions depended on specific setting conditions (context) combined with specific actions taken within that context (mechanisms), which led to desired outcomes (Pawson, 2013; Kantilal et al., 2020).

Realist review aimed to develop theories regarding why a program or intervention operated as it did. It generated these explanations by forming hypotheses about the causal relationships between a system's context, resources, and people. Realist reviews differed significantly from traditional systematic reviews regarding their purpose, the types of evidence considered, and the approach to assessing evidence quality (Greenhalgh et al., 2017a). Unlike traditional reviews, which assessed *whether* an intervention or program was effective, realist reviews focused on understanding *how* and *why* a program succeeded. Realist reviews prioritised the explanation of phenomena by examining causal elements instead of calculating effect sizes or impacts, as was common practice in other social research. Realist reviews did not aim to cover all literature and evidence on a specific topic comprehensively. Instead, they aimed to draw out descriptions of causal mechanisms and interactions among context elements and the causal actions of

stakeholders within an intervention to produce the outcome patterns of interest (Pawson et al., 2005).

Realist review did not restrict evidence searches to specific interventions or programs (say, technology and disabled people or domiciliary care), but emphasised theories explaining the intervention. This approach allowed researchers to trace causal chains across diverse literature and evidence sources, extending beyond the confines of a particular research field. Realist reviews deliberately integrated evidence from various sources, including academic literature, grey literature, and input from stakeholders (Groot et al., 2017; Emmel et al., 2018). Project white papers, thought pieces, policy documents, and discussion sections of literature often contained the most applicable evidence. These papers were where authors more frequently discussed the potential reasons behind their research results, which realist researchers used as evidence to connect elements of their theories (Jagosh et al., 2014). This meant realist literature searches extended beyond the expected content domain (AT studies) and into related areas such as implementation science, project delivery, and rehabilitation science.

The realist evaluation went hand-in-hand with realist review but focused more specifically on using primary data to validate theories developed during the review process (Greenhalgh et al., 2017a). It was a critical step in the research journey, offering a more in-depth understanding of the intervention's function and interaction with context. Realist evaluation involved using primary data during the theory development and CMOC-refining stages. In this research, I integrated realist review and realist evaluation at multiple research stages. I used secondary data from literature and primary data from focus groups and interviews to shape, refine, and evaluate theories explaining how the technology produced outcome patterns for disabled technology users (Greenhalgh et al., 2017a). While the realist review focused on synthesising and analysing existing knowledge, the realist evaluation involved collecting and analysing new and existing data to test the fitness of theories developed during the study. These two methods, used together and run concurrently in this research, provided a more comprehensive understanding of complex interventions.

3.6 Data Collection and Analysis

The research methodology used in this research combined realist review and realist evaluation methods, an approach first described by Cooper, Lhussier and Carr in 2020 (Cooper et al., 2020). Researchers conceived this methodological fusion in response to a series of challenges encountered in research endeavours, such as the need to merge diverse types of evidence, a lack of empirical evidence, discrepancies in the theoretical underpinnings of collected evidence, and a limiting focus on binary evaluation outcomes ('did it work? Yes/no') (Cooper et al., 2020). These challenges resonated closely with the concerns at the heart of my research, making the concurrent use of realist review and evaluation methods particularly apt.

3.6.1 Evidence in Realist Review and Evaluation

Initially, I overwhelmingly focused on assistive technology evidence from and for professionals who used it to support disabled people. This literature amplified the experiences and perspectives of staff and professionals. The concurrent application of review and evaluation methods offered a unique opportunity to draw equally from an array of primary and secondary evidence sources. The approach enabled the identification of valuable insights, which contributed substantively to the development and refinement of theoretical frameworks. Additionally, it facilitated the evolution of questions posed to stakeholders, allowing for a seamless transition from the initial stage of idea-gathering to the subsequent phase of evaluative realist interview questioning. This progression enabled me to best collect evidence tailored to the specific nuances of each CMOC under development and refinement.

The evidence most valuable for a realist review could vary in the robustness of methodology and the quality of the findings and still be highly relevant to the realist research question. Instead of appraising quality in the same way as in systematic literature reviews, realist researchers focused on careful notetaking related to the relevance (the degree to which it could contribute to theory-building and testing) and rigour (trustworthiness of methods used to produce evidence) of each source to determine its inclusion or exclusion. Academic and grey literature required a series of judgements on the degree of relevance and the robustness of the data as they related to the realist research question (Wong et al., 2013b). Evidence that was not

scientifically robust could still be highly relevant in terms of discussion regarding practicalities related to implementing the elements, theories, or interventions of interest. Evidence for this realist review included impact studies, qualitative interviews, ethnography, mixed method case studies, policy documents, business plans, project initiation documents, and ‘grey literature’ project write-ups (Wong et al., 2013b). It was worth noting that with realist research, even poorly designed research sometimes yielded highly relevant author and participant insights, which added value to the realist processes of CMOC development, refinement, and evaluation (Pawson, 2006a). As the researcher, I carefully documented and described the judgements regarding relevance and rigour in a transparent manner for readers of realist research to understand the inferencing process (Wong et al., 2013b).

Several additional considerations came into play to enhance the robustness and trustworthiness of realist research. Data triangulation played a vital role, encompassing data collection from multiple sources and using various methods to corroborate insights. Furthermore, this approach acknowledged the critical importance of context, focusing on understanding and articulating how contextual factors influenced mechanisms and outcomes. Data validation techniques, including debriefing discussions with other professionals and my advisory team, ensured the reliability and credibility of the data. The analysis process was not linear but embraced an iterative nature. I revisited my CMOCs and refined them as new data emerged, reflecting the dynamic nature of the research. Last, realist researchers engaged stakeholders throughout the research process, with their insights and contributions playing a pivotal role in refining CMOCs and validating interpretations.

3.6.2 Data Collection

Throughout this multifaceted process, realist researchers systematically conducted data collection and analysis with the core goal of “aggregating as many viewpoints as possible” (Pawson and Tilley, 1997b: 154). This approach aimed to capture a comprehensive spectrum of perspectives and empirical evidence sources. It ensured that the ongoing refinement of CMOCs was based on a rich and varied set of perspectives. In this stage of research, realist investigators continually honed these CMOCs to comprehensively depict the broader patterns extracted from the evidence.

These patterns showed the intricate ways disabled people used technology in tandem with care and support to build the lives and experiences they wanted. Data collection in realist research was comprised of a mixed methods approach, purposeful sampling, document analysis, stakeholder involvement, and data transparency and documentation. Qualitative methods, such as interviews, focus groups, and document analysis, captured rich contextual data and explored mechanisms, while quantitative data helped identify patterns and trends in outcomes. These sources provided valuable historical and contextual information, in addition to some speculation from researchers and project managers as to why and how they thought they found the reported results.

Sampling in realist research was purposeful and driven by the research questions. Literature, participants, and documents were selected based on their likelihood of providing insights into the CMOCs under investigation. Sampling strategies in this research included details about specific contexts, mechanisms, and outcomes which described any links between them. Stakeholder involvement throughout the research process was essential to data collection and analysis and was a hallmark of realist research. Stakeholders' perspectives and experiences offered crucial insights into mechanisms and context, contributing first to theory development and then to evaluation and refinement. Data transparency was maintained through meticulous documentation of data collection processes. The aim was to ensure transparency of collection and analysis, but not necessarily reproducibility. Detailed field notes, comments in documents, a table of relevance and rigour notes, and a reflection journal provided a comprehensive record of data sources and their relevant CMOC configurations.

3.6.3 Retroductive Logic

Realist research was iterative, involving fluid movements between stages of research to guide and direct the research toward CMOC building and evaluating. Realist research followed a retroductive logic process while looking beyond and behind observable evidence to find causal descriptions for the outcomes. Abductive logic inferred additional details behind observations, sometimes described as 'reading between the lines' (Hunter et al., 2022). Inductive logic sought to explain using observation of behaviours or events, taking collections of evidence at a

detailed level to generate broader CMOCs which explained them. Deductive logic created and tested broad ideas, starting at a top level of abstraction and building out details based on evidence. Retroductive logic was a mode of inference that involved examining elements not seen or easily observed. It endeavoured to explain events by postulating and identifying mechanisms capable of producing them, uncovering causal forces behind identified patterns. Each of these methods of reasoning explained phenomena using observable evidence. At the same time, retroduction examined things that were not seen or easily observed but provided richness and ontological depth to the observed outcome patterns and inferences made (Jagosh and Centre for Advancement in Realist Evaluation, 2020). 'Retroduction was a mode of inference in which events were explained by postulating and identifying mechanisms which were capable of producing or causing them' (Sayer, 2000; Greenhalgh et al., 2017b). To state it differently, retroduction helped identify causal forces which lay behind identified patterns, observable evidence amenable to collection, or changes in those patterns (Greenhalgh et al., 2017b; Gilmore et al., 2019).

This was the logical process of this research, as many mechanisms playing a causal role in positive technology outcomes were reactions from staff such as trust, confidence, and persistence (Jagosh and (CARES), 2020). Since these concepts were challenging to observe, researchers could identify proxies in evidence to indicate the presence of these mechanisms. For example, discussion of findings and evidence may not have directly described that staff trusted or had confidence in technology. However, realist researchers could infer trust and confidence from descriptions of engagement, frequency of technology use, effort to support someone to use something new, and changing work patterns. Retroduction used inductive and deductive logic, insights, and hunches to capture the elements critical to the core ideas, but which evaded evidence capture. Realist researchers who believed that causal processes cannot be fully explained with observable evidence alone used retroduction to capture elements related to outcome patterns.

Realist researchers refined CMOCs through deductive reasoning by searching for case evidence in interviews, industry papers, and identifying examples that were consistent with the CMOC. However, realist researchers did not ignore or exclude

inconsistent cases and evidence. Conflicting accounts did not invalidate a CMOC but provided additional perspective and depth of understanding of the underlying contexts and mechanisms that combined to cause the observed evidence (Sobh and Perry, 2006). Counterevidence provided valuable insights on how to form a new CMOC or refine the current CMOC in more detail. Realist researchers then compared the newly refined or newly formed CMOCs against evidence and further cases (using deductive reasoning again). This process continued as researchers developed and tested CMOCs, moving back and forth between inductive and deductive logic while drawing out inferences and logic that explained the observable evidence but may themselves not have been explicit or observable.

3.6.4 Summary

Realist research methodology emerged as the ideal approach for investigating how disabled adults experienced technology in RCSs. This methodology recognised the complexity of these interactions, allowing for a deep exploration of the underlying mechanisms and contextual factors that shaped these experiences and produced outcomes. In Chapter Four, I will describe the specific methods used in this research, providing insights into how I navigated this intricate terrain to unravel the web of causation and context. Through the lens of realist inquiry, I gained a nuanced understanding of how technology impacted the lives of disabled adults in RCSs, ultimately contributing to a more holistic and insightful exploration of this significant topic.

3.7 Positionality and Reflexivity

In this section, I will describe the concepts of reflexivity and positionality within the context of CRDS, exploring how my own experiences and perspectives shaped the research process and outcomes. As a practitioner with a background in organisational business psychology and behaviour analysis, my expertise lay in understanding the dynamics and complexities of education and RCSs. This practical experience informed my understanding of the research context and allowed me to approach the study with a deep understanding of the challenges and nuances involved in the disability support sector. Additionally, my role as a researcher, conducting research consulting work in education, non-profit, and social care

settings for the past 8 years, provided me with a unique perspective on the research process and the impact it could have on the people, processes, and communities being studied.

Through the lens of critical realist disability studies, this approach acknowledged the social construction of disability while also recognising the existence of objective realities and material conditions that influenced the experiences of disabled people. From a critical disability studies perspective, I undertook this project committed to challenging ableism and advocating for the rights and well-being of disabled people in RCSs. My critical realist perspective further emphasised the importance of understanding the underlying structures and mechanisms that shaped disability experiences. This theoretical framework informed my research design and analysis by forcing me to balance the volume of evidence and different perspectives of different stakeholder groups. By grappling with the heavy participation by assistive technology professionals compared with disabled technology users, I worked to uncover the complex interactions between social, cultural, and structural factors that impacted disabled people in RCSs.

3.7.1 Positionality

In the context of CRDS, positionality referred to my self-identification as the researcher, including my background, personal experiences, beliefs, and other factors I brought to the research process. Positionality was crucial as it influenced how I related to the research topic and the identities of the participants. It also acknowledged my personal identity and experiences and how those shaped the research process and outcomes. My different background roles and identities created a lens through which I saw all aspects of my research. My background as an organisational behaviour analyst meant that I have substantial experience with untangling how systems and processes in organisations result in the employee (practitioner) behaviours and experiences they see. Due to my perspective and professional experience, there was a risk of my limiting the explanation of technology outcomes to only systems and process elements.

I also have background as an educator and clinical practitioner which, along with my lived experiences, affected my understanding of disability. I grew up with multiple

incorrect disability diagnoses, which influenced me to want to advocate for disabled people who may not be accessing the right kinds of supports to build the lives they wanted. Reflecting on this background enabled me to consider the relationships between disabled people, their supporting network, and support providers and the ways in which their goals were and were not well-aligned. My professional training and background led me to view disability as something to be 'corrected,' which came into direct conflict with my experience of being disabled and not feeling as though I myself needed to be 'corrected,' and that my personal disability activated in spaces and around people whose expectations did not align with my needs. Reflecting on these elements helped me shape how I wanted to feature the different voices represented in the research, and how to carefully balance how I reported CMOCs without placing responsibility for positive technology use solely on social care organisations. Having grown up with a disabled relative living with my family for a short time, I watched my mother struggle to access services and supports for them. Reflecting on this potential bias ensured that I could reduce the ways in which my research could be influenced against support providers and disability support services by assuming they did not adequately meet the needs of disabled adults.

As a researcher who did not live in an RCS, I acknowledged that my understanding and perspective was going to be limited. This limitation necessitated my proactive engagement in the teacher-learner cycle of realist research. I had to be open to the fact that there were certain questions I may not have been aware of and knowledge that I did not know existed. Recognising my positionality as an outsider to the RCS experience was crucial in shaping my approach and interpretations in this research. It allowed me to be sensitive to potential biases and to constantly question and reflect on why I was asking certain questions or interpreting evidence in certain ways. One example of this positionality was using more quotes from AT professionals in my evidence because they contributed more to the higher abstraction level used in the final middle range theory format, whereas evidence from interview and focus group transcripts with disabled technology users was more heavily featured in earlier program theories and thus less represented in this final piece of work. To respond to this challenge, I tried to carefully craft stories that highlighted the experiences of disabled technology users as they were still relevant to the final CMOCs, even while having more direct quotes from assistive technology

professionals. In doing so, I aimed to ensure that my CMOCs were grounded in an accurate and nuanced understanding of the RCS context and the balanced perspectives of both stakeholder groups.

3.7.2 Reflexivity

Reflexivity in my research referred to my ability to critically reflect on my own positionality and how it might have influenced the research process and my CMOCs. I acknowledged that I was not a neutral observer but an active participant in the research process. My social identities, values, and experiences shaped my perspectives and interpretations. In CRDS, reflexivity was particularly important as it recognised that disability was influenced by societal structures and power dynamics.

I began this research believing that organisations were ultimately seeking ways to utilise technology in order to reduce the cost of providing care and supports. This assumption influenced my desire to provide relevant and actionable analyses for multiple stakeholders. My objective was to equip organisations with the requisite knowledge to foster an environment conducive to favourable technology outcomes, thereby safeguarding their existing investments in technology. Additionally, I wanted disabled people to have evidence to advocate for a different approach to their support systems, showcasing the benefits of a more inclusive and diverse view of what support entails. To achieve these goals, it was crucial for my research to be rigorous, generalisable, and respected for its quality.

I continuously questioned and challenged my assumptions, engaged in dialogue with participants and other researchers, and was transparent about my own position and limitations. I examined my relationship to this research through daily reflective journaling exercises throughout all stages of the research. These exercises involved critically examining whether and how my biases and values were influencing my research design, recruitment processes, and how I interpreted the data collected. It was through these reflective exercises that I saw an opportunity to have more balance in my data analysis, despite having more evidence for the final CMOCs from professionals than from disabled people themselves. I was able to ensure that I used evidence from and about disabled technology users to describe how they

experienced all aspects of technology delivery and usage, while using more evidence from professionals related to delivery processes and organisational values. I also formed a peer group of other doctoral researchers, all undertaking very different kinds of social research. We discussed how we were related to and influencing our work weekly and through all stages of our research. These practices helped me consider the research processes (who were the key stakeholders? How could I draw out the evidence I needed from the people who have lived expertise?), questions I wanted to ask (am I trying to help the organisation, or disabled people? Can I ask questions that achieve both?), and which voices I wanted to feature or amplify.

Reflexivity within CRDS enhanced my research by promoting self-awareness and critical engagement with the research process, ensuring that my analyses were objective and grounded in an accurate understanding of the complexities and nuances of the topic. Ultimately, reflexivity enabled me to navigate the research process with self-awareness, transparency, and a commitment to producing meaningful and impactful findings that addressed the diverse needs and aspirations of disabled technology users in RCSs. This approach would enable organisations to plan supports differently, while empowering disabled people to advocate for new ways of being supported that incorporated technology.

3.7.3 Power Imbalances

There were inherent power imbalances involved with this research. Seeking the perspectives of disabled people using a product or service and the perspectives of the people professionally providing those services was problematic. The inclusion of the word 'professional' in my description of this assertion demonstrated a potential bias toward the validity and value of one stakeholder group over another. This bias required careful planning and a true teacher-learner cycle to stay alert to how I was questioning stakeholders differently and the impact that could have on the applicability of evidence I collected (Pawson and Tilley, 1997b). The teacher-learner cycle involved me as the researcher teaching stakeholders about a CMOC being developed or tested (participants as learners), and then reversing these roles for the participants to teach me the relevant details and connections in response to the described CMOC (Manzano, 2016; Greenhalgh, Greenhalgh, Pawson et al, 2019). It

was sometimes more challenging to describe a CMOC and relevant details to disabled technology users, which meant I may sometimes have been less effective at conducting interviews which produced similar quality and quantity of evidence from both stakeholder groups. It was also difficult to ask the questions I wanted to ask in order to evoke relevant evidence for CMOC refinement from disabled people who needed support from a support worker in order to participate. Disabled adults did not want to speak negatively or highlight any challenges with how they and their technologies were supported in the presence of the people delivering those supports, which also impacted my ability to draw out evidence that balanced stakeholder perspectives.

As a researcher, I recognised the importance of acknowledging the structural factors that contributed to unequal power differentials within support organisations and the supporting workforce. There were misunderstandings among the workforce across multiple organisations related to the Mental Capacity Act (MCA) and how it applied to disabled adults they supported. Gatekeepers in the social care organisations I approached to conduct this research would not extend the opportunity to participate to any disabled adults who would require an MCA assessment in order to consent. Upon further conversations with leadership, I uncovered that deputy managers and team leaders did not have enough resources (time) to complete the organisation-specific paperwork to justify exposing disabled adults to the opportunity, or to complete the additional paperwork that would be required for each participant who elected to participate. This misunderstanding was a substantial barrier to recruitment and further perpetuated the power differential of support professionals having more power and authority than disabled adults, even over those who had the capacity to communicate their own decisions after having the opportunity to review the participant information materials. This barrier led to an increased reliance on snowballing for recruitment, and reliance on participants who were disabled technology users themselves working professionally in the assistive technology field referring me to one another.

While I made efforts to account for these power imbalances, it was important to acknowledge that complete reconciliation was a complex and ongoing process. However, through my research, I aimed to shed light on these power imbalances and

provide recommendations for mitigating them, ultimately contributing to a more equitable and inclusive support system.

3.8 Summary

I began in the Methodology section discussing critical disability studies, realism and realist research, critical realist disability studies and realist research of technology. Critical disability studies was an interdisciplinary approach to challenge dominant models of examining the experience of disability. Realism and realist research offered a generative theoretical framework for constructing an observed reality in the context of their less-observable causal elements. Critical realist disability studies embraced complexity and aimed to provide causal explanations for the factors generating outcomes for disabled technology users. In the section on Key Concepts for Realist Research, I described the concepts of social programs or systems and the realist research involvement of key stakeholders. Social programs or systems referred to changes that were implemented in complex and entangled social systems, sometimes referred to as interventions in research literature. The involvement of key stakeholders was an important feature in realist research, as it contributed to a researcher's ability to triangulate multiple perspectives and sources of evidence in order to build a more comprehensive understanding of causal forces in social programs.

I used the section on Context, Mechanism, Outcome configurations to describe the CMOC as the primary unit of analysis in realist research. Causality in realist research was described in terms of the elements of mechanisms which, under the right contextual conditions, activated to produce the outcomes of interest in an investigation. Mechanisms were different forces, processes, and behaviours which could be activated in the right context. Context referred to the conditions or setting circumstances within which a change was taking place, which may or may not activate mechanisms to produce outcomes. Outcomes were described as 'outcome patterns,' as realist research posited that nothing worked everywhere and for everyone; patterns of outcomes were the optimal way to describe what result was being generated by mechanisms acting in context.

In the Theory Development in Realist Research, I provided a detailed discussion of the building of IRPTs, refining rough program theories to CMOCs, and how these were developed into middle range CMOCs. The section on Method Selection in realist research described the realist review as a structured way of reviewing literature to inform theory development and CMOC formation, and realist evaluation as the method selected to collect primary data and apply it to the development and testing of CMOCs generated in the realist review. In Data Collection and Analysis, I explained how evidence was evaluated and extracted in realist review and evaluation, using retroductive logic to synthesise a diverse set of evidence. Finally, in the Positionality and Reflexivity section, I described my positionality as a researcher in this work, reflexively analysed the impacts this positionality could have on my role, and discussed the power imbalances present and how I mitigated each.

In Chapter Four, I will describe my research methods in further detail, starting with a description of the realist review for theory development which involved building initial theories, searching for evidence, and refining CMOCs in a cyclical and iterative process. I will then explain the realist evaluation and how it relates to the realist review, followed by the realist survey and final data synthesis.

Chapter Four: Realist Review and Evaluation Methods

Having described the realist research methodology in the previous chapter, in the current chapter I will describe my realist review and evaluation methods, including the details of each step in the iterative process of consulting with stakeholders, literature searching, screening of literature, evidence extraction, and CMOC development, refinement, and ultimately evidencing for evaluation. I have included a visual map of this process to show a broad overview of the entire research process, but I will attempt not to duplicate material already described in Chapter Three or in early sections of the current chapter. The diagram below (Figure 1) visually represents the iterative theory development process, showing the research activities which developed initial rough program theories through to more nuanced and contextually sensitive explanations of how a program functioned in a real-world context (CMOCs). Each stage of research will be described in more detail in the following sections; I am first showing the visual below to acquaint readers with how the processes and activities were interconnected.

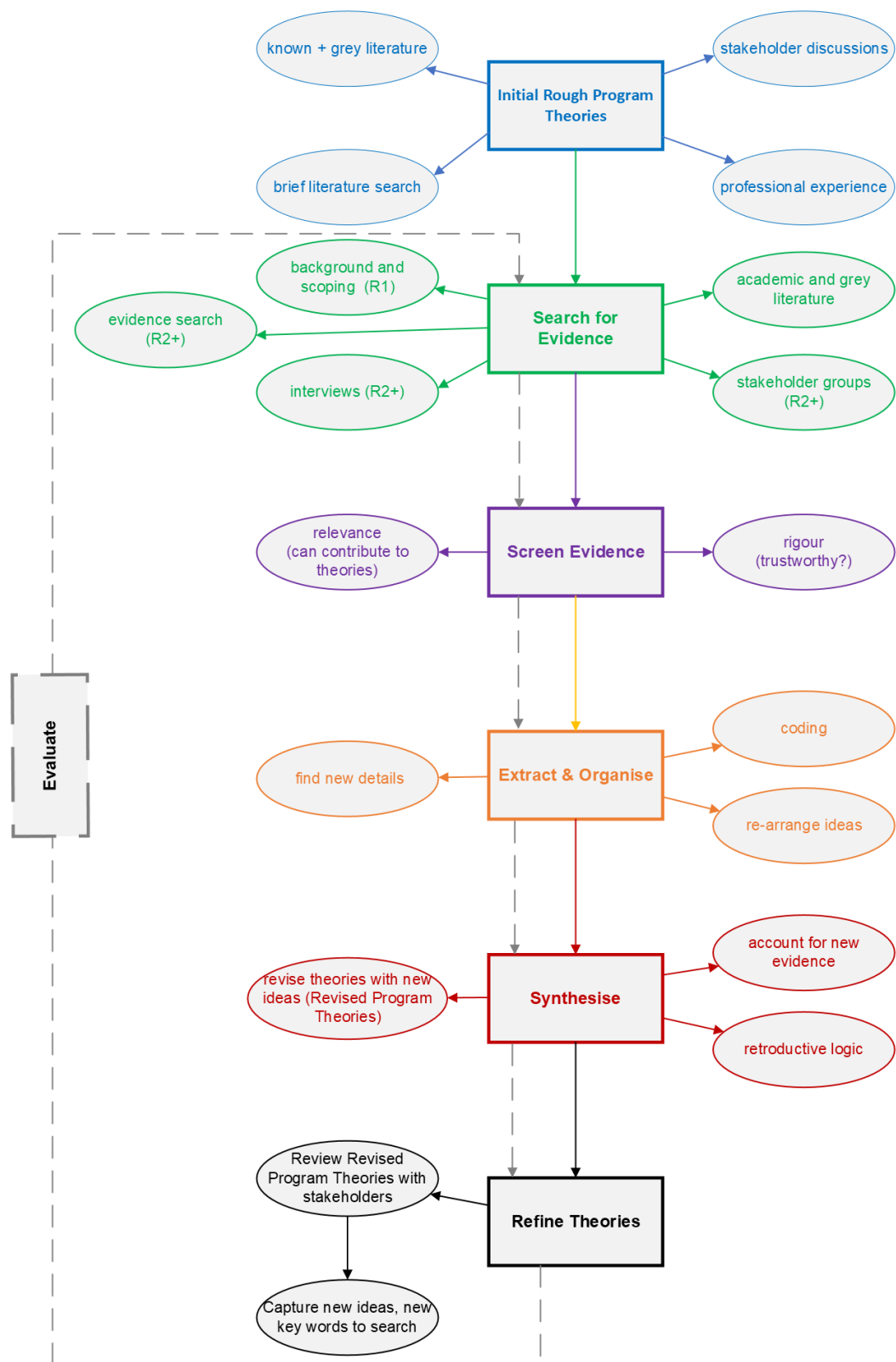


Figure 1. Map of methods process

The above diagram can be navigated by looking at the rectangles from the top to the bottom. These rectangles showed the rough stages of research activity related to

theory development, including initial rough program theories, the search for evidence, screening of evidence, extraction and organisation, synthesis, and refining of theories into CMOCs. Connected to each stage were ovals of the same colour, which described the research activities supporting this stage. Again, while the diagram showed the process of realist research as linear, the process was iterative and distinctly non-linear, as I revisited activities as the evidence required. Each theory required separate investigation; thus the process and phases were not the same for all theories. While the direction of the arrows indicated the direction of travel through these processes, there was also backward, forward, and skipping movements, depending on the requirements of the research. The following flowchart shows an example of theory development through the phases of research from Initial Rough Program theory to Context-Mechanism-Outcome Configuration. I included a similar diagram to show how theories developed through this process in Appendix C.

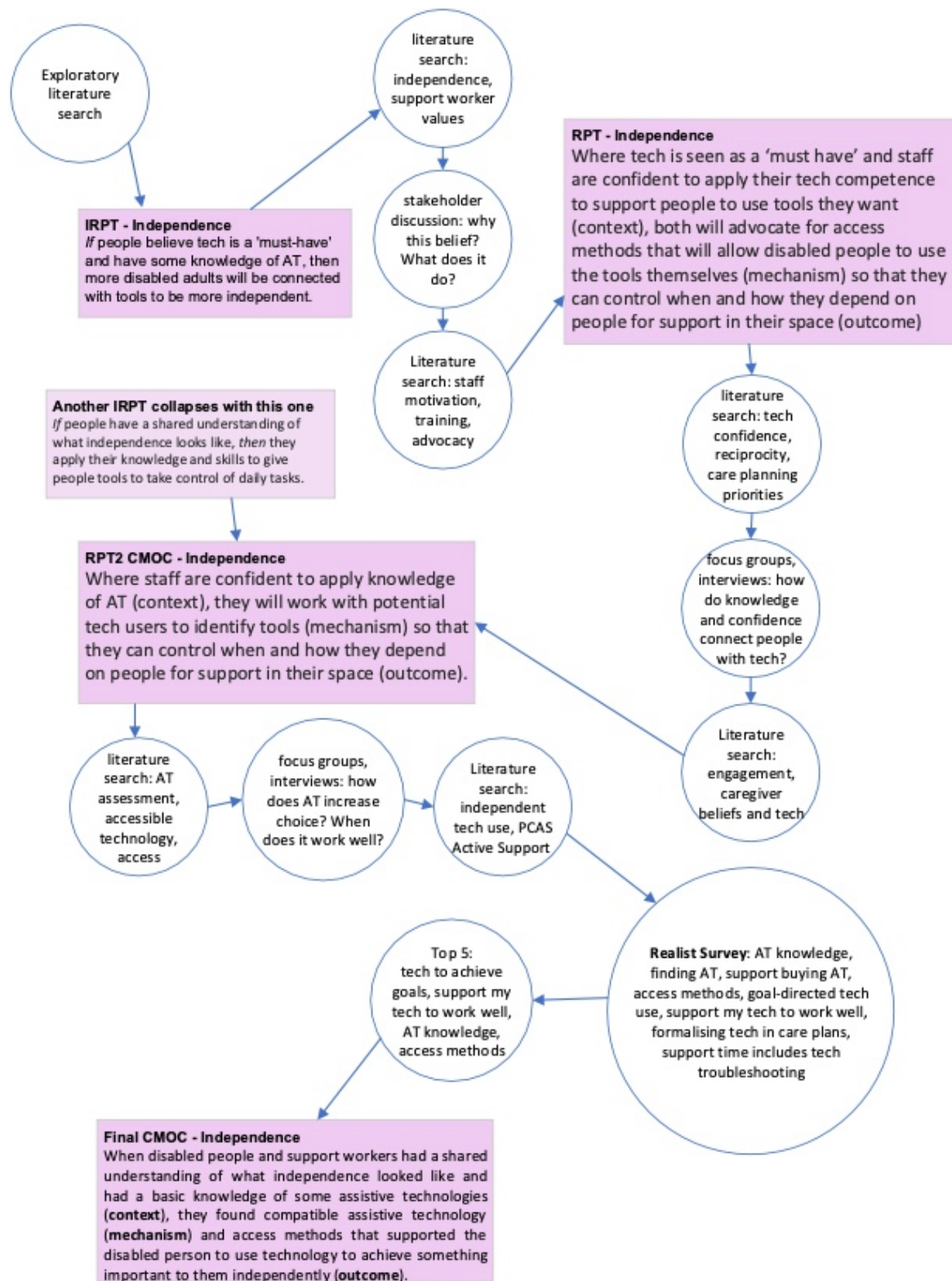


Figure 2. IRPT to CMOC development pathway

The realist review methods described in sections 4.1 – 4.3 produced the initial rough program theories using early interviews, an exploratory literature search, and focus groups. These procedures were followed by a more structured literature search to further refine IRPTs and begin to formulate the context-mechanism-outcome configurations (CMOCs). From that point, the realist review and evaluation ran concurrently, with my processes moving iteratively between them, both CMOC building and evaluating stakeholder agreement and fit through the rest of the research process. In the realist evaluation, I used increasingly targeted interview and realist interview techniques to test CMOCs at different stages of development, using the evidence gathered to inform next stages of realist review methods for more informed searching through existing literature to confirm or refine changes that were informed by the realist evaluation interviews. In an effort to avoid repetitive sections and descriptions of methods, I begin the description of realist evaluation methods in section 4.4. Although my explanations of the methodological process are presented in a sequential manner, the actual implementation of these methods was iterative and adaptable to the demands of the inquiries and research phases.

There were four kinds of data collected for this research: primary data from interviews and focus groups, evidence from literature related to the theories in development, realist interviews to test the refined CMOCs, and an impact survey to follow-on from early interviews to determine the priorities of different stakeholders to target dissemination and evidence synthesis. The previous chapter described the theory development stages. This chapter will focus on describing the methods of conducting the realist review and evaluation. The early process included sampling the literature and meeting with stakeholders to develop ideas. Next, I will describe conducting the first structured literature search with screening and data extraction, followed by theory development and refinement. Each subsequent section will be shorter in length, describing additional phase iterations in the order performed for this project without repeating details of iterative process components.

4.1 Starting Initial Rough Program Theories

The initial rough program theories (or IRPTs) in this realist review explained technology's varying effects on disabled technology users in RCSs. These IRPTs

were a starting point for inquiry. I refined and recreated the ideas based on evidence from literature and stakeholder data (Hunter et al., 2022). I used inductive reasoning to develop these initial rough program theories. This process was informed by evidence from technology project white papers (grey literature), an initial search of academic literature, stakeholder interviews (disabled technology users and assistive technology professionals), and from professional experience.

I presented my research objectives as a keynote discussion at NatSpec's TechAbility online conference in November of 2021. In that discussion, participants shared their experiences as technology users and professionals, which provided background experiences to scope in my research. The Google Jamboards I created from these discussions are included in Appendix D to show the early stages of ideas. The ideas generated in that early discussion guided the initial search terms and concepts I used to formulate the key ideas to inform my exploratory literature search for additional relevant context evidence to build IRPTs.

The following table shows the number of participants involved in each phase of the iterative realist review and evaluation. While I have provided totals for each described stakeholder group and stage, these numbers should be considered the number of interviews or participants in focus groups, rather than the total number of participants. Some participants contributed to multiple phases of the research, and are therefore double- or triple-counted.

Phases of RR & RE	Data collection rounds	Disabled Technology Users	Assistive Technology Professionals	Totals
Phase 1: Realist Review	Round 1	4	3	7
	Round 3	2	4 (focus group)	6
	Round 6	6 (2 focus groups)	4	10
Phase 2: Realist Evaluation	Round 2	3	4 (focus group)	7
	Round 4	2 (focus group)	6	8
Phase 3: Realist Survey	Round 5	14	23	37
Totals		31	44	75

Table 1. Participants per research phase

4.1.1 Exploratory Literature Search

The first literature search focused on concept-mining and mapping of evidence related to the experience of technology and outcomes for disabled people in RCSs. My objective in this search was to mine for and organise relevant evidence about the experiences of disabled people using technology in RCSs. I aimed to uncover a comprehensive picture of the field by identifying data sources, extracting relevant insights, and elaborating on initial concepts.

In order to conduct a comprehensive investigation in this field, I employed an initially broad approach to data collection. I used Google, Google Scholar, and Elicit.org to identify research studies, project reports, and publications that would elucidate connections related to outcomes from the initial discussions. The search focused on grey literature from research groups, charity websites, and industry professionals who delivered assistive technology to disabled people in RCSs. I selected this starting point because non-academic reports described project outcomes in ways that could better contribute to theory building, including speculation on potential causes for project results. I also hand searched through cited publications in these reports and other recommended white papers, and forward-cited works from my professional networks and colleagues.

I focused on identifying materials from the technology industry professionals that could inform my understanding of the underlying mechanisms. By examining these materials, I wrote IRPTs to describe the pathways I found related to the outcomes of interest. As I expanded my searches across the gathered materials, I found new relevant search terms. Although this was not a formal systematic review of the literature, it was carefully structured and targeted literature which might provide insight into why authors achieved the reported outcomes. I used the evidence I located to guide initial focus group and interview discussions, allowing me to test and refine my IRPTs into increasingly informed CMOCs.

4.1.2 Focus Groups and Interviews

Selecting whether to conduct focus groups or interviews for the realist review and evaluation involved careful consideration of research objectives, the research

questions, and advantages of each method. For this research, I used both focus groups and interviews. Focus groups were useful for capturing diverse perspectives, and understanding program outcomes, with discussions enriched by not only responses to prepared questions but also by the conversations between participants (Ritchie et al., 2014; Kitzinger, 1995). Discussion among participants was especially valuable for scoping the key ideas on a topic early in research and for drawing out contextual details and differences in terminology which could further enrich my search for evidence in the literature (Liamputtong, 2011). Especially in the early stages of evidence collecting and idea generating, I preferred to use focus groups when possible for participants to engage with the subject while also exploring group dynamics and differing perspectives. Arranging these focus groups was easier with assistive technology professionals who regularly participated in online meetings as part of their typical work routines, compared to disabled people who often required advance support arrangements, posing challenges in finding mutually convenient times for multiple participants in a focus group.

I began employing interviews to collect data earlier than expected to account for these scheduling challenges. Interviews were still highly impactful data collection methods, as they facilitated the research objective of deeply engaging with individual experiences and perceptions. Several disabled technology users expressed they were somewhat uncomfortable sharing in a group setting. The interviews enabled me to have more focused stakeholder consultations, and I later utilised them in the later research to analyse CMOC elements in great detail with one person at a time. Combining these methods gave me a comprehensive and informed starting point to explore the relationships between context, mechanism, and outcomes of how disabled people were experiencing technology in RCSs.

4.1.3 Sampling and Participant Selection

I focused on two stakeholder groups: disabled technology users and assistive technology professionals. For the inclusion of disabled technology users, my participant selection strategy employed a multi-faceted approach. I made my recruitment and participant information materials accessible to people with distinct communication preferences and accessibility needs by employing inclusive materials and disseminating them across various platforms. The materials provided included a

digital recruitment flyer, an audio description, and a succinct recruitment video. I also used a gatekeeping approach (Ritchie et al., 2014) by sharing participant information and recruitment materials directly with service managers in RCSs with whom I was already professionally acquainted or who were referred to me by their peers, requesting that they share the materials at their next RCS resident's meeting.

For the assistive technology professionals, social media and the snowball method were the best sampling methods, as they were a small population and were difficult to identify in other ways (Ritchie et al., 2014). This method allowed for initial participants to refer others to me with unique insights and experiences, resulting in a more holistic understanding of the group's perspectives (Berg, 2014; Biernacki and Waldorf, 1981). Additionally, I contacted moderators of Assistive Technology mailing lists, which targeted an audience with a demonstrated interest in the subject matter. These methods encouraged the inclusion of different disabled people living in various locations and ensured representation from professionals involved in other facets of assistive technology, such as creation, sales, and support. I recruited the first group of participants by sharing recruitment materials on Twitter, LinkedIn, and an internal Workplace site for an adult social care organisation. I also emailed these materials directly to professional contacts, some of whom responded, and some of whom connected me with others in their organisations interested in participating. I used a Google form to collect contact details for interested potential participants. As Google forms was a familiar and accessible platform, I also used it to record informed consent and provide additional information for participation. I created a LinkTree website where all recruitment and participation materials and information could be referenced by participants.

4.1.4 Disabled Technology User Interviews

I selected an adult social care organisation and a care and policy research organisation as recruitment partners because of their extensive experience and expertise in the field of adult social care and RCSs. These organisations had a deep understanding of the challenges and needs of disabled adults in RCSs, which made them excellent sources for potential participants. The customer advocate representative, who worked closely with residents in these settings, connected two participants to ensure that I had representation from this specific residential care

setting (a potential technology project site). Additionally, one participant expressed interest in participating from another technology implementation site, providing a unique perspective on the topic and expanding the opportunities to produce generalisable insights across multiple settings. Finally, a fourth participant responded directly due to their previous professional engagements with me, making them a valuable contributor as both a professional in the field and a disabled technology user. This person's expertise and lived experience greatly shaped my early research and provided valuable feedback in later stages. Three participants lived in RCSs with private rooms and on-suite washrooms, supported by 24-hour on-site workers. One participant lived in their own flat with 24-hour support from care workers, personal assistants, and an informal support network. This participant was included because he felt that he still experienced technology through layers and systems of support which were similar to those in RCSs but different enough to ensure findings were generalisable in diverse support structures.

The purpose of the first assistive technology user stakeholder focus group was to explore people's experiences of technology in RCSs and with support teams, understand what kinds of technology they used daily and what they used it for, and to learn about how they were impacted by technology delivery and support processes (or lack thereof) in their RCSs. I scheduled the first disabled technology user focus group for 2 February 2022. There was difficulty with identifying a common time and date for participants to contribute with the additional supports they preferred. Ultimately, participants preferred individual interviews instead of a focus group due to these support scheduling challenges. This method necessitated four separate interviews with disabled technology users across the first week of February. Each meeting was different and scheduled for one hour, with each lasting between 42 and 47 minutes (42, 43, 44, and 46 minutes). I held all interviews online in Microsoft Teams and recorded them to produce a transcript for analysis. I made additional notes after each interview to allow my full engagement and attention during each interview. Three participants preferred a known and trusted support worker be present during our conversation, who also supported any communication challenges I experienced during our interview due to my unfamiliarity with the participant's speech, or difficulty with the Teams audio.

Interviews were exploratory and responsive to participant interest and information, which would best contribute to understanding the highest priority technology outcomes to drive the next stages of my investigation. I began all interviews with opening questions such as ‘tell me about what kinds of devices you have’ and asked, ‘how do you use these devices/technologies in your daily life / what do you do with them?’ Based on responses, I probed for further details on specific ideas or topics from each technology user. My objective was to elicit insights as to the impact of incorporating technology into user’s daily routines, as these circumstantial details would aid in determining the comprehensiveness of my findings regarding the effects of technology on disabled people. Additionally, they would highlight any potential areas for further investigation or increasingly precise language to explore. When needed as examples or discussion prompts, I also shared selections of evidence from my initial pilot searches of the literature and professional experience. I collected feedback on areas that required additions or amendments to my IRPTs, as well as ideas that supported counter-IRPTs (hypotheses about how the absence of certain key components led to an undesirable outcome).

I analysed the interview data, including meeting transcripts, notes, and research reflections, to group together similar ideas and identify relationships (examples of these relationship maps can be found in Appendix C). These concept maps extracted outcomes of interest to inform the forthcoming focus group with the Assistive Technology Professionals. I used the outcomes prioritised by the disabled technology users as an outline for discussion with the next focus groups and interviews. I devised a set of guidance questions designed to unveil intricate circumstantial details to foster the progression of explanations of these priority outcomes, thereby decoding how they may have been constructed.

4.1.5 Assistive Technology Professional Focus Groups

For the next focus groups, I recruited participants by sharing a recruitment flyer and accompanying audio recording to increase access options on Twitter and LinkedIn. I also emailed these materials directly to professional contacts, a JISCmail list for disability researchers, and a JISCmail list for assistive technology professionals. I directly contacted three participants for the first group, as they were previous professional contacts who had expressed a keen interest, each with different but

relevant backgrounds in assistive technology delivery and support. Initially, I focused on including professionals with experience in technology delivery in RCSs but based on initial discussions and reviews of the literature, outcome patterns and priorities for disabled technology users appeared to be similar across multiple high-support settings. Considering this similarity and potential generalisability across settings, I included further education and higher education assistive technology professionals. Two participants were professionals in assistive technology in higher education with a combined 34 years of professional background in accessibility, disability support and assessment, and delivery, training, and maintenance of assistive technology in higher education settings. The third participant worked in a charity for learning disabled people as their lead assistive technology project manager and researcher, who was conducting graduate research on technology project delivery in support settings.

The first assistive technology Professionals focus group aimed to explore CMOC-building elements and devise a strategic evidence search plan. On 4 February 2022, I conducted the meeting on Microsoft Teams which lasted for 61 minutes. I recorded the meeting to have Teams produce a transcript for coding.

I prepared materials to ensure I focused on the two key activities: discussion of process and outcomes details from disabled technology users and devising a search plan. I focused on stimulating rich discussion from which I could later extract the elements of interest. I began by asking about the participants' experiences of assessing for, delivering, or supporting mainstream technology devices. I then described the outcome patterns I found from the disabled technology user interviews and my pilot literature search.

Following conversations about the outcome patterns of interest and related infrastructure and support needs elements, I concluded the meeting by discussing the search plan. The participants recommended several industry-specific databases to include and search terms that would capture more literature related to assistive technology delivery, adoption, and support, and some citation tracing search services. I downloaded the transcript and my notes from this meeting from Teams and saved them as Word documents, with critical ideas highlighted and notes captured in comments.

Creating concept maps on whiteboards to capture core ideas, I analysed the evidence I had gathered thus far. I further coded the transcripts with the ideas from the concept maps using NVivo, using each outcome as a top code. From those codes, further sub-codes (context, mechanism, and outcome) ensured that evidence related to the same IRPT were kept connected. After coding all the transcripts with these sub-codes, I transferred the data and quotes into the evidence frameworks to associate the evidence with the supporting or refining IRPTs.

4.2 Search for Evidence

Once I felt I had sufficient evidence to support changes to the initial rough program theories, I searched the literature for evidence of the mechanisms uncovered in the first interviews and focus group. This evidence searching allowed me to detect context, discuss those mechanisms, and see how other evidence connected them with the outcomes and context elements I uncovered. I searched through academic search engines, specific recommended industry databases, and report repositories for disability advocacy and charity organisations. By integrating research tools such as Semantic Scholar and Elicit.org, I found additional similar studies which did not appear in academic searches under my chosen keywords.

4.2.1 Literature Search

By scoping the literature, I aimed to find details to develop IRPTs into CMOCs describing the circumstances of technology use by disabled adults. Through this search, I identified and mapped out key concepts related to outcomes and explored related processes and discussion of the outcomes of interest. I narrowed the focus of the review based on these concepts pulled from a small sample of known documents and interviews with key stakeholders. Other professionals who had published reflections and results from technology delivery in RCSs shared documents for me to include in my review.

For this search process, I gathered articles from previous work and recommendations from colleagues. I saved articles related to my practitioner role, studies and papers I found through subscribed content alerts from relevant journals, and papers shared with me by other researchers over the course of the year

preceding the review. By reviewing the title, abstract, and discussion sections, I chose six papers to begin concept mining for potential outcomes, causal descriptions, and elements of interest in assistive technology and technology adoption. Two of the six papers did not yield new details not found in the first four and were therefore unnecessary to include. Based on recommendations from other professionals in assistive technology and RCS research, I explored four papers which contributed to additional outcomes and potentially helpful search terms and reference lists for later exploration. I kept the sample small to streamline my analysis and to capture initial ideas, knowing I would search in more depth and detail to capture evidence to refine and test the CMOCs in later stages of the investigation.

I extracted data from the scoping search into a framework Word document, capturing any descriptions of processes, actions, or hypothesised causal chains contributing to outcome patterns of interest. From these data, I extricated the outcomes and grouped them by topic according to key terms selected from the Google Jamboard ideas and early focus group and interviews (those relating to *independence / reduced reliance on support or help*, *autonomy*, *control/choice*, and *access to entertainment/leisure / meaningful engagement*). I used these outcomes and process elements to guide the next round of discussions with focus groups and interviews.

4.2.2 Evidence Screening

I determined the quality of literature based on criteria outlined in the Realist Synthesis publication standards and training materials (Wong, Greenhalgh, Westhorp et al, 2013a). Evaluating a paper's contribution and evidence credibility hinged on relevance and rigour. *Relevance* was the ability and degree to which a paper could contribute to CMOC-building or evaluation. *Rigour* referred to whether the methods used to generate the data were credible and trustworthy (Wong et al., 2017; Wong et al., 2013a). Pawson also described a concept of 'digging for nuggets [of gold],' which pronounced that highly relevant evidence for CMOC-building and evaluation could be produced through mediocre or less trustworthy methods (Pawson, 2006a). With this concept in mind, I read each paper and rated based on relevance, rigour, and the ability to confirm or refine the current CMOCs.

I uploaded all papers into NVivo for analysis. By searching for keywords of interest for the specific CMOC being built (e.g., if the CMOC being built related to independence, the number of times this concept was mentioned in the paper), I determined relevance to CMOC-building using high, moderate, and low as the scale. Based on the soundness of the methods used to generate evidence, I rated the rigour as high, moderate, or low. Empirical evidence produced in the included papers was not the only kind of data being sought. According to Jagosh (2014) and Pawson (2006a), the discussion sections of papers often had a highly relevant dialogue of the mechanisms which produced reported outcomes and contributed meaningful evidence for CMOC-building. I rated each paper's ability to contribute to CMOCs (relevance) as high, moderate, or low depending on the amount of relevant additional detail for the formulation of a CMO configuration.

From the strategic academic literature search results, I assessed 118 for eligibility, eliminating 76 which did not meet inclusion criteria (about children or youth, based in education settings, or focused on assessment of a specific technology or device which was not similar to the devices in this research), eight for insufficient rigour, and 26 that did not include content to contribute to CMOC development. The 26 papers that were considered irrelevant underwent a more thorough review to determine if they included any contextual discussion regarding their findings; they did not. I included eight remaining papers from this academic literature search to develop initial rough program theories.

From the grey literature search results, the final list of articles comprised 17 potentially relevant search results, 14 papers authors shared with me (white papers and industry publications), 53 from citation searching from relevant papers from my search, and 68 papers which professional stakeholders and colleagues recommended. This made 152 pieces of recommended literature from professionals and grey literature searching to be screened. I excluded 83 papers which did not include user outcomes (5), studied technology not used by disabled people themselves (4), literature reviews which did not pull out discussion of outcomes/processes by which outcomes were achieved (4), those recommended based on realist approach but did not have to do with technology or disability (61), analysis of policy or deployment processes which could not contribute to CMOC

building (2), those related to children or educational applications of technologies only (3), and those with no full-text access (4). These eliminations left five papers to be included for building initial rough program theories.

Combining the academic literature screened results (8), and the recommended and grey literature screened results (5), I used 13 papers to develop initial rough program theories. Some of these papers were double counted because they were relevant for building multiple CMOCs. Therefore, I assessed their relevance to each CMOC instead of treating them as singular papers, hence the unclear arithmetic. Based on their relevance to each CMOC, a keyword count helped determine that six of these results were highly relevant, eight were moderately relevant, and two were of low relevance. Regarding rigour, the final set had eight papers rated as highly rigorous, eight as moderately rigorous, and none rated low. In terms of their ability to contribute to CMOC-building, I rated eight articles as high, six as moderate, and two as low. The two rated as 'low ability to contribute to CMOCs' were still included because, while there was not a high *volume* of valuable data, there was high *value* in the few 'nuggets' of evidence.

4.2.3 Data Extraction and Organisation

Interview transcript data were first coded to pull key ideas and related insights across sources to formulate well-informed concepts, which served as the initial rough program theories. I examined each piece of evidence to identify passages supporting or challenging CMOCs. The organisation of the CMOC data extraction framework maintained the integrity of the relationships between outcomes, quotes, and sources and included a section to describe my thought processes during analysis. A sample of the data collection and analysis framework can be found in Appendix E.

This framework extraction method allowed for 'cherry picking' evidence related to the outcome of interest and discussions about reactions or delivery processes, which enabled me to discover and articulate the mechanisms and related contextual factors. I copied passages of text that described the elements of interest into the 'evidence' section under the relevant initial rough program CMOC. Most sources of evidence contributed to several IRPTs.

4.2.4 Evidence Synthesis

When I felt the evidence captured in the framework reflected sufficient detail to articulate an informed theory, I individually analysed each section for core ideas and repeating elements of context and mechanisms to describe causal pathways to the outcome of interest. Each CMOC section was then re-configured to include all relevant details in the causal pathways described by the majority of the evidence. This reconfiguration allowed for re-describing the evidence and revising the CMOCs to describe them. For more tactile engagement with these pathways, I copied each framework section onto coloured sticky notes on my research wall in my office. Using a colour-coding system, I wrote context elements on pink notes, mechanisms on yellow notes, and outcome elements on blue notes. I kept causal pathways intact by keeping the Context-Mechanism-Outcomes together in a row on the wall. I included Figure 18, a photograph of one version of my IRPT maps, in Appendix C.

4.2.5 Initial Program Theory Refinement

After laying out these theories on sticky notes as described above, I consolidated the ideas with repetition in context and mechanism elements, or where there were causal pathways using the same elements. I then rewrote theories to reduce the elements into the fewest number of causal pathways that fully described how to create each outcome. I followed this process with each CMOC in the framework. I refined the theories with additional evidence, requiring a re-search through selected literature or new searches to ensure the relationships in the new configurations included all relevant evidence.

4.2.6 Underpinning Foundations

Following the initial discussions with assistive technology professional focus groups, it became evident that a more comprehensive infrastructure and set of value systems needed to be defined to support all potential causal pathways. In response, I created a section on underpinning foundation elements. There will be more discussion of these in Chapter Six, but an example was the clear need for stable technical infrastructure. Positive technology user outcomes related to general and specialist internet-connected devices required a physical infrastructure that was

stable, monitored, and well-supported. Without this and other identified foundations already in place, users were much less likely to rely on these devices or use them to their full potential. Therefore, I prioritised collecting and analysing data to identify these underpinning foundational elements that were repeatedly mentioned, in order to separate them and explore the contingent causal chains tied more directly to user outcomes.

4.3 Refining Content-Mechanism-Outcome Configurations

Ideas produced after an initial round of data collection and extraction to explore the initial rough program theories in more depth became the refined CMOCs (Hunter et al., 2022). The organisational foundations established the first keywords to search in literature, the core ideas to discuss in stakeholder groups, and formed the updated framework for data extraction and analysis. The refined program theories (RPTs as CMOCs) developed as key ideas from the IRPTs expanded and required separate causal descriptions to capture the explanatory causal information. Based on the evidence sought in the iterative research cycles, I refined these CMOCs through multiple iterations. Through the inquiry process, I refined five initial rough program theory ideas into 13 theories in CMOC format. These theories continued to both expand and synthesise as I applied additional evidence. Some of these were sub-categories of a single CMOC; others were combined derivations of multiple IRPTs which overlapped. Diagrams with examples of these relationships and development changes are found in Appendix C.

I repeated the process of literature searching, primary evidence collection, and evidence synthesis described thus far to refine the program theories, aside from the below-described changes. I used research tools such as Semantic Scholar and Elicit.org to find additional relevant academic literature which did not appear in my other search methods but held new relevance to the evolving in the CMOCs.

4.3.1 *Realist Interviews*

As I iteratively refined the CMOCs based on collected evidence, the aim of the stakeholder interviews shifted from exploratory idea capture to targeted questions to evaluate CMOCs. The realist interviews were theory-driven, using the refined

CMOCs as guidance to ask questions which would systematically uncover related elements to further explain how certain pieces of context activated mechanisms in ways that produced the outcomes of interest. This shift aimed to elicit and better understand participants' views and experiences of the context and mechanisms in practice. The process used a 'teacher-learner cycle' where I taught the participants one of the CMOCs and they responded by sharing their stories, experiences, agreement, or examples of the CMOC as described (Greenhalgh et al., 2019; Hunter et al., 2022).

In these mid-process interviews, I discussed a CMOC I developed, often citing some of the evidence I used to illustrate connections between elements and their relevance in building the configuration. Interviews began by discussing the participants' background or initial thoughts about the CMOC described. Participants then considered the CMOC's specific elements or responded to the idea to reveal new connections or evidence of the relationships. I focused questions on uncovering what worked, for whom, and in what circumstances, with the questions becoming increasingly concentrated through the course of the interview to evoke discussion which would reveal different components or circumstances related to the CMOC (Greenhalgh et al., 2019).

The questions I posed in the late process realist interviews were specific to each CMOC I sought to evaluate. I used a flexible framework for each interview based on the CMOC and followed an exploratory inquiry approach. As an example, for a CMOC describing the role of access methods in independent daily technology use, I asked questions like:

- What is the best way to ensure access methods are well-matched to the technology and the person?
- Why is knowledgeable assessment (an element mentioned in the participant's response to the first question) important for access methods to be well-matched? How does a knowledgeable assessment turn into a good match?
- What do the people supporting the assessment need to know after the assessment for this outcome to be achieved?

Therefore, questions for each CMOC being refined and tested were different but became increasingly precise to draw out evidence of the relationships between the causal factors based on the comments and discussion with each participant.

4.3.2 Literature Search

After refining the CMOCs based on the evidence, I revisited a literature search that explored the new mechanisms and outcomes to find any additional context and discussion. I started with the literature already cited to ensure I captured all relevant passages which may now apply to the CMOCs. I then visited pertinent citations of those articles and searched for relevant new articles. For this search, I found grey literature had the highest-value contributions, containing the most ‘nuggets of gold’ for the evidence I required. Elicit.org was a helpful searching tool for searching within academic papers which did not have many of the keywords in the titles or abstracts but often had relevant content to contribute.

I focused my grey literature search on all industry-specific databases recommended in the early focus groups by assistive technology professionals and through other later interviews and professional contacts. These sources included but were not limited to the Social Care Institute for Excellence (SCIE), the National Institute for Health and Social Care Excellence (NICE) evidence search portal, and a review of the Global Disability Innovation Hub publication repository. Using the search terms ‘assistive technology, care,’ ‘social care, technology,’ and ‘assistive technology, social care,’ I kept the articles which seemed most relevant based on title and executive summary or abstract. I retained 114 results which seemed most relevant and worth screening based on the title and a brief abstract scan. I combined the 83 articles saved from emails, recommendations from others, and table of contents alerts from journals since the last literature search. I re-added some articles which were discarded in the initial exploratory searches, as some of them were newly relevant to the revised CMOCs.

I uploaded these results and the full results from my previous search into NVivo. Here, I searched the entire set by keywords related to the current mechanisms and contexts to identify the articles that may be most valuable. These searches included ‘agency,’ ‘community networks,’ ‘inclusion,’ ‘independence,’ ‘social inclusion,’

'wellbeing,' 'involvement,' and 'adoption,' among others. I sorted the articles by number of references from each of those queries. I then read many of the full articles, focusing on excerpts and context around each term to determine whether the paper had evidence to further refine the relationships in the CMOCs. When I found evidence for supporting or refining a CMOC, I copied out the relevant article passages into the current version of the data collection framework under the relevant CMOC, citing the article. I also made notes in another section of the data collection framework justifying or clarifying why this evidence was relevant to the CMOC.

I refined and synthesised CMOCs based on the evidence collected in the framework, interviews, and focus groups to reduce duplicated ideas while keeping causal chains for important outcomes intact. I then synthesised the theories from 28 organisation-related program level CMOCs to seven core causal chains, and from 23 user-related CMOC statements down to eight. I then proceeded with these CMOCs to the evaluation phase of the investigation.

4.4 Context-Mechanism-Outcome Configuration Testing and Evaluation

As previously described, the realist review and realist evaluation occurred iteratively and concurrently, with each phase capturing evidence that supported or refined the CMOCs. This process generated CMOCs with substantial supporting evidence from the review process. I extracted new primary evaluation data into the same frameworks used throughout the research to keep all evidence and quotes together under the CMOCs to which they related. For the evaluation phase, data included secondary evidence collected in the realist review, primary evidence collected during the realist review, and new primary qualitative and quantitative data collected for the realist evaluation. The following figures show an example of how generated program theories were formed and refined through the realist review and evaluation. Detailed diagrams for the remaining three domains can be found in Appendix C.

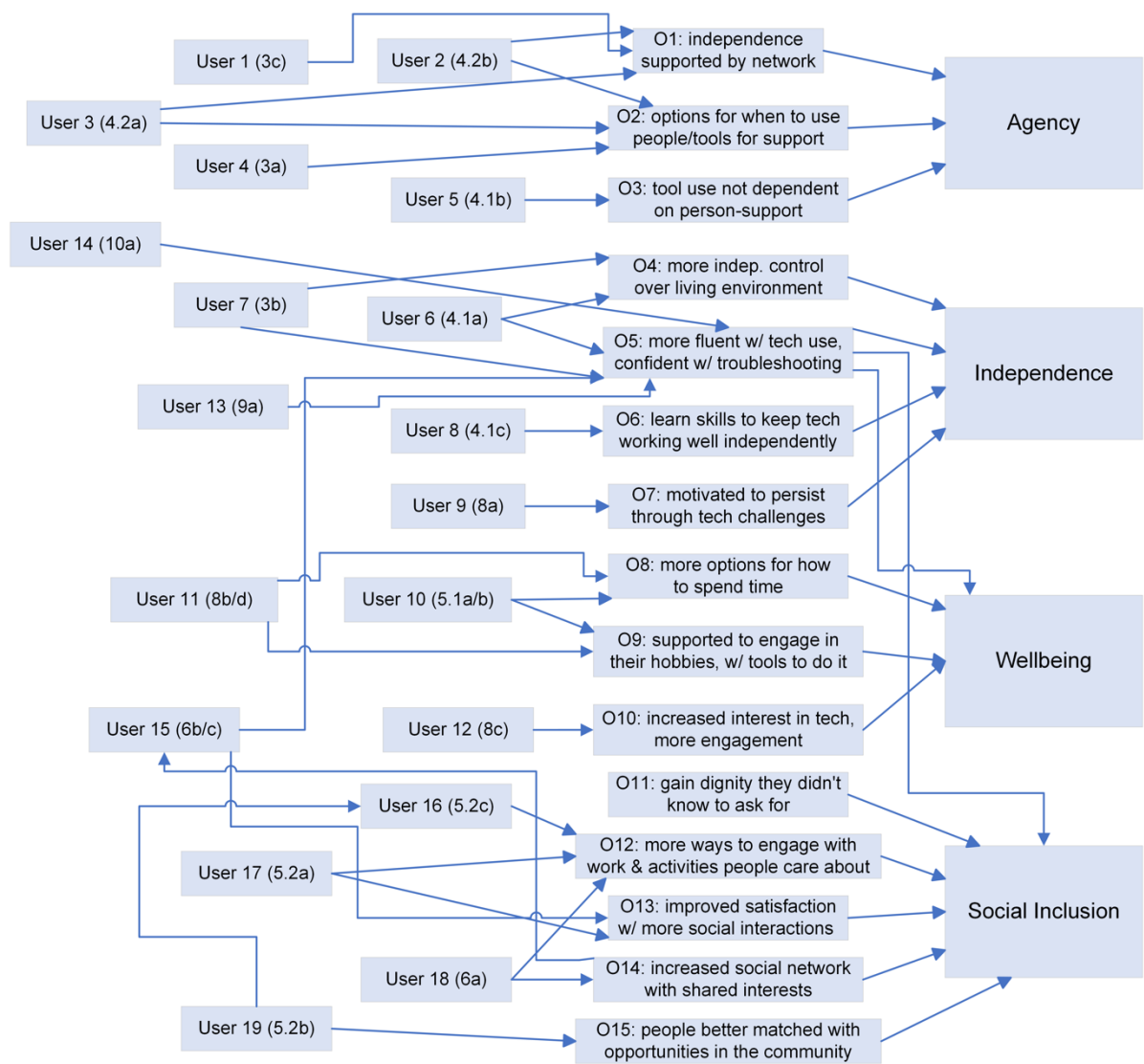


Figure 3. Example of IRPT relationship map

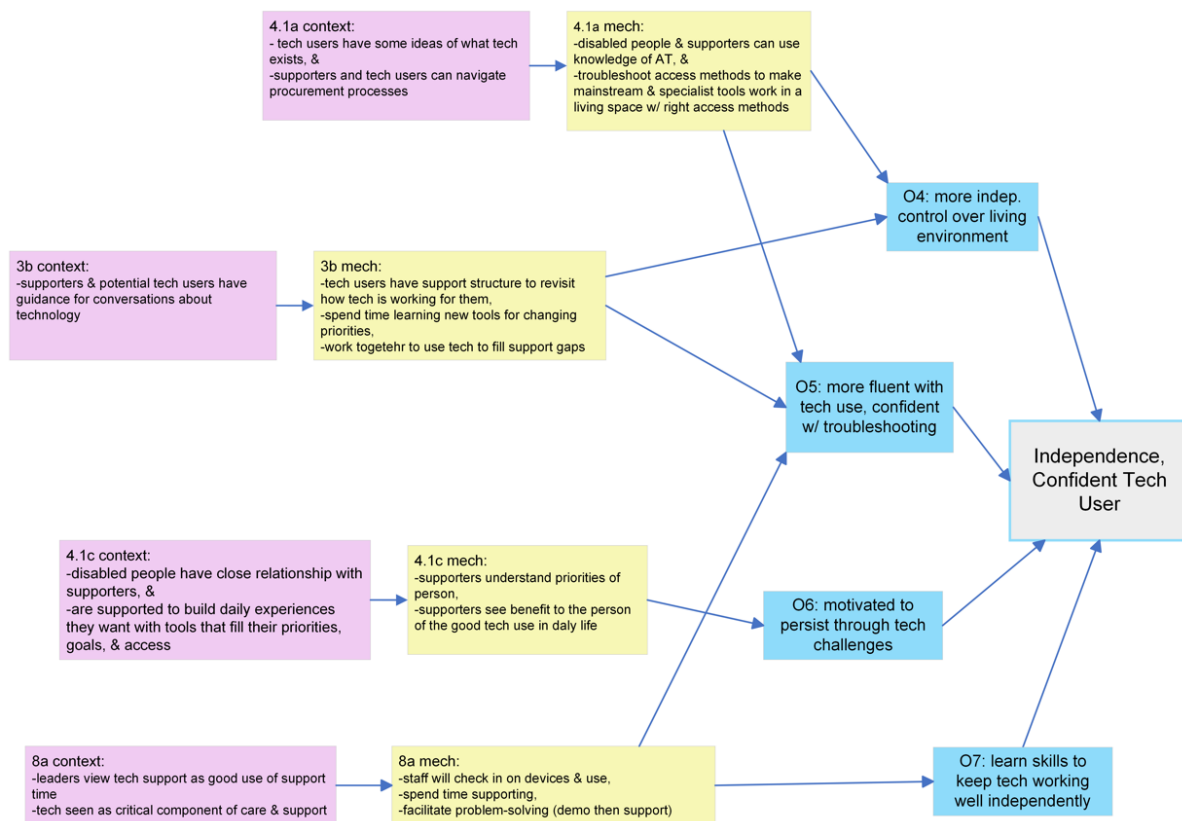


Figure 4. Independence IRPT map

4.4.1 Literature Search for Mechanisms

I extracted evidence from the final refined literature search described above to enter into the frameworks to evaluate and prove the CMOCs in their latest form. These data were used to further prove, disprove, or refine the CMOCs. I made note of any evidence that did not support the CMOC in case it revealed additional details and made applicable refinements.

4.4.2 Primary Evidence from Interviews

With the final refined CMOC framework, I re-organised all evidence from the previous frameworks, keeping them together in the CMOC pathways to which they were still relevant or moving them to a CMOC they now better described. Not all evidence gathered in earlier stages was present at the end of the CMOC development and evaluation. Using NVivo, I revisited the coded and annotated transcripts and literature data captured under the final CMOCs where relevant. I used each final refined CMOC as a code and conducted text searches of key terms

(‘care role,’ ‘embed, integrate,’ ‘network engagement,’ ‘connectivity’) to find the most relevant primary evidence.

4.5 Realist Survey for Impact

4.5.1 *Rationale*

I selected a survey as an additional method for capturing evidence related to the CMOC elements being evaluated, which extended the earlier realist interviewing methods. This realist survey method enabled me to collect additional qualitative details to refine and evidence the CMOCs, also adding a way to quantify participant agreement with the connections within the CMOCs (Schoonenboom, 2017). By structuring questions as ‘with your technology’ and ‘without your technology’ and focusing on outcomes of interest, I quantified agreement with these elements and mapped how respondents perceived the proposed causal connections in each CMOC. Since each realist interview conducted earlier in the research was unique and I rarely asked the same question to multiple participants, the realist survey ensured multiple people provided their views on the same causal connections. This evidence contributed to a larger perspective of the strength of the connections between CMOC elements and the outcomes of interest. The survey provided an additional form of quantitative evidence to strengthen CMOC statements for final analysis and enhanced understanding of the extent to which people in this context experienced or endorsed these connections.

Another benefit to including the survey in this research was allowing interested participants to contribute again in a later research cycle. Many participants mentioned that they would enjoy being contacted for any additional research questions related to the current work. To respect both their willingness to contribute more and their valuable time, the survey served as a pragmatic way to engage with participants again, giving additional evidence to the CMOCs in a more flexible and time-sensitive manner.

I recruited survey participants directly through emails with previous participants (only those who mentioned in their previous interactions that they would prefer to be contacted again) as well as in social media posts on LinkedIn and Twitter. I also

encouraged assistive technology Professionals to invite and support disabled technology users they knew to participate in the survey.

4.5.2 Realist Mechanisms and Impact Survey

I used a Microsoft Forms survey to assess the impact of technology on the core outcomes (independence, autonomy, social activities and participation, and wellbeing and satisfaction) and perceptions of causal connections. The questions mimicked the format of the Adult Social Care Outcomes Toolkit (ASCOT) questions, as many participants were familiar and comfortable with the wording and structure of that questionnaire (Towers et al., 2015). I piloted potential answer choices with a small group of disabled technology users, who preferred having four answer choices rather than five, with two confirmatory and two dissenting options. This format was similar to the ASCOT answer choice format. I reworded the questions to evaluate the degree to which participants felt that technology impacted each outcome. Then, I gave each respondent a list of related elements (mechanisms and contexts from the latest CMOCs) for participants to note their agreement or disagreement with the relationship between the elements and the outcome. I included the full text of the survey questions in Appendix F.

4.5.3 Survey Data

The survey produced vital evidence related to contexts and mechanisms, which I described in more detail in Chapter Five. Based on the four outcomes identified by disabled technology users, both disabled technology users and assistive technology professionals shared how they felt about how their (or those they support) independence, autonomy, social activities and participation, and wellbeing and satisfaction were impacted by their current technologies. This survey produced additional details of the potential impact of technology on these important outcome areas and a small metric to justify my focus on these domains based on stakeholder priorities. The survey also allowed more people to share their opinions on the explored causal factors and their potential role in the outcomes.

I analysed these data by grouping the before and after technology impact data by outcome. I counted the number of respondents who identified causal connections for

each causal factor compared with the entire participant pool to produce an agreement percentage with each factor. The top five causal factors with the most connection responses from each participant group became the focus for the final level of analysis and synthesis of the CMOCs in the realist review. Based on responses, I returned to the realist review process and synthesised the final CMOCs, featuring the causal pathways which included the top selected causal factors. I will give a complete description of the survey findings in Chapter Five, followed by the CMOCs the survey findings informed in Chapter Six.

4.6 Final Synthesis

The final stage of synthesis and data analysis for this realist review and evaluation aimed to refine the complex web of details gathered during the study into actionable insights at a middle range theory level of abstraction. The initial step in this phase involved selecting and prioritising CMOCs, adopting a judicious strategy by extracting the top five responses to impactful causal factors from the survey. This approach rooted the final synthesised CMOCs in the voices and perspectives of key stakeholders. Giving the final research approval to the stakeholders themselves, this stage prioritised the causal factors disabled technology users identified as most significant in driving outcomes. By acting as a filter, this final set of primary evidence directed the analysis towards the most relevant CMOCs in the dataset. This final analysis was critical in crafting concise and actionable CMOCs which captured the core elements of the causal relationships identified in this study. The finalisation of the CMOCs represented the culmination of the synthesis process, rendering a coherent and refined understanding of the research evidence and interpretations.

4.7 Summary

This chapter outlined the realist review, realist evaluation, and realist survey methods utilised in this research. Starting with a section on Initial Rough Program Theories, I explained the method of the exploratory literature search, detailed about the planning and execution of the focus groups and interviews, sampled and selected participants, further described the later disabled technology user interviews, and provided additional details of the later Assistive Technology professional focus groups.

In the Search for Evidence section, I outlined the processes for my literature search, screening of evidence, extraction and organisation of data, synthesis of evidence, and refinement of the initial program theories and organisational-level foundations. The refined program CMOCs, presented in the next section, were formed from the described processes of additional realist interviews and literature searches.

To illustrate the different methods associated with the realist evaluation, the next section on CMOC testing and evaluation explained the literature search for mechanisms, with details on the use of primary evidence from interviews. The section on the realist survey for impact included the rationale for using the survey as part of the quantitative evaluation data, the process for creating and delivering the survey, and how the survey data were extracted and used for the realist review and evaluation. The process for the final synthesis preceded the final section, which described the final data synthesis from the evaluation and applied to the realist review.

In the next chapters, I will provide details on the findings for the realist survey with additional context which situates them within this research in Chapter Five. These survey findings were then applied as the final layer of analysis to generate the final CMOCs, which I will describe in depth in Chapter Six.

Chapter Five: Survey Context and Data

In this chapter, I will report my empirical survey data and the literature reviewed to present the four core outcomes of technology to disabled technology users. By analysing empirical data from the literature and my focus groups and interviews, I will outline the significance of these outcomes for disabled technology users, as well as their experiences when critical elements were absent. These survey outcomes were used to focus final CMOC development in the realist review, which will be described in Chapter Six. Using the four outcomes of technology use by disabled adults, I will report the results of the realist survey and provide a contextual analysis of the evidence, connecting survey findings with evidence from previous stages of data collection and CMOC development. The survey results quantified the participant agreement with the causal connections producing outcomes, contributing to the realist evaluation to determine which causal pathways to focus on for the final CMOC revision. The survey results represented a critical layer of analysis that enriched my understanding of how disabled people experienced technology in RCSs. The connections prioritised by participants in the survey became the causal elements of context and mechanism for the final CMOCs. Although these findings were collected in a later stage of this research, they take precedence in the order of reporting as they shaped the final middle range CMOCs I will describe in Chapter Six.

5.1 Participant Demographics

A total of 37 participants completed the online survey, with eight disabled technology users contributing in an interview format so I could record their responses on their behalf. These technology users expressed a preference to hear the questions and speak the answers to me, rather than access the Microsoft Form on a tablet or laptop themselves. Across the two participant groups, 53% of respondents were women and 47% of respondents were men. For the empirical data from the focus groups and interviews, pseudonyms were used to describe specific contributions in a way that protected the privacy of participants. Participant pseudonyms were also used for any direct quotes from participants who left open responses in the survey. A table of these pseudonyms can be found in Appendix G. In the following sections, I will describe survey participant characteristics, key survey findings by outcome,

findings of the impact of technology on each outcome, and the top causal factors for each outcome which will be applied as the final layer of analysis for the CMOCs.

5.1.1 Disabled Technology User Demographics

Of the fifteen disabled technology users who took part in the survey, the majority were men, with significantly fewer women. Not all participants responded to all questions, resulting in different numbers for different answers. The age distribution of respondents showed that more were between 30-44 years old, followed by a smaller number in the 18-29 age range, and even fewer in the 45-59 age group.

The survey commenced by asking participants to describe how they configured their accommodations and support. The largest group of respondents lived in shared accommodation, with more of them receiving part-time support. Comparatively, there were fewer respondents living with full-time / 24-hr support on-site. These largest two groups represented the primary focus of the research, and therefore were considered an adequate representation of voices of disabled technology users in RCSs.

Regarding disability identity, a greater percentage identified as physically disabled compared with other categories. There was a small percentage of respondents who did not consider themselves disabled, primarily because they lived in their own home and relied on a network of unpaid support from family and friends. The percentages for those identifying as learning disabled or having multiple disabilities were also relatively lower, while some chose not to respond, which was a comparable percentage to those with specific disabilities. Table 1 below shows the demographic data for disabled technology users.

Age	
18-29 years old	4 (29%)
30-44 years old	8 (57%)
45-59 years old	2 (14%)
60-74 years old	0 (0%)
75 years or older	0 (0%)
I prefer not to respond	0 (0%)
Gender	
Men (including transgender men)	10 (71%)
Women (including transgender women)	4 (29%)
Prefer not to say	0 (0%)
Prefer to self-describe (below)	0 (0%)

How You Live	
In own home (by myself or with my family) with no paid support	3 (21%)
In own home with part-time paid support	1 (7%)
In own home with full-time paid support	0 (0%)
In a home I share with other adults with part-time paid support	5 (36%)
In a home I share with other adults with full-time / 24-hour paid support on site	4 (29%)
I prefer not to respond	0 (0%)
Which most closely describes you?	
I am physically disabled	8 (57%)
I am learning disabled	1 (7%)
I have multiple disabilities	1 (7%)
I am not disabled	2 (14%)
I prefer not to respond	1 (7%)

Table 2. Disabled technology user participant demographics

5.1.2 Assistive Technology Professional Demographics

A total of twenty-three assistive technology professionals participated in the survey, with women significantly outnumbering the men. The years of experience among the respondents varied widely, with the largest group having practiced for twenty-one years or more, followed by a smaller percentage in the sixteen to twenty years and eleven to fifteen years' experience ranges. Fewer professionals had been in practice for six to ten years or zero to five years, demonstrating a trend of more experienced respondents.

When asked about their professional roles (with multiple answers allowed), a few respondents identified as assistive technology providers, while the most common role was assistive technologists who coordinated assistive technology services and supports, significantly outnumbering other roles. These responses indicated that most responses came from highly experienced professionals with direct practitioner experience with assistive technology. Most respondents reported that they had directly supported disabled people to use assistive technology. This was a larger group than those who supported staff to implement technologies or who had 'been involved' in technology project delivery. A few worked for technology companies developing products for disabled people, while a few others described additional details about their roles with a range of experiences and responsibilities. Table 2 below shows more detail of demographic responses.

Time Working in assistive technology Field	
0-5 years	3 (13%)

6-10 years	5 (22%)
11-15 years	2 (9%)
16-20 years	4 (17%)
21 years or more	9 (39%)
Gender	
Men (including transgender men)	7 (30%)
Women (including transgender women)	16 (70%)
Prefer not to say	0 (0%)
Prefer to self-describe (below)	0 (0%)
AT-Related Role	
I am an assistive technology provider	4 (12%)
I am an assistive technologist who coordinates AT services and supports	11 (33%)
I am a social care worker or manager	5 (15%)
I am an assistive technology policy expert	2 (6%)
I am an assistive technology or disability researcher	4 (12%)
Other (please describe below):	7 (21%)
Occupational Therapist supporting users to access technology & caregivers to support them. Working to build a tech-informed practice model. I'm a behaviour analyst. Student Advisor Inclusion I am developing and delivering a higher education course which aims to train assistive technologists, I am therefore now an academic. I have previously led the development of an integrated technology team in a specialist education context, in that context I have provided AT, and have coordinated AT services. I have contributed to policy development via various forums. I am also an early career AT researcher. Occupational therapist. Help and assess people to use appropriate technology eg communication devices I am an OT assistant who works with young people who use assistive technology	
Expertise and Area of Practice (check all that apply)	
I have directly supported disabled people to use technology	21 (64%)
I have directly supported staff teams to implement new technologies	17 (52%)
I have been involved with a technology delivery project with disabled people	15 (45%)
I work for a technology company that develops products for disabled people	2 (6%)
Other (please describe below):	3 (9%)
I worked for a technology company for a year until April 2022. I am a disabled person and use and sell assistive technology. I work in further education.	

Table 3. Assistive technology professional participant demographics

5.2 Key Outcomes

Identifying the key outcomes for disabled technology users in RCSs established which specific causal pathways warranted detailed exploration and explanation in this research. Informal professional discussions, focus groups and interviews with both stakeholder groups, and targeted literature searching informed the causal connections to outcomes of interest selected for the study. I built these outcomes from the analysis of evidence, synthesising the cumulative terms and ideas which closely related to each other. In Chapter One, I introduced definitions for some outcomes based on early discussions and literature. I further developed these definitions as focus groups and interviews progressed.

I determined the outcomes for investigation in this research in a similar way to the CMOCs—by starting with ideas generated in focus groups and interviews and searching in the literature to find connected concepts and similar terms.

Subsequently, I presented the evidence to the stakeholders and gathered and synthesised their ideas. I revised these ideas and ensured that all the evidence I had collected related to outcomes of assistive technology for disabled people in RCSs. For this research, I sought to deconstruct the outcomes deemed the highest priorities by disabled technology users and provide explanatory pathways to producing these outcomes across different settings. I extracted any evidence that did not fit in one of these direct causal pathways to outcomes and formed the broader contextual foundations described in Chapter 6.1. As I will refer to specific participant pseudonyms in the following chapters, there is a key in Appendix G for reference.

These outcomes were the focus of the survey content. The survey collected additional evidence to both justify and substantiate the impact of technology on independence, autonomy, social activities and participation, and wellbeing and satisfaction. For the remainder of section 5.2, I will contextualise each outcome with related primary and secondary evidence to describe the rationale for its inclusion in this work. In 5.3, I describe the impact of findings, followed in 5.4 by the connections with top causal factors for the final CMOCs.

5.2.1 Independence

As described in Chapter One, I defined independence as ‘moments when someone could do things for themselves when they would like to, even when they used person-delivered support for other parts of the day and activities.’ Evidence collected from focus groups, interviews, and selected academic literature described outcomes such as more independent control over the living environment, more fluent technology use (technology confidence), motivation to persist through technology challenges (troubleshoot for yourself) and learning skills to keep technology working properly. As one assistive technology professional, Will, described:

“It is interesting...to look at...what is the Venn diagram that makes up what we think makes up motivation? And one of those is competence...what might spark my enthusiasm?”

Regarding the factors that drove people to utilise technology for its potential to increase independence despite its challenges, Will emphasised the significance of motivation as a crucial component of tools for independence. He stressed the necessity of creating an environment that promoted and valued independence. One common way that people gained more independence was through controls over their space. Emma, a disabled technology user, said in our interview that she would like “to put a light on and off when I want to rather than waiting for staff to do it. I would like that.” She elaborated later that “staff are always too busy; I can’t ask them for things.” This evidence highlighted a connection between technology functionality and motivations by the users – if there were technologies that made practical daily tasks easier or better, people would be made more independent through access to those technologies.

Evidence in the literature confirmed evidence from participants in my research that more independent control over living environments significantly contributed to overall independence for disabled adults in RCSs. In the literature, semi-structured interviews conducted in 2013 with fifty people showed that personalising supports by including environmental assistive technology improved choice and control, which technology users reported enhanced their independence (Rabiee, 2013). Another research team confirmed that assistive living technologies such as environmental

control systems made people feel more independent by making them feel enabled, giving more choice and control, helping them feel secure, and making them 'feel less needy' (van Dam et al., 2024).

Disabled technology users who were more fluent with technology use reported improved independence through their technology. My focus group discussions and the existing literature confirmed these ideas of the impact of technology fluency, sometimes referring to 'technology confidence' as the deciding factor for an improved independence outcome. Chloë, an assistive technology professional in one of my focus groups, described how technology confidence and skills interacted with technology for independence by highlighting the link between implementing technology where independence was a new idea, saying:

"It is very different for you to actually use that concept or that skill in a place where it doesn't feel natural yet. And until it [independence] is natural you don't feel confident to do it [use technology]."

In the literature, Agree found that disabled adults with more technology resources and more experience with technology were more successful at using technology to be more independent (Agree, 2014). The evidence suggested that people who were more fluent and confident in using technology were more successful in integrating assistive technology for empowerment and independence. This may be attributed to their extensive exposure to technology throughout their lives.

Experience and confidence with technology to achieve independence also impacted motivation to persist through technology challenges. Participants agreed that experiencing high benefit (independence) from assistive technology motivated them to engage more with the technology and troubleshoot when the technology was not working well. Caroline, an assistive technology professional, explained this relationship in an interview, saying:

"I think having the opportunities to see the benefit - if somebody doesn't see the benefit of the equipment [technology] and for whatever reason that is, then it's less likely to be successful [for improving independence] and whether

that's the patient or the carer, if the ... benefit is not apparent then I think it's more likely to be abandoned or not given or not practiced.”

This evidence described the connection between benefit realisation motivating people to engage with technology more. Evidence in the literature showed that the desire to resist negative aging or disabled identities was sometimes a motivator to keep assistive technologies working (Astell et al., 2019). The potential for assistive technology to improve independence (Agree, 2014) and to enhance control over their environment (de Sousa Leite et al., 2016) increased user willingness to ask for help with technology when it was not working, use online search tools to troubleshoot issues, and to persist through other challenges with a smart, environmental controls ecosystem. Learning new skills to keep technology working properly significantly enhanced technology's impact on independence (Cullen et al., 2017; Golisz et al., 2018). This evidence clearly showed the connection between assistive technology and outcomes related to independence correlated strongly enough with participant evidence to warrant inclusion as the first outcome of interest for this research.

5.2.2 Autonomy

Evidence collected from focus groups, interviews, and selected academic literature early in the realist review described concepts related to autonomy such as agency (being able to be your own person, advocate for yourself), choice and control (having options in your support and daily life, being 'in charge' of your decisions), and self-determination (“having a self-directed life” from participant, Clint). Participants agreed that to have autonomy, one first needed the tools and skills to have some independence. This idea made the autonomy domain distinct from but linked to independence. In the literature, autonomy-related outcomes for assistive technology included having independence that was respected by the support network, having the skills and tools to choose when to use people or tools for support, and assistive technology use that was not dependent on person-delivered support or facilitation.

There were challenges agreed upon by both disabled technology users and assistive technology professionals around how to create independence in RCSs – spaces which inherently “do care to people” (a quote from Kayla, an assistive technology

professional referring to the structure of support in RCSs). In a disabled technology user focus group, participants Aidan, Margaret, and Liam discussed how their independence had to be respected by their support network in order for it to result in true autonomy for them. They specifically cited their negative experiences when going to hospital with severe illness and having their communication devices taken away, effectively disabling their ability to advocate for themselves and their care. Margaret elaborated, saying:

“They took my AAC off me at hospital ... They don’t realise it is my whole voice! I can’t advocate for myself without it.”

The rest of the group agreed, describing this phenomena as both medical staff misunderstanding the importance of their communication devices and incorrect assumptions about their ability to advocate for themselves and exercise autonomy. Other disabled technology users shared they felt that, because of the extent of support they required for large portions of their day, their support workers forgot that there were decisions they could take part in making. There was a lack of consensus regarding the notion that independence was not a dichotomy. One could use support in certain matters, yet still retain the ability to give consent and assert independence in moments where they could advocate for themselves. Some literature introduced the idea of relational autonomy, describing how social and relational connections influenced autonomy. These connections were often context specific, and those researchers highlighted the tension between providing ‘good care’ to disabled people who were paying for support (Salami and Lashewicz, 2015; Pols et al., 2017). Cross-referenced with evidence from the current investigation, this evidence further highlighted the cognitive dissonance experienced by support workers while attempting to support people with independence and autonomy. Numerous support workers expressed concern about being perceived as neglectful or unskilled practitioners when allowing disabled people who pay to be supported to take on certain tasks themselves. This seemed particularly incongruous if those activities entailed any level of health or safety hazard ‘on their watch.’

During the discussion of autonomy, many disabled technology users mentioned having the skills and tools to have options when they used people or tools like technology for support. Assistive technology professionals (specifically Robert,

Carla, Will, and May) described a necessary procedure that was required when delivering assistive technologies in RCSs. Robert elaborated that:

“I found that quite difficult previously with people being very concerned that we were doing things that were going to undermine their job and they thought it was ... we had to spend a huge ... amount of energy on a charm offensive with the staff to understand that, that's not what we were doing, and that it was 'as well as' [as in technology was not meant to replace staff, it was meant to be in addition to staff] and it was an enrichment thing, and it was about independence. It was not about replacing people with robots or some such.”

Trudy, another participant in the first focus group, elaborated on how the idea of support workers feeling threatened manifested in the environments in which she had experience:

“We went from subtle rejection of what we were doing [technology installation] to outright, blatant [rejection] ... saying '*if you put all of this technology in, I am going to resign.*' They just said, you know, I like this job ... if I can't do it [this way] 'cause a piece of technology is taking over, I'm not supporting it.”

Support workers needed assurances that their supporting roles were not at risk if tools increased independence and, therefore, autonomy. Otherwise, disabled technology users would not have as many opportunities to use their tools to control decisions about their support. Several studies in the literature have shown the importance of technology skills as tools for autonomy, but also their interaction with implementation and support processes for success (van Dam et al., 2024; Wehmeyer et al., 2020; Sallinen et al., 2015). Both disabled technology users and assistive technology professionals who contributed to the current investigation shared that when the paid supporters felt threatened, they felt that assistive technology to improve independence reduced the importance of and need for their support services, reducing their engagement with technology and their support for disabled adults to use technology. In the broader discussion about engagement with technology for autonomy, Carla, an assistive technology professional, clarified:

“[Technology is] the step back that [staff] can take, which then enables them to have that meaningful interaction, which means that they can then go *‘Richard, let's go into town. Let's go and visit the library. Let's go and visit the day service. Let's go and do an activity that you wouldn't be able to do on your own because the one that you did do on your own is freed up now.’* It's enabling care providers to create meaningful interaction out of their prescribed hours, because I think it's not about reducing the hours necessarily, not about reducing the support, but making it meaningful and making it have a real impact on that individual that they're supporting”.

In this discussion, Carla was describing one of the messages that had been helpful when meeting with support workers who felt threatened by technology for autonomy. If it was clear that technology for autonomy did not mean that technology would replace their person-delivered supports, but instead allowed them to use their support time for more meaningful and complex tasks, their engagement improved. When assistive technology professionals and disabled technology users framed technologies as an empowering support option that reduced strain on support workers' limited time, they reported better outcomes for independence.

The next idea was a prominent topic, especially for those engaged with AAC devices either as users or as assistive technology professionals and Speech and Language Therapists. In order for assistive technology to support autonomy, its use could not depend on person-delivered support or facilitation. This connection was especially emphasised when describing someone who required an AAC device to be mounted to a wheelchair each day. Don, an Assistive technology professional I interviewed, felt that independent access was an absolute necessity for technology use for autonomy – especially for those who used an AAC device as their voice, as they were not able to advocate for themselves without their device.

“I mean the very basics are they need to be able to make sure that the technology is available to that person when they need it. So, you do that by turning up with several lengthy steel poles and bolting it onto their wheelchair so that no one can miss it! And you need to ... give them a no-tech or low-tech way of saying, *‘I need my communication aid’* so that when they get up in the morning and the staff forget they can just point to a massive sign that

says, “*put my f***ing communication aid on my wheelchair!*” Yeah, which was very, very funny, but ... I think those are the really important things you need. You need staff to realise that that device has the appropriate value and needs to be available to that person.”

This connection description underscored how independent technology use might mitigate misaligned values in terms of support for assistive technology and AAC use. People having independent command of their devices increased the likelihood that they could advocate for themselves, even if support workers were not as encouraging toward technology use. In several of my interviews, we extensively discussed the need for AAC devices to be mounted to wheelchairs or calibrated daily for accurate eye gaze control. Both disabled technology users and assistive technology professionals described going to great lengths to assist with integrating this support into early morning routines for support workers. Liam, an eye gaze user, described his difficulties with advocating for himself without his AAC device.

“I can’t tell people I need my AAC device without my AAC device. It was difficult. I think care workers forget, but I never forget...I wish I could put it on myself”.

In further discussion, many AAC users with limited mobility acknowledged that they would probably always need their access facilitated when devices needed to be mounted and calibrated daily, but that if they could control that themselves, they could ‘take charge’ of their days. Participant experiences showed that advocating for oneself or taking control over one’s support became effortful without having or being able to use communication tools without facilitation. Recalling previous support conversations he had had attempting to communicate the importance of technology use for autonomy, Don shared:

“You try really hard to empathise with [support workers] and say, “*Look, this is an important piece of kit.*” You bring them in and you say “*look, come and talk to X. Have a conversation and then think about how that conversation might have gone if the technology wasn’t there.*” Basically, you can’t [have those conversations], or it would have taken you forever to do 20 questions to decide whatever was the topic of the day.”

This collective evidence underscored the distinct significance of understanding, with greater precision, how assistive technology contributed to autonomy for disabled people and therefore warranted inclusion in this work as an outcome of interest.

5.2.3 Social Activities and Participation

I constructed the social activities and participation domain by synthesising primary evidence from participants and selected academic literature early in the realist review. The related ideas used to build this domain included the importance of meaningful leisure activities as part of how disabled people were supported, how tools for meaningful activities helped build both skills and social networks, increased dignity, and how technology facilitated an increased social network with shared interests. When I asked why other disabled people might benefit from technology, Marcus responded:

“I think people would be less lonely. I think it’ll give them more freedom to get in touch with relatives, even more so if they have relatives overseas or off and away... video calling, you know. Keeps people in touch.”

This quote stressed the role of technology in facilitating a social network of friends and family by enabling real-time connections across locations. This explanation also showed the impact of having contact with friends and family and how it connected with social participation. A topic that came up repeatedly in focus groups and interviews was the idea that care and support in RCSs usually focused on ‘keeping people alive, but not building a life’ (a common sentiment among disabled technology users). Other disabled technology users (specifically Clint, Marcus, Janice, and Jason) felt that support workers were too short staffed, had too many responsibilities, and simply could not support above and beyond the tick-box list of shift tasks to ensure that disabled people had meaningful things to do with their time. Jason described not wanting to burden overworked staff with ‘silly things,’ saying that with technology to read him audiobooks and control his space.

“I got more options [for activities]. Like if I want to read a book, or if I want to listen to music. I’m not a music person, but if I want to listen to music I can do”.

He claimed that before his technology, he felt 'simply lucky' that he had friends and family who helped him find meaningful things to do during the day – he was dependent on others to facilitate having activities to engage with throughout the day. He now used assistive technology to play music he liked, control his television to follow a few programs he enjoyed, and used social media to stay in contact with acquaintances and friends. In the literature, both Knecht-Sabres et al (2020) and Innes et al (2016) agreed with this idea, indicating that part of the professional responsibility of support workers was addressing the barriers to accessing leisure activities faced by disabled adults in RCSs. Mihalia et al (2017) and Rossow-Kimball and Goodwin (2014) emphasised both the importance of leisure activities and the need for leisure activities to be facilitated by support workers in RCSs.

Both disabled technology users and assistive technology professionals mentioned social media and online activities as being integral to this domain. These discussions related to the importance of having tools (such as AT) for meaningful online activities to build both skills and social networks. In the midst of a discussion on the role of assistive technology in social inclusion, Aaron, an assistive technology professional, described assistive technology as a ladder which gives disabled people a way over the 'wall of isolation':

"I think where it [technology] has been a success with someone who has previously been isolated, it really enabled them to engage and have some enjoyment activities. So, I'm thinking of one example where a person who was previously quite withdrawn, and quite isolated, was able to play online games with other people. And ... so not only did it provide entertainment where they were previously isolated, but they can now play online games through their iPad and whereas previously they were restricted to television watching or constantly looking around for other entertainment. So not only are they now in control of their entertainment but they can also use their iPad to engage with online games and also recognise people through their avatars and who are regular players and begin to have brief chats, even something as simple such as *'hello, welcome back'* or *'I see you are in this game again'* ... you know, it's just that initial communication whereas previously [social] communication was always initiated by other people and, dependent on their availability and time,

and now with the online platforms they can access entertainment and interaction whenever they wanted, they couldn't make their entertainment choices and also begin initial limited communication".

Evidence in the literature corroborated these ideas. In a scoping review, Macdonald and colleagues (2021) found that across 25 included studies, evidence consistently showed the benefit of assistive technology through increasing and improving access to social interactions through social media. De Sousa Leite (2016) also highlighted the importance of access to technologies in facilitating access to social engagement. Among the numerous contributions from assistive technology professionals during my investigation, the comments made by Trudy and Carla were particularly noteworthy. The participants shared stories about certain adults they had supported, speaking of a complete shift in their personalities upon gaining access to assistive technology and receiving assistance in establishing a social media presence. One learned how to use these tools and developed a flourishing social life, connections with peers outside his RCS, and required less support as his social needs were being met by peers rather than paid staff. Indeed, one disabled technology user, Marcus, emphasised:

"I don't know what [people] do all day if they don't have tools like this so they could reach out into the world...they just sit [in front of the telly]? I am taking a graphic design class and play online games with my friends ... someone like me can't arrange that alone."

He went on to suggest that since he had obtained these tools, he had made new friends, connected with old ones, had more confidence, and was learning new skills that might lead to a paying job. He felt that none of those benefits would have been realised without assistive technology.

Other disabled technology users explained how assistive technology enabled them to engage in activities they were too embarrassed to request person-delivered support with. Milo (who did not want to be directly quoted) explained how he liked to engage with his religion and how assistive technology had enabled him to worship, watch sermons, and interact with other like-minded peers without asking for support. An assistive technology professional who worked with Milo felt that this access to

meaningful activities afforded him some dignity that he would not have known to ask for or advocate for, which had dramatically improved his demeanour and how he interacted with support workers and his family and friends.

Building on this concept, many participants considered how assistive technology increased their social activities and participation, which helped disabled technology users connect with more peers with similar interests through social media. Online gaming had also opened additional opportunities to disabled technology users through the peers they met and skills they could demonstrate through their assistive technology. Marcus said that as his network of online friendships had grown, people had offered him consulting work and small paid projects, which he never would have gotten without assistive technology and having support to start him with his assistive technology and social media. Describing how they supported students in higher education to properly access their coursework with assistive technology. Mary shared how socialisation from online gaming had built more generalised technology skills:

“And for a lot of them, it’s how they socialise as well ... they are not going out to pubs and clubs to meet people, they are speaking to their mates online. And they are playing games on their Xbox or PlayStation or whatever.”

The evidence mentioned above suggested that social activities and participation should be further explored as a significant outcome for disabled technology users in this research.

5.2.4 Wellbeing and Satisfaction

The wellbeing and satisfaction domain synthesised both the cumulative effect of the previous domains (participants widely agreed that all the previous domains contributed to wellbeing and satisfaction) as well as ideas around what ‘quality of life’ looked like and what created it in RCSs. Clint, a disabled technology user, described how vital it was for wellbeing and satisfaction to be accounted for in supports.

“There is no talk about how important it is for people to have fun, just every day have fun things to do. And that is important. That is life changing. What is

the point of being safe if you can't even live your life?! Like, a life that you enjoy?!"

Discussion and literature in this area included healthcare analytics which improved health outcomes, bridging the gap between staff capacity and support needs, and promoting identity and happiness.

Participants discussed the positive impact of specialist healthcare analytics technologies on health outcomes. These improved outcomes kept disabled people with preventable or treatable conditions out of hospital, increasing their satisfaction with proactive support from their support teams. In addition to the contributions from the disabled technology users who described negative impacts from separation from their AAC devices in hospital, evidence showed that the stabilisation of health conditions did have a positive impact on wellbeing and satisfaction. In the literature, there was evidence that reductions in depression (Delmastro et al., 2018) and other mental health conditions (Puvill et al., 2019) had positive impacts on wellbeing through improved access to primary health care (Hughes-McCormack et al., 2021). One disabled technology user I interviewed, Marcus, described how healthcare technology positively impacted his happiness:

"I mean, look what you can do with a smartphone! It's unreal, like especially if you are like me and you are trying to lose weight, and you've got all these health apps that you can download to help you keep up with your health... do you know what I mean? I can monitor my own health and understand my health better ... I've got [a smartwatch]! I'm on top of the world! Well, it tells me my heart rate, it tells me when I seem stressed, and when I should drink water ... when I need to drink up more, when I've not moved for a while, it will buzz me to remind me. It counts all your steps and calories, distance... "

For this technology user, smartphone apps and a smartwatch made him feel more comfortable with his health, which gave him peace of mind and happiness that he had visibility into his own health. Building from that idea, participants described some of these improvements to wellbeing and satisfaction through assistive technology as filling the gap between staff capacity and support needs. Some of the effects were apparent through enabling disabled people to meet with their doctor without the

constraints of arranging transportation and support. Other disabled technology users felt that when assistive technology reduced staff burden, support workers were more cheerful supporters. Clint described this scenario as,

“It is more stressful to ask for help. You can feel pressured to have to manage everything yourself. Because carers don’t have time ... [you compromise what you want] so it isn’t overwhelming for other people ... and you get better support when ... they are less stressed.”

Disabled technology users also felt that they were more comfortable and built better relationships with their support workers when their supporters were less stressed. Evidence in rehabilitation literature commonly observed that the use of assistive technology allowed disabled people to recover post-surgery in their RCS with their familiar supporters, while still making functional gains and healing with remote specialist support (Garcon et al., 2016).

Finally, assistive technology supported wellbeing and satisfaction by promoting identity and happiness. Participants in both groups shared examples of how they achieved increased happiness through assistive technology. listing improved access to activities, more social connections, and the ability to pursue hobbies they previously could not physically pursue. Heather, a voracious reader and disabled assistive technology user, could not read books since she could not physically manage holding the books and turning pages. With her assistive technology. she was accessing kindle and audio books from her local library and reclaimed her identity as the resident bookworm. Another disabled technology user, Scott, shared:

“I read without ruining books ... I used paperclips to keep the pages from turning, but then I couldn’t use library books because it tore them. I am reading Hunting Ground in my Kindle app [on the iPad]. I can read what I want.”

Milo had been able to re-join an old bible study group virtually—an activity he felt was core to who he was and which he had sorely missed since his mobility became a transportation barrier for him. Assistive technology provider Kayla (who was also an occupational therapist) felt that increased happiness came when technology enabled

someone to achieve their goals. When she supported disabled people to procure the right tool, they reclaimed some purpose and identity and increased their happiness and quality of life.

Once I synthesised these ideas into the core domains, the realist review process continued to build out CMOCs to explain how disabled technology users experienced technology in RCSs. The survey results (described in the remainder of this chapter) identified different details associated with these domain outcomes, which I then used as a last layer of analysis for the final CMOCs (in Chapter Six).

5.3 Survey Findings

This survey aimed to determine then explore the impact of technology on the key outcomes established by disabled technology users early in this research. I distributed the survey online through social media networks and directly via email to colleagues. I asked disabled technology users to rate their own experiences with assistive technology. Assistive technology professionals were asked to reflect on a person they had supported to utilise technology and provided responses based on their perception of the person's technology-related experiences and its impact on relevant aspects. The purpose behind collecting this data was to give priority to the causal factors seen as most impactful to these outcomes of interest in the final CMOCs.

The next sections describe and discuss the results of the survey related to the impact that technology had on the four domains of interest to disabled technology users. Each participant was asked to rate the strength of the connection between the outcome (independence, autonomy, social activities and participation, and wellbeing and satisfaction) with and without their technologies. Their responses showed the potential impact of technology on these key outcomes from the perspective of both stakeholder groups. In Table 4 below are the response distributions to each answer choice for the impact survey questions. These findings are discussed in the following sections. Bar graphs of these overall responses by participant group can be found in Appendix H.

	Things are great	Things are good	Things are bad	Things are very bad
Independence				
DTUs with tech	64%	36%	0%	0%
DTUs no tech	0%	36%	43%	21%
AT Pros with tech	43%	43%	13%	0%
AT Pros no tech	0%	4%	78%	17%
Autonomy				
DTUs with tech	64%	36%	0%	0%
DTUs no tech	0%	29%	50%	21%
AT Pros with tech	35%	39%	26%	0%
AT Pros no tech	0%	4%	78%	17%
Social Activities and Participation				
DTUs with tech	43%	43%	14%	0%
DTUs no tech	0%	21%	43%	36%
AT Pros with tech	30%	48%	22%	0%
AT Pros no tech	0%	4%	70%	26%
Wellbeing and Satisfaction				
DTUs with tech	50%	50%	0	0
DTUs no tech	7%	36%	43%	14%
AT Pros with tech	48%	48%	4%	0%
AT Pros no tech	0%	4%	74%	22%

Table 4. Survey response overview

The next table (Table 5 below) displays the degree of impact of technology on each of the outcomes of interest. The degree of impact was determined by the amount of movement on the answer choice scale the same respondent made between the 'with technology' to the 'without technology' answers. No change on the scale meant no impact, one change was considered mild impact, two changes were considered a moderate impact, and three changes were considered a severe impact. For example, if one participant responded that their independence with technology was 'things are great' and then responded that without their technology 'things would be bad,' this was two changes on the answer scale, indicating a moderate impact on independence. Table 5 below displays the percentage of impact changes compared with the total response changes. For example, of the 14 Disabled Technology Users (DTUs) who answered the independence impact questions, 21% felt a loss of technology had no impact on independence, 29% felt a loss of technology had a

moderate impact on independence, and 21% felt a loss of technology had a severe impact on independence.

	0 change (no impact)	1 change (mild impact)	2 changes (moderate impact)	3 changes (severe impact)
Independence				
DTUs	21%	29%	29%	21%
AT Pros	0%	46%	46%	8%
Autonomy				
DTUs	14%	29%	36%	21%
AT Pros	15%	38%	38%	8%
Social Activities and Participation				
DTUs	36%	21%	7%	36%
AT Pros	15%	46%	31%	8%
Wellbeing and Satisfaction				
DTUs	29%	36%	29%	7%
AT Pros	0%	38%	38%	23%

Table 5. Degree of impact of technology on outcomes

5.3.1 Impact on Independence

In this research, key stakeholders described the concept of independence as moments when a disabled person could complete tasks themselves when they would like to, even when they used care and support for other parts of their day and activities. This section will describe responses from both participant groups, followed by analysis contextualising the survey responses with other research findings to build toward the CMOCs described in Chapter Six. Below are the graphs representing the responses to impacts on independence.

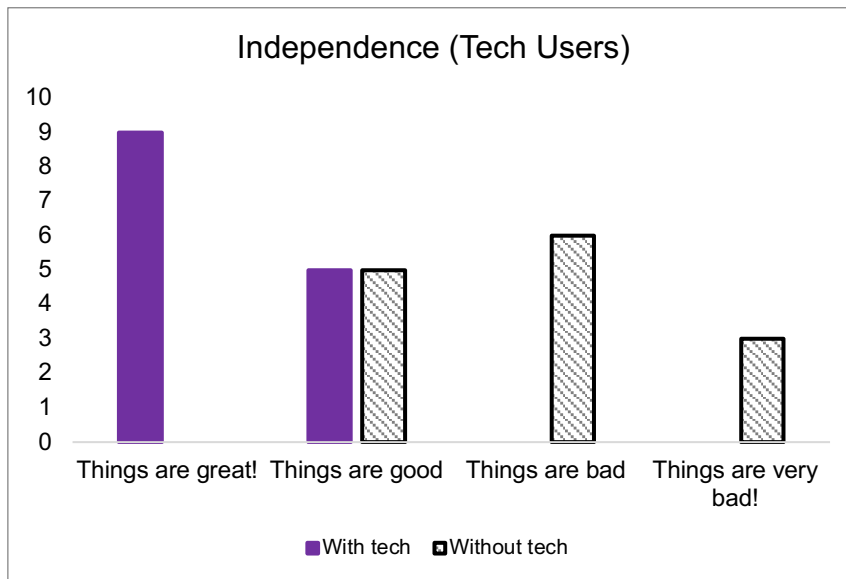


Figure 5. Independence, disabled technology user responses

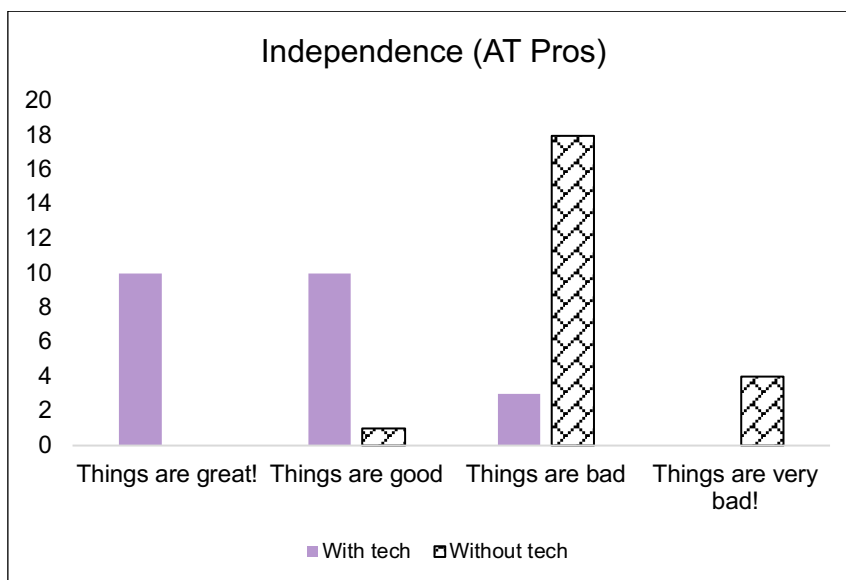


Figure 6. Independence, Assistive technology professional responses

Disabled technology users expressed how they felt technology had impacted their independence, with most respondents reporting ‘things are great,’ with ‘things are good’ as the second most frequent response. When asked about how their independence might have been without their current technology, the majority believed ‘things would be bad,’ followed by those who thought ‘things would be good,’ and a smaller group who responded, ‘things would be very bad.’ It was important to note that when asked how circumstances would be without their technology, all responses changed. In other words, no one felt their status would

remain unchanged without their technology, and all responses indicated circumstances would be slightly or moderately worse without it.

Comparing the changes in responses between the two questions, some reported a severe impact on independence (moving from 'things are great' to 'things would be very bad'), with a similar percentage noting a moderate impact. A comparable percentage described a mild impact on independence, but no respondents reported that there would be no impact. This evidence demonstrated that technology had varying degrees of impact on independence for the respondents.

One disabled technology user shared an open response, elaborating on the importance of ownership and the need for support when organisations built technology into a physical space rather than technology being brought by the person. These responses underscored the importance of technology in relation to independence and highlighted broader considerations related to organisational infrastructure and support requirements.

Assistive Technology professionals had varied responses on the potential impact of technology on independence. While most said 'things are great' and 'things are good,' there was also a moderate group saying that even with technology, 'things are bad.' When considering what would happen to independence without technology, the majority felt that 'things would be bad' or 'things would be very bad,' with a small set of respondents answering that 'things would be good.' Comparing the before and after technology responses, no one foresaw a severe impact on independence with technology, though all responses again changed by at least one answer choice without technology. These results suggested that technology had a moderate impact on independence, potentially influenced by the type of technology used (e.g., open-text comments mentioned AAC devices).

Three respondents provided additional insights about technology's impact on independence. One respondent, Amanda, emphasised the importance of active support methods for skill development, highlighting the need for ongoing skills training and the role that technology played in it. Two participants, Geoffrey and James, agreed on the significance of leadership within adult social care organisations, the importance of technology training, and the principles of person-

centred approaches for technology to produce satisfactory independence outcomes. They both shared the need to align the user's priorities with the technology's potential, emphasising the role of peer support in expanding the applications of assistive technology. These comments reiterated the complexity of systems which produced outcomes such as independence, with multiple participants leaving comments specifying broader contextual elements.

The comments left in the survey underscored the complexity and dissonance in identifying and reconciling priorities for disabled technology users and the goals or metrics of note to support teams. Disabled technology users had a more optimistic view of their own independence (all responses were 'good' or 'great' with tech) compared with assistive technology professionals (13% 'things are bad'), both with and without technology. Based on interviews with this stakeholder group, while I did not know whether the same participants who agreed to interviews completed the survey, I could infer that overall, this stakeholder group did not feel that supporting disabled people in large RCSs was the right way to foster independence. Indeed, there were several lively exchanges as to whether I should conduct this research at all (as in, social care should not be structuring support and accommodation this way, thus I should not be conducting research to encourage improvements to the RCS model). Particularly in responses from disabled technology users themselves, describing technology amidst the 'tug of war between too much support and not enough' and discussing complexity of ownership of devices in 'managed living spaces' further confirmed the need to portray technology experience in the context of interacting causal factors.

5.3.2 Impact on Autonomy

I described autonomy as a disabled person making their own choices, being their own person, and feeling in charge of their lives. This section will describe responses from both participant groups, followed by analysis connecting the survey responses with other research findings.

When asked 'which of the following best describes how much you get to make your own choices and be your own person (autonomy)?,' more disabled technology users expressed that 'things are great,' while fewer chose 'things are good' with their

technology. When asked about autonomy without technology, the majority leaned towards 'things would be bad,' with a smaller group still feeling that 'things would be good.' Below are the graphs representing the responses to impacts on autonomy.

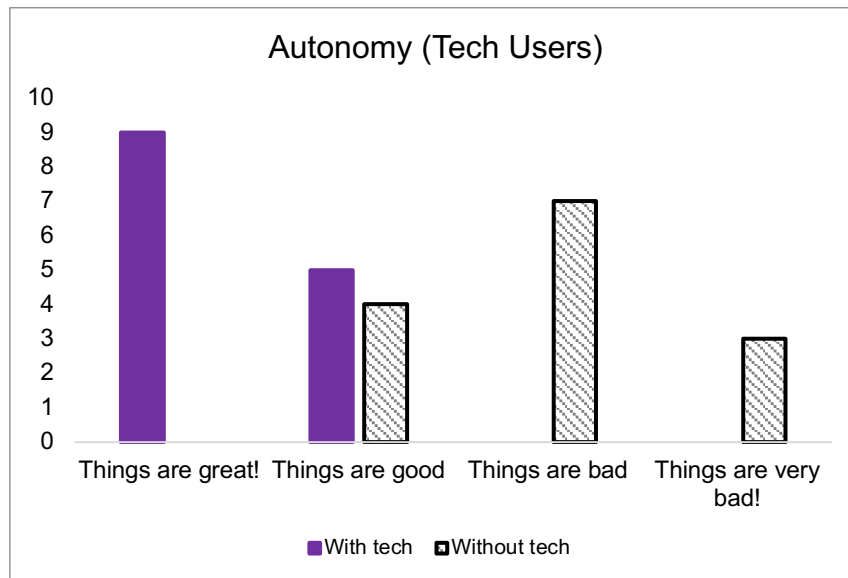


Figure 7. Autonomy, disabled technology user responses

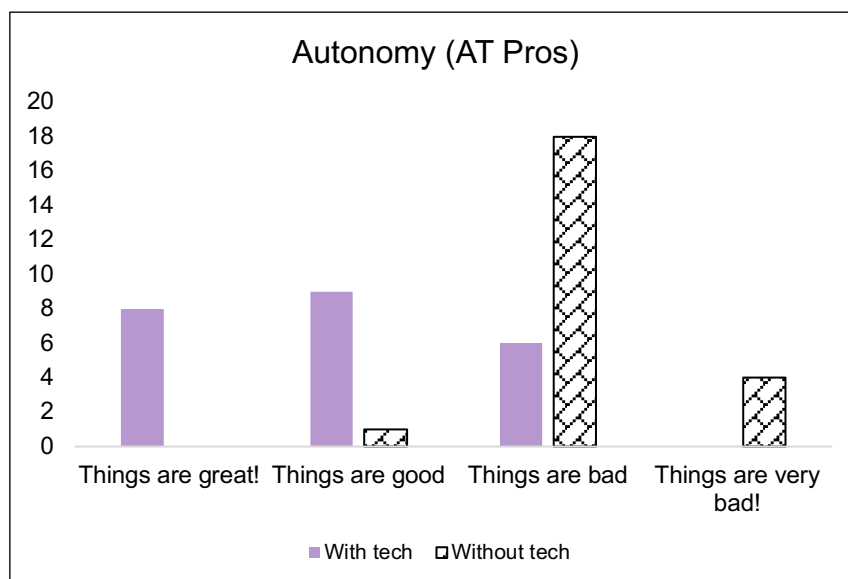


Figure 8. Autonomy, Assistive technology professional responses

Comparing the responses between these two questions, around one-fifth of respondents believed that not having their technology restricted their autonomy, signified by a three-step change in answers (a severe impact). A larger portion (36%) anticipated a moderate impact, with a similarly sized group expecting only a mild

impact. A small fraction of respondents foresaw no impact on their autonomy. This finding implied that a significant majority (86%) of participants concurred that technology promoted their autonomy and their ability to make their own choices and be their own person.

Two participants provided open comment on their responses. Daviana emphasised the importance of technology supporting conditions like AD(H)D, mentioning the convenience of various memory and organisation features on common smartphones. James highlighted how 'it [was] hard to imagine life without this technology,' saying that technology enabled him to live his daily life and feel like his own person. Especially in a survey with limited open responses, these contributions highlighted a topic running through this research that *how* disabled people were supported mattered, and that the wrong kind of support was more disabling than helpful.

I asked assistive technology professionals to respond based on their experiences of what has worked while delivering or supporting technology to be used by disabled people in RCSs. When asked 'in your experience, which of the following best describes how much a disabled person using technology in care gets to make their own choices and be their own person,' more professionals chose 'things are great' compared to 'things are good,' with fewer selecting 'things are bad.' Subsequently, when asked about the scenario where the disabled person would no longer have the technologies, the majority believed 'things would be bad,' followed by a small fraction considering 'things would be very bad,' and only a few responding that 'things would be good.' Analysing changes in responses between the two questions, a small percentage reacted that losing technology would severely impact autonomy, while a larger segment expected a moderate impact. Comparatively, more respondents expected a mild impact, and a smaller group saw no impact. The fact that a large portion of respondents (78%) reported a decline in autonomy without technology demonstrated that having technology did indeed support the autonomy of disabled people in RCSs.

When given the opportunity to provide open responses, six respondents shared additional insights, shedding light on various aspects of how technology supported autonomy for disabled technology users. Participants commented on factors such as the availability of support, significance of knowledge and skills, troubleshooting,

motivation, user preferences and choice, and practical aspects of care delivery (e.g., not enough staff or time to integrate technology). These quotes collectively underlined the multifaceted nature of the impact of technology on autonomy and described some of the connected causal factors which produced autonomy. While these comments were not used to build the CMOCs, they contributed to a more comprehensive understanding of the factors influencing the impact of technology on autonomy.

There was complexity in the concept of autonomy and how different stakeholder groups constructed their views of autonomy. Professionals in a disabled person's supporting network had a different understanding of what constituted personal autonomy than many disabled people themselves. In interviews, professionals often described autonomy as 'being in charge' and 'having control,' whereas disabled people focused more on autonomy as 'being their own person' and getting to live the life they would like while being supported. These variances in interpretation may have accounted for some of the differences in responses between stakeholder groups. More than a quarter of assistive technology professional respondents felt that autonomy was poor ('things are bad') even with technology, which may be more of a judgement against how disabled people were being supported than against the role of technology itself. Three assistive technology professionals, in their separate interviews, made comments about how we should not be supporting disabled people 'at this scale' (meaning in larger care settings that still 'truly resemble' institutions) and that there was 'no way to support well this way.' Several disabled technology users also alluded to these support structures impeding their ability to build the kinds of lives they wanted, saying that they often did not even request an afternoon cup of tea when they knew staff were busy, and that they 'were not allowed' to make it themselves. Yet, their responses to the survey indicated they all felt that their autonomy was quite high. While I cannot presume that technology was responsible for this greater autonomy, based on the second responses rating autonomy as much lower without technology (71% of disabled technology users and 96% of assistive technology professionals rated as 'bad' or 'very bad'), I can interpret with some confidence that there was at least some role for technology in building or supporting autonomy. This particular role of technology was situated within the broader research as contingent upon the contexts and mechanisms described throughout the

CMOCs. It was evident that certain elements in the environment, as well as the actions and behaviours of those interacting with technology, were indispensable for the attainment of outcomes like autonomy.

The survey did not cover the function and specific types of technology, it was simply described as 'any electronic devices that you [disabled technology user] personally use like a smartphone, smart watch, smart speaker (like Alexa, Google assistant, or Siri); tablet (iPad or android device, laptop, or computer); home control switches (like smart plugs or speaker-managed appliances); video gaming systems; and other electronics.' Though not captured in the survey participant characteristics questions, based on my recruitment conversations, there was a large representation of professionals who specifically supported Augmentative and Alternative Communication (AAC) assistive technologies. This detail was important in that AAC users literally used technology as their voices and it was the only way they could advocate for themselves and communicate, and having it taken away would have had a significant impact on their autonomy (among other domains). This explained some of the difference in responses between stakeholder groups (only 4% of assistive technology professionals felt autonomy would be good without technology compared with 29% of disabled technology users).

5.3.3 Impact on Social Activities and Participation

The survey described the concept of social activities and participation as contact with friends and family, engaging in activities people cared about, and the extent of someone's participation and engagement in their local community outside their home. In the next section, I report the responses related to the impact of technology on social activities and participation and meaningful connection, followed by an analysis of the results. Below are the graphs representing the responses to impacts on social activities and participation.

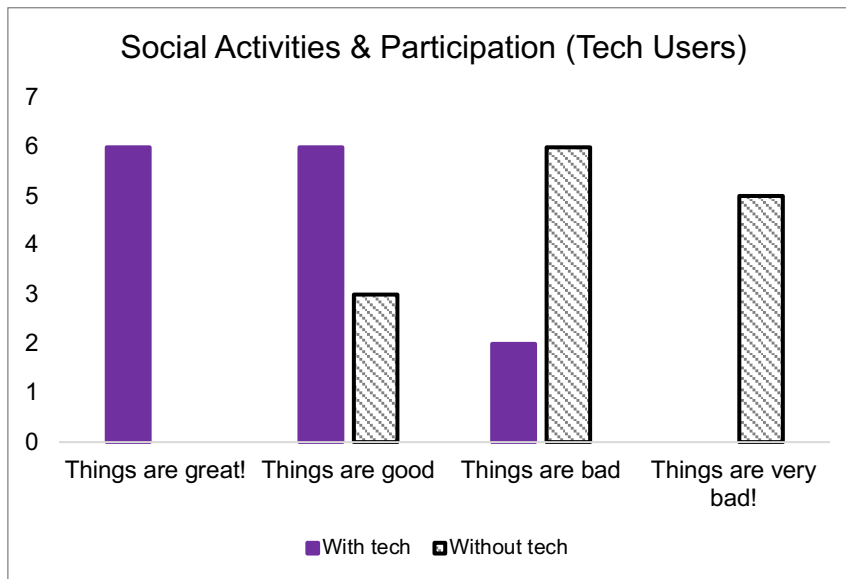


Figure 9. Social activities and participation, disabled technology user responses

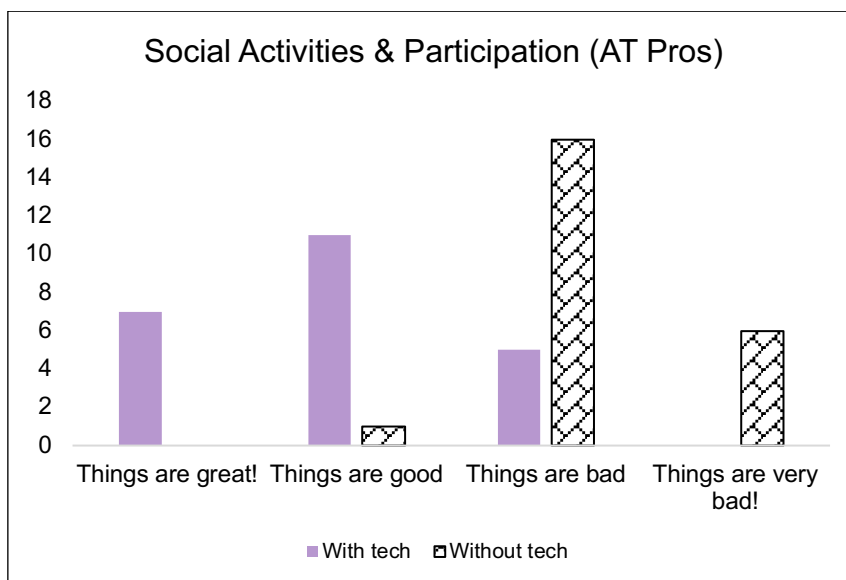


Figure 10. Social activities and participation, Assistive technology professional responses

The survey asked disabled technology users which answer choice described their social activities and participation. A large group responded, ‘things are great,’ with an equal group saying, ‘things are good.’ A small group reported that even with their technology, ‘things are bad.’ When asked how they would rate their social activities and participation without their technology, the two largest responses were ‘things would be bad,’ or ‘things would be very bad.’ A moderate remaining group reported that ‘things would be good.’ The changes in responses between questions showed that 36% felt technology had a severe impact on social activities and participation,

7% saw a moderate impact, 21% saw a mild impact, and 36% felt there may be no impact.

When synthesised with evidence in research interviews, I could infer from these responses that disabled technology users who were heavy social media users would have been more severely impacted by the removal of or non-working technology than those who used technology for other tasks (such as controlling their environment and interacting with their televisions rather than to connect with family and friends or online activities). This distinction reiterated the importance of connections and participation through RCSs and the local community. Most of the participants who responded that technology did not have a significant impact on their social participation also did not select causal factors related to connectivity and partnerships. They were also more likely to have lived in a shared home with other adults and full-time / 24-hour support on site. Disabled people who were living with support structured like a RCS seemed to be less likely to have local connections and were less likely to use technology for social engagement, and therefore did not report impacts in that area. Indeed, the two open responses left for this question confirmed different and less relevant applications of their technology. The first respondent said they 'used it mainly for social and entertainment, online language learning and classes, making lists for grocery store (cognitive supports).' The second shared that "social media gave more ways to contact people, texting, calling. [I] have made contacts with people in other states ... wouldn't have met otherwise."

When asked about social activities and participation and technology, nearly half of assistive technology professionals responded that 'things are good' with the next largest group reporting 'things are great.' Only a small group reported that 'things are bad,' even with technology. When followed by the question without technology, nearly every response was 'things would be bad' and 'things would be very bad.' Only 4% of respondents felt that 'things would be good.' The changes in responses to the first and second questions showed that a small group felt technology had a severe impact on social activities and participation, a moderate sized group saw a moderate impact, and nearly half saw a mild impact. A small group believed there was no impact.

The survey and open responses highlighted the role of staff support and engagement in using technology to facilitate and support (or be a barrier to) social participation and relationships, synthesising well with the CMOCs I will discuss in Chapter Six. These suggested that, while technology certainly facilitated social activities and participation, the impact may have depended on what the technology was being used for, as well as other context and mechanism interactions mentioned throughout this research.

Social activities and participation in local communities was a challenging topic for disabled people in RCSs. Based on interviews, disabled technology users either did not see the connection between technology and social participation or saw it as the primary facilitator and enabler. For those who were on social media, technology felt like their social lifeline; without it, they would have lost a substantial number of connections, engagement with their interests, and the opportunity to participate in new spaces and activities. But for those who were not on social media, the technology did not seem as connected to their ability to engage with their local communities because they were still used to doing this in person. In fact, for those who did not start using social media even during COVID, their social engagement still has not returned to pre-COVID levels, technology or not. Several RCSs were still moving in and out of 'lockdown' scenarios depending on where people were testing positive. The open responses from disabled technology users focused on the vital role of technology in facilitating access to social virtual spaces and a way to maintain relationships remotely and without support. In short, disabled technology users talked about technology as a facilitator for social engagement and relationships, while assistive technology professionals spoke about technology as an attractor of social interaction and engagement. As one assistive technology professional participant entered in the open response:

“I found that the mere presence of technology ... brings more people into the user's orbit. People are more inclined to speak to a person with a physical disability if they see an AAC device, for example... technology can, in itself, be a conversation piece....”

The quote presented a fascinating outsider's perspective on the interaction between technology and disabled people, as it described how others in the community, upon

witnessing a disabled person utilising technology, became curious and engaged with the user to understand its intricacies.

The range of responses from both stakeholder groups to the current state of social activities and participation was similar—86% ‘things are good’ or ‘great’ from disabled technology users, 78% ‘things are good’ or ‘great’ from assistive technology professionals. But 14% of disabled technology users and 22% of assistive technology professionals responding ‘things are bad’ even with the technology was an indication of the opportunities being missed to increase expectations for social activities and participation for disabled people. RCSs, which can be incredible facilitators for building lives and daily experiences, overwhelmingly were not adequately integrating social community access. Under certain conditions, including the proper knowledge and co-management of the technology integration process among disabled people, support teams, and organisations/leadership, the data indicated that technology had the potential to bridge the gap caused by physical separation from the local community due to staffing limitations, health restrictions, medical concerns, or transportation accessibility challenges.

5.3.4 Impact on Wellbeing and Satisfaction

This research described the concept of wellbeing and satisfaction as disabled people’s general level of happiness and how satisfied they were with their day-to-day lives. In this section, I will describe responses from both participant groups, followed by analysis connecting the survey responses with other research evidence. Below are the graphs of these responses.

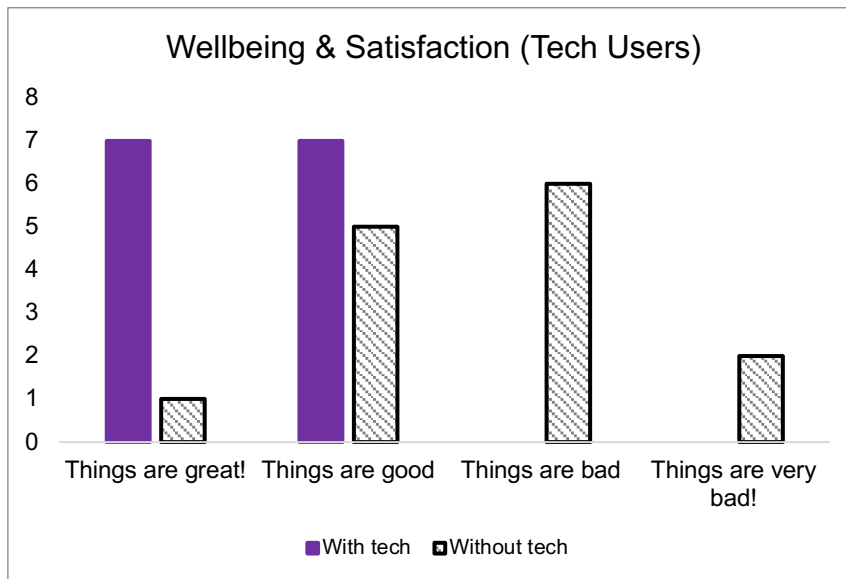


Figure 11. Wellbeing and satisfaction, disabled technology user responses

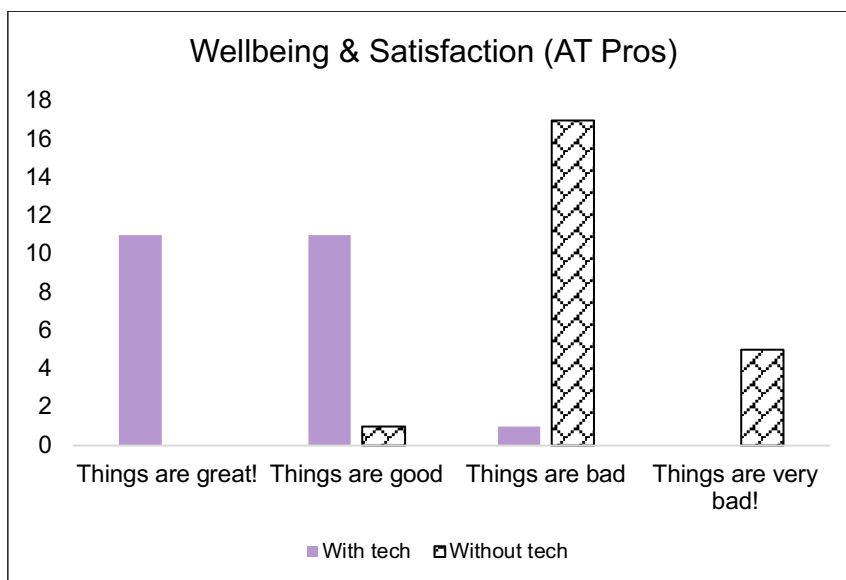


Figure 12. Wellbeing and satisfaction, Assistive technology professional responses

When asked ‘which of the following best describes your wellbeing and satisfaction with daily life?’ disabled technology users responded evenly between ‘things are great,’ and ‘things are good.’ When followed by the question ‘without using your technologies, which of the following would best describe your daily wellbeing and satisfaction,’ a smaller group expected ‘things would be great.’ The largest group felt ‘things would be bad,’ with the next largest saying ‘things would be good.’ A small group responded that ‘things would be very bad.’

Comparing the responses, it was apparent that the impact of technology on wellbeing and satisfaction varied. A minority felt that technology had a severe impact on their wellbeing and satisfaction. A larger segment saw a moderate impact, while more noted a mild impact. A final moderate percentage believed there would be no impact. Two participants, James and Daviana, added open details to their responses, highlighting the importance of accessibility in household appliances and support structures for troubleshooting technology. Along with the impact responses, this gave further evidence of connections to skills and knowledge infrastructures within organisations and how they influenced outcomes for wellbeing and satisfaction.

When asked about the wellbeing and satisfaction of the disabled people they had supported, assistive technology professionals split responses evenly between 'things are great' and 'things are good,' with a smaller percentage indicating 'things are bad.' However, when presented with the scenario of wellbeing and satisfaction without technology, only a small group believed 'things are good,' while the majority thought 'things are bad,' and a smaller fraction perceived 'things are very bad.' Comparing their responses to the two questions revealed that technology had a varying impact on wellbeing and satisfaction. A small group of assistive technology professionals indicated that technology had a severe impact, with a larger segment viewing it as having a moderate impact. Nearly half believed technology had a mild impact. No respondents felt that technology had no impact on the wellbeing and satisfaction of the disabled technology users they had supported.

The open and impact responses suggested that disabled technology users and assistive technology professionals saw the impact of assistive technology on wellbeing and satisfaction differently. All assistive technology professionals felt there was some degree of impact, while a little more than a quarter of disabled technology users felt there may be no impact at all. It was reasonable that assistive technology professionals did not have the same perspective as disabled technology users, as many reported having only short-term access to the disabled technology users they had supported and therefore were not likely to see longer-term or sustained changes in this area. It was also reasonable to infer that wellbeing and satisfaction did not depend on technology, although discussions with many disabled technology users

confirmed that there was not agreement among this group either. Several disabled technology users in interviews claimed to be 'bored' and 'more difficult to entertain' when their technology was not working properly, and that they 'ran out of things to do' and felt like they had wasted their days without technology.

Disability research contested the concept of wellbeing and satisfaction, assuming that the experience of disability necessitated monitoring the 'wellbeing' of disabled people more than in other populations (though post-COVID, wellbeing became a more mainstream conversation). These assumptions (that disability automatically had a negative impact on wellbeing and needed to be understood and supported, a sentiment derived from the medical model of disability) were strong in the assistive technology professional stakeholder group, reflected in interviews, focus groups, and in the open responses. While this approach overlooked the social and environmental factors that contributed to wellbeing, the participants seemed to hold this sentiment whilst demanding exploration of context and contributing factors surrounding a disabled person's outcomes. This perspective was an unexpected and interesting theoretical mixing. Some comments suggested that disabled people should persist and embrace technology as a solution, even in challenging situations where technology was not effective, adequately supported, or providing consistent benefits. This approach viewed technology as a solution for disability-related issues that all stakeholders did not universally recognise or appreciate.

A tension which arose here and throughout this research was that stakeholder groups agreed on what technology could and should be used for but disagreed on what that looked like in practice. 96% of assistive technology professionals felt that wellbeing and satisfaction would be 'bad' or 'very bad' without technology, compared with 57% of disabled technology users. This difference meant that disabled technology users may have had a more stable construction of wellbeing which was less dependent on technology than assistive technology professionals preferred to believe. This causal relationship also depended on what the technology was being used for. While many disabled technology users described how they used technology for entertainment and leisure activities (which would certainly have had an impact on wellbeing if removed), the open comments suggested respondents thought more about technology to control their spaces. If disabled people already

had adequate control of their spaces, they may not have been as impacted by technology in that area.

5.4 Top Causal Factors Related to Each Domain

In addition to the impact questions related to technology, I asked participants to select all relevant listed components they agreed were related to each of the domains. I posed the question, ‘what factors do you think have influenced how technology may impact your (disabled peoples’) independence/autonomy/social activities and participation/wellbeing and satisfaction?’. The options listed were the causal factors (contexts and mechanisms) extracted from the CMOCs at that stage of development to analyse and determine the most important connections. I used the top five causal factors responses as the final layer of analysis to revise the CMOCs from earlier stages of the research. These results brought emphasis to the program theories that most closely highlighted the factors participants felt were most connected to outcomes. In Chapter Six, I will describe the final CMOCs. Both participant groups did not choose the same top five causal factors. Because of the interrelated nature of these connections, some CMOCs will have multiple elements of context and mechanism. As elements of context and mechanism were dynamically intertwined in realist research, a factor may have been context in one causal pathway and a mechanism in another. As such, some of the causal factors I will discuss in the following sections become context in the final CMOCs, while some become mechanisms. These results were based on the five highest connected causal factors from disabled technology users, who were the key participant group for this work. For comparison, I also included the number of assistive technology professionals who responded with those causal factors.

5.4.1 Independence Causal Factors

In the survey I posed the question, ‘what factors do you think have influenced how technology may impact your independence?’ Assistive technology professionals answered, ‘what factors do you think have influenced how technology makes disabled adults in RCSs more independent?’ Table 6 below shows the top causal factors from disabled technology users, with the number of responses from both participant groups.

	Disabled Technology Users	Assistive Technology Professionals
The technology allows me to achieve something important to me	12 (86%)	23 (100%)
Those who support me understand how important it is that my technology work well for me	10 (71%)	20 (87%)
I know enough about technology to find devices I want to try	9 (64%)	17 (74%)
Those who support me knowing enough about technology to help me find technology to try	8 (57%)	19 (83%)
Finding the right access methods / way for me to use the technology (switches, eye gaze, voice control, touch)	7 (50%)	22 (96%)

Table 6. Top causal factors for independence

The top five causal factors prioritised by each participant group were fairly well-aligned, though not in the same order of importance. These highlighted how goal-directed assistive technology use, the assistive technology knowledge of both disabled technology users and their support workers, and well-matched access methods were critical to achieving independence through the use of assistive technology. Kevin, a respondent to the disabled technology users survey, added a note about ownership and the need for support with technology. This notion applied whether the technology was pre-installed, such as when an RCS included a suite of smart home kit in their accommodations, or whether disabled people brought their own technology to new accommodation. They also commented on the difficulty of relying on technology when the Wi-Fi stopped working properly. These additional comments emphasised the significance of having a solid physical infrastructure for technology to function reliably, and for including support for their technology as part of the supports provided to disabled people.

5.4.2 Autonomy Causal Factors

The survey asked disabled technology users about the causal factors they believed influenced the impact of technology on their autonomy and ability to make independent choices. Assistive technology Professionals were asked ‘what factors do you think have influenced how technology may impact disabled people’s ability to be their own person and make their own choices (autonomy)?’ Below in Table 7, I show the most prioritised causal factors.

	Disabled Technology Users	Assistive Technology Professionals
Your support network believes you deserve as much independence as possible	12 (86%)	23 (100%)
You can control the technology without support	11 (79%)	20 (87%)
Support network (carers, close friends, family) feel that technology represents user voice / wishes	10 (71%)	21 (91%)
Carers support you in a way that you can do quite a lot for yourself when you can	10 (71%)	21 (91%)
You feel comfortable using technology in daily routines because it feels 'normal' where you live	10 (71%)	21 (91%)

Table 7. Top causal factors for autonomy

Both participant groups selected the same top causal factors as most crucial to support technology contributing to autonomy for disabled people living in RCSs. The importance of support was repeatedly mentioned, this time in the context of the values and beliefs of a person's network of support. Supporters who not only believed that someone deserved to be as independent as possible but also incorporated that belief into how they delivered supports played a key role in building autonomy with technology. This evidence also emphasised the idea of technology being 'normalised' and well-integrated into daily routines to cultivate the social acceptability of technology use in daily situations.

5.4.3 Social Activities and Participation Causal Factors

In the next set of questions for disabled technology users I asked, 'what factors do you think influenced how technology may impact your social activities and participation?' Assistive technology professionals responded to, 'what factors do you think influenced how technology may impact the wellbeing and satisfaction of disabled adults in RCSs?' The following table shows the most prioritised causal factors related to how technology impacted social activities and participation. Disabled technology users ranked several causal factors as equally important, resulting in more than five factors listed in Table 8.

	Disabled Technology Users	Assistive Technology Professionals
Technology gives me access to more activities I enjoy	12 (86%)	22 (96%)

Technology allows me to stay in contact with people who do not live near me (maintain relationships)	9 (64%)	21 (91%)
My supporters and care setting have lots of connections with the local community	8 (57%)	11 (48%)
I feel more involved in my local community because of tech	7 (50%)	13 (57%)
I have found ways to participate in my local community because of technology	7 (50%)	10 (43%)
I have built a bigger network of peers and friends by using technology	7 (50%)	18 (78%)
I feel I have benefited from partnerships between my care setting and the local community	7 (50%)	11 (48%)

Table 8. Top causal factors for social activities and participation

For this domain, the participant groups did not have the same priorities. The disabled technology users felt that the most important function of technology was to connect people with loved ones and give access to activities they enjoyed. While the assistive technology professionals agreed with these, they also prioritised building bigger networks of friends and meeting new peers in online spaces or group games as facilitators to technology for social activities and participation. Previous literature and interviews emphasised the importance of local community connections, but the current results indicated they were viewed as less significant than previously believed. Instead, the more important causal factors seemed to be technology acting as an access portal; a way that disabled people could connect despite any physical constraints (transportation, availability of support, portability of necessary technologies) which separated them from their local communities.

5.4.4 Wellbeing and Satisfaction Causal Factors

When asked about the causal factors that influenced the impact of technology on wellbeing and satisfaction, disabled technology users and assistive technology professionals did not select the same top causal factors. Table 9 below shows responses from both participant groups.

	Disabled Technology Users	Assistive Technology Professionals
Those who support me knowing enough about technology to help me find technology to try	11 (79%)	19 (83%)

The support I use includes time spent supporting my technology	9 (64%)	19 (83%)
The technology allows me to achieve something important to me	8 (57%)	23 (100%)
I know enough about technology to find devices I want to try	7 (50%)	17 (74%)
Those who support me understand how important it is that my technology work well for me	7 (50%)	20 (87%)

Table 9. Top causal factors for wellbeing and satisfaction

The participant groups had divergent opinions regarding the top causal factors related to technology supporting wellbeing and satisfaction. Disabled technology users clearly prioritised the importance of recognition of and support for the role that technology played in their daily lives. Assistive technology professionals clearly prioritised having formalised processes for selecting and supporting technology in an ongoing way (96%), as well as determining access methods that enabled disabled technology users to access their technologies without facilitation. Interestingly, while disabled technology users agreed that technology enabling them to achieve something important to them was critical to independence, they did not see it as being as connected with wellbeing and satisfaction. This evidence suggested that increased independence may not be as closely or causally linked to wellbeing and satisfaction as previously assumed.

The results from the survey became the final layer of prioritised causal factors applied to the revised CMOCs to produce the most finalised CMOCs for this research, which I will describe in detail in the next chapter.

5.5 Summary

In Chapter Five, I have described the survey data and provided additional context to how these findings were applied to the realist review and evaluation. After describing my participant demographics, I detailed how participants responded to the potential impacts of technology on four key outcomes. The consensus among both participant groups was that technology played a positive role in independence, indicated by all responses declining by at least one answer choice in the absence of technology.

For the impact of technology on autonomy, 86% of disabled technology users and 78% of assistive technology professionals reported that a loss of technology would result in a decline in autonomy to disabled people. 64% of respondents felt that the removal of their technology would have a severe or moderate negative impact on their social activities and participation. Finally, the most variable responses to the impact of technology came in relation to wellbeing and satisfaction, with a moderate percentage of respondents believing technology had no impact on wellbeing and satisfaction.

The final section of findings from the survey produced the contextual factors of strongest interest to stakeholders, which were then used as the final layer of analysis for the realist review and evaluation. These findings demonstrated the relationships between investigated elements and outcomes, and the strength with which those associations were likely causal in producing each outcome. These factors were then ranked, with the top five responses to each outcome area acting as the final layer of analysis, emphasising the CMOCs featuring these connections.

In the next chapter, I will present and detail the foundational context elements upon which the remaining CMOCs are built, followed by the full details and evidence for the final CMOCs from the realist review and evaluation.

Chapter Six: Foundations and Context-Mechanism-Outcome Configurations

In realist research, the purpose of developing context-mechanism-outcome configurations (CMOCs) was to condense complex data from varied sources to describe detailed causal pathways which interacted under the precise conditions to produce outcomes under investigation. These rendered a CMOC into its \ and contingent components (Pawson, 2013). These CMOC theories began in the realist review as initial rough program theories (IRPT) in the form of *if-then-because* statements. For example, one IRPT from discussions and literature early in this work was ‘*if* technology feels like a normal part of being supported and other people are also using it, *then* disabled technology users are more likely to engage with technology *because* they feel more confident using it publicly.’ These statements served as initial hypotheses for subsequent investigation in the realist review. *If* the prescribed elements were in place under suitable conditions, *then* the program would produce the anticipated outcomes *because* of specific interactions between elements. The CMOC format specified the relationship(s) between features of *context* under which *mechanisms* activated to produce *outcomes*. *Context* conditions were the backdrop conditions in which an intervention or program of change occurred and included cultural norms, geographic location, resources and opportunities, and other conditions which may have triggered or modified whether or how a mechanism might activate. *Mechanisms* were the agents describing how a program operated to generate changes and included resources, behaviours, beliefs, reasoning, and choices made. *Outcomes* were the change results which were produced when *mechanisms* activated in the right *context* conditions (Jagosh et al, 2012).

Due to the complexity and variety of settings and contextual factors in RCSs, most of the CMO configurations produced in this research required several of each causal element to completely and precisely describe the formulas producing the outcomes under investigation. Reducing each CMOC to a single element of context, a single mechanism, and a single outcome missed necessary complexity in these interactions. Therefore, in many of the final CMOCs in this chapter, there are multiple elements of context and mechanisms explained to produce the outcomes.

There were some commonalities in elements of context which were present across CMOCs. These commonalities were extracted to describe the foundational socio-ecological landscape which must be constructed for the causal contexts to create the conditions for mechanisms to activate. In these research results from the realist review and realist evaluation, there were structural, social, political, and cultural elements which all contributed to the broader context required for positive technology outcomes in RCSs.

Describing this foundational contextual landscape from the realist review in the first section lays the underpinnings for the CMO configurations related to independence, autonomy, social engagement and participation, and satisfaction and wellbeing in the sections that follow. First, I will describe the foundational contextual landscape which underpins the precise middle range CMOCs.

6.1 Foundational Context

Through the process of analysing these data, I found common elements of context which underpinned every IRPT and CMOC I wrote; without these contextual elements present, the mechanisms could not activate, but in each CMOC there were additional elements of context unique to that causal pathway. Synthesising these recurring contextual elements into a broader foundational context description allowed me to focus on the more direct causal pathway elements for the CMOCs for each outcome. Therefore, the next section will describe the underpinning contextual scene upon which I built the final configurations. Each CMOC described in the later sections of this chapter should be considered to contain these foundations without repeated mention.

6.1.1 *Physical Infrastructure*

Discussion of physical infrastructure arose in all four focus groups and in seventeen of the individual interviews. The core components of a stable infrastructure included sufficient power mains, data access, and adequate broadband. Sufficient power mains ensured that all devices could be powered and charged without interfering with other necessary electronic devices. Data access supported many internet-enabled features on common assistive technologies. Adequate broadband ensured

smart ecosystems of technology would have capacity for multiple people at a site, as was critical in RCSs. The stability and reliability this physical infrastructure provided to users made this a critical consideration for both disabled technology users and assistive technology professionals. Harold, who used assistive technology to give him improved independent access in his space, proclaimed “if you can’t trust it to work, you always need a backup method... then what’s the point?” Caroline, who supported disabled technology users, shared that in her experience:

“... [we] basically found out that once you had like two or three bad experiences with reliability, then that's it - you cannot go on with it again.”

She described this evidence as an example of how, without basic physical infrastructure, there was poor adoption and trust in new technologies. She also shared how quickly engagement and enthusiasm for new tools waned with uncertain function or reliability. Marietta, an assistive technology user living in a RCS, exclaimed,

“If Alexa isn’t going to be able to tell me the daily news every single time, I just don’t want it. I just want to know how to get things done that I need doing.”

Several white papers across the United Kingdom related to technology projects in adult social care also discussed the importance of stable physical infrastructure. The Association of Directors of Adult Social Services (ADASS) and the Tech-Enabled Care Services Association (TSA) created a joint report on the need for stable infrastructure. They specified the necessity of a stable digital infrastructure and the negative impact its absence has had on true integration of technology. They also highlighted unequal access to both physical infrastructure and the technologies to build upon it in RCSs.

“Covid-19 has highlighted the extent of digital inequalities in the UK and how digital exclusion was having a negative impact on many people who use care services, both in lost opportunities for wellbeing but also the wider benefits” (ADASS and TEC, 2021: 18).

Disabled people living in regions lacking sufficient digital infrastructure could not progress beyond the constant setup and troubleshooting phases of technology in order to attain proficient usage. But this lack of digital infrastructure deprived disabled people of equal access to the full capabilities of these assistive technologies in another way. To ensure the successful adoption and utilisation of technology, assistive technology professionals highlighted the importance of thoroughly examining the foundational physical infrastructure requirements. Overlooking these practicalities quickly eroded trust and engagement among technology users and staff. Janet, an assistive technology delivery practitioner, shared ‘I’ve never ... well, maybe rarely ... had a technology delivery go well if the internet and plugs aren’t sorted out first.’

Finally, McClain-Nhlapo and Raja (2021) confirmed that inequities and gaps in access to a robust digital infrastructure negatively impacted disabled people’s technology use, highlighting the importance of investment in basic electrical and data infrastructure. While this insight seemed to be an obvious element of practicality, the fact that it was mentioned in nearly every focus group and interview that I conducted meant people recognised its direct connection to any positive technology outcomes for disabled technology users.

6.1.2 Financial Pathways

While infrastructure formed the backbone of assistive technology integration in RCSs, the effective utilisation of these technologies hinged on the ability to navigate sensible financial avenues for their acquisition. Navigating the financing and procurement of technology arose in three focus groups, in every interview with assistive technology professionals, and in one interview with a disabled technology user. Clint described the assistive technology funding landscape this way:

“I had a combination of agency funding, research project funding, and worked with a few charities to get my [AT]. But if you don’t know where to look, and you don’t have skills or time to navigate, you just never get what you need.”

He had spent significant time and resource searching for funding for a more advanced wheelchair and smart home ecosystem that he would actually be able to

use and commented that most people living in RCSs would never have access to complex technology because of the lack of resource to locate funding. Leadership in charity and support organisations repeatedly cited the lack of knowledge related to available funding sources as justification for failing to invest in technology for the people they supported. To identify these resources, charity and support organisations would need to comb through local, regional, and national funding sources for every single person they supported, understand the parameters for spending funds, and navigate the procurement processes. These were tasks that most support workers did not have time or expertise to do on their own, and which few organisations had designated as a dedicated job role (Gibson et al., 2016).

Based on participant discussions with assistive technology professionals, there were extreme challenges to understanding financial resources available for smart home technology for disabled adults in RCSs, as well as substantial administrative barriers to applying for, accessing, and ultimately spending identified funds. Robert, with a background in transitioning people and their assistive technology from higher education to RCSs, described the change in funding resource between higher education and RCS: "... there is definitely a cliff edge in terms of funding and support as you move from college to adult provision." Having experienced fundraisers familiar with grant writing and navigating funding systems would better enable organisations to draw from a variety of funds to use for assistive technology investment. They could also support disabled people to access these funding pools to assist with the expense of purchasing assistive technology to integrate in order to reach goals in a support plan. Ultimately, a person-centred approach meant that the supports and tools travelled with a person to build a life that worked for them wherever they lived. At a higher level of abstraction, this relationship meant funds needed to be allocated to the *person*, not the *setting* or environment (e.g. at home, at work for employment support, for daily living and community participation, and for higher education).

In order for people to access technology as support tools for independence, adult social care and support organisations, assistive technology providers, and disabled adults using support needed to know about funding sources available to spend on technology. The ideal funding would cover both up-front purchase costs as well as

ongoing maintenance, support, and subscription models for technology use. Ginnifer, an assistive technology professional, emphasised:

“There must be a friendly policy infrastructure ... policy can be a real infrastructure barrier sometimes. You know, ‘*you can’t have this here (in this setting), and you can’t have that there, and you can’t have this here*’... just endless policy that I had to navigate through just to bring a place [residential care setting] into the modern world.”

This quote highlighted the difficulty of understanding and advocating for the role of technology as a support and daily living tool for disabled people. Another assistive technology professional, Carla, commented:

“You shouldn’t have to fight for provision that enables you to live just a happy, healthy, successful life ... that should not be something that humans have to fight for under any circumstances.”

This was in response to the segmentation and separation of funding by setting, which tended to exclude disabled people who were not in education or employment. Both evidence in literature and discussion with participants found that the cost of the smart home technologies was often not the biggest challenge, but identifying funding sources allowable for such spending was a key barrier (Jamwal et al., 2020; Harris, 2010; Ibrahim et al., 2022).

In the United Kingdom, there were funding programs for disabled people in employment (Access to Work), in education (Disability Student Allowance), and for specific sensory supports such as hearing aids (NHS) (Giannoumis, 2023). While they had established the Personal Independence Payment, it was available to few disabled people and did not apply to people living in RCSs. Gibson and colleagues found that, despite availability of technologies to improve quality of life and wellbeing, local authorities focused more on telehealth technologies to help the workforce and rarely provided technology directly to people (Gibson et al., 2016; LGA, 2020). The speed of obtaining technology was crucial in actual adoption—the longer it took to navigate these processes and secure funding for devices, the less likely people were to achieve successful use of the tools when they arrived (Phillips and Zhao, 1993;

Jamwal et al., 2020; Harris, 2010). Another report from the NHSX found that ‘technology providers experienced lengthy commissioning and procurement processes within the sector, slowing down both innovation and adoption,’ highlighting a last link between policy in this space as it impacted consumer access to funding (Oxford Brookes University Institute of Public Care, 2021).

Considering the consistent mention of funding in the interviews, it emerged as a necessary component in the broader landscape of factors influencing the causal pathways that shaped the resulting outcomes. Users could not achieve positive outcomes for technology use if they could not identify how to secure and spend funding for technology.

6.1.3 Technology Leadership

Two of the focus groups directly identified the critical impact of technology leadership, as did eight interviews with assistive technology professionals. Three discussions with disabled technology users alluded to the importance of support structures within RCSs. One exchange in an assistive technology professional focus group illustrated the connected impacts of leadership which triggered this discussion:

Amy: “there is real need for staff to buy into it because unless staff are wanting to do it, they’re not going to follow up on the Wi-Fi or figure out ‘why’s that important’ and instilling that into the staff”.

Chloë: “I suppose that then means that engaged leadership, don’t you? You need the leadership to want to pay for different things or extra sockets when needed, and so you’re not begging them to be on board with that or thinking you can manage with one socket for all your stuff”.

May: “I also think management support – if you’ve got support ‘from upstairs’ and you’ve got the ability to say that we’ve got to talk to the staff and try to keep the staff engaged, so if leadership are on board staff are much more likely to be on board.”

This foundational concept of the importance of leadership and their engagement started with organisational and site leaders who were both competent and confident

using basic technology. Leaders needed to clearly understand and believe in the role of technology both for daily living and in the lives of support workers. Many people had smart phones and smartwatches, used smart assistants and speakers at home, and used computers or tablets for social media and shopping. Chloë elaborated on this leadership in confidence about technology, saying:

“It feels like a bit of a pyramid though, doesn’t it? Where everybody is kind of ... well, that’s where leadership comes in, everyone’s got an awareness and are thinking about technology. Not everyone necessarily needs to be the expert in it, but yeah, everyone with a little ... *‘I’ve seen a bit of technology, maybe I do know of something that could be done?’* Then everybody ... kind of thinks about it ... and where you get that, it’s quite a cultural thing, isn’t it?”

From the experiences of the participants of this study, adult social care organisations who led the way by demonstrating technology use and permitting people to engage with their personal technologies while at work had a substantially easier time integrating technology into their support workflows. Technology already ‘felt normal’ there, compared with sites which banned personal devices from being on their person while on-shift, which made any new technology feel forbidden and out of place.

Another helpful way that leaders supported technology was by helping staff teams to overcome their fear of technology. While many people were grudgingly coming along with technology development, there were still workers in the adult social care profession for whom mainstream technology was still financially inaccessible. Many of these people did not own more advanced technology devices, giving them the impression that they were ‘not that techie.’ The following exchange was an example of a helpful role that leaders could play: to highlight how people were already engaging with technology to reduce their feelings that ‘they were not techie.’ Norm, an assistive technologist, described a leader on one of his installation sites who made a tremendous impact on technology adoption by staff. When he was delivering training on new technology and getting engagement from the trainees, one woman said, ‘I’m just not very techie.’ To this, the site manager laughed and teased, ‘who’s set up your smartphone then? What is that, a smart watch? Not techie indeed!’ This conversation demonstrated that when leaders could see technology seamlessly

integrating, not interfering, with daily life, it was much easier to appeal to the 'inner techie' identities of others and engage them in a positive and confident way. They were better able to activate 'technology competence' in their support workforce.

While most of the evidence found in the literature related to leadership support of technology used by the support workforce and not by disabled people themselves, there was still a breadth of evidence that leadership support was key to successful technology adoption and engagement. One study found that the ability of a leader to create a shared vision for the role of technology and to build an environment of 'innovation safety' where staff felt confident to engage with technology influenced adoption (Vogelsmeier and Scott-Cawiezell, 2009). Kayla, an assistive technology professional in this research, described a lack of leadership support for technology, saying:

“I think it [lack of leader support, engagement] kind of contributes to maladaptation. [Disabled] People have to adapt to where they are, so they cope by lowering their expectations, like being more passive...maybe reducing aspirations? And I think that happens across for supporters as well as tech users.”

This discussion revolved around the fact that many support workers possessed a higher level of technological proficiency than they acknowledged. This was evident when they engaged with smart televisions, smartphones for communication, or tablet-based activities such as gaming or browsing social media platforms for their own leisure. Yet, in the absence of support from leaders, they returned to work and failed to recognise the value of technology for the people they supported or its potential role in their day-to-day activities. In the literature, researchers found that this separation created misuse and under-use of technology and stifled innovation (Bauwens et al., 2021).

If leaders effectively minimised resistance to the use of technology, often starting by permitting personal devices, integrating technology into support workflows would result in more effective technology use. When leaders demonstrated proactive leveraging of technology to do their own jobs well, they made it more normal to see and use technology in the context of typical support work. When leaders were

intentional about the technology they selected, and the technology either adequately replaced or enriched work tasks rather than increasing the complexity of a support workload, people viewed technology as a support rather than a chore or burden. This distinction was an important mindset shift to build toward the causal pathways for positive technology outcomes for disabled people being supported in these RCSs.

Leadership had a critical role to play in whether people got satisfactory use of their technologies by being competent and confident with technology themselves, by helping people overcome fear and unfamiliarity with technology in RCSs, and by considering technology to be critical in daily routines and life. But even the strongest technology leadership could not mitigate a lack of information, knowledge, and practical skills for interacting with and maintaining technology.

6.1.4 Assistive Technology Knowledge and Skills

Every focus group, four disabled technology user and eight assistive technology professional interviews discussed the challenge of staff skills, professional development content related to technology and support, and knowledge resources to fill the gaps. Foundational qualities mentioned as being crucial in organisational training and support included a resilient skills infrastructure, professional development, and knowledge resources.

Assistive technology professionals primarily mentioned the concept of a resilient skills infrastructure, and especially the few with a background in Information Technology or training. The description of a resilient skills infrastructure involved the distribution of training across various levels and job roles within support organisations, while also distinguishing the specific knowledge and skills required for each. Choosing ‘technology champions,’ for example, meant that the organisation heavily invested in a single person to build their knowledge and skills whilst neglecting skill investment in other workers. When the trained person went on holiday or was away from work for several consecutive days, all the tech-related knowledge and duties unravelled. Robert, one of the assistive technology professionals, explained:

“Having your only technologist go on holiday, or leave the company, means all of the training or qualifications you’ve invested in walk out the door. And the real risk is, what if you’ve gone all-in with a huge suite of kit? Now what will you do with it? Was it all money lost if no one else can work it?”

Another assistive technology professional and three disabled technology users mentioned the importance of having multiple staff members with the skills and time to support technology. When organisations invested all the upskilling and professional development related to digital skills to a select few staff members (or worse, team leaders or managers who did not have as much direct contact with people being supported), the risk was high that those people would not be available when needed to address issues that inevitably cropped up with technology (ADASS and TEC, 2021; Gilbert, 2022). One support worker, May, who supported technology, emphasised that technology seemed to go wrong when she was away, and by the time she returned, it had been out of use for several days with a frustrated user. Evidence in the literature confirms these findings that diversifying assistive technology training across people and roles had made it more likely that a knowledgeable person would be on site to engage when needed (ADASS, 2020; SCIE, 2015).

In the absence of proper training and exposure to new technologies, both disabled people and their supporters were unaware of the full range of possibilities. Without training and direct demonstrations of kit for both staff and potential technology users, people did not know what technology was available, the variety of functions and features, and the kinds of activities made possible by tech. May, the support worker, described technology training as ‘making the lightbulb come on,’ saying:

“People just have no idea ... *‘you mean I can make this machine read books that I love to me? That little thing can really play any music I want it to?’* I ask people what they’d like to do, and they don’t have an answer because they don’t even know the choices.”

But in the experience of many of the assistive technology professionals and technology users, sparking initial ideas set them on a course to discover the technology they wanted. Prior to receiving some exploratory information about

technology, they did not even know what to seek out, thus even if they learned about new kinds of devices they were not personally interested in, they often learned enough to explore for tools they might want.

While evidence in literature broadly acknowledged that there was no way to teach every skill needed for effective use of technology, it still tended to be the focus of technology delivery plans (Dept of Health and Social Care, 2021; Vabulas, 2021; Blake et al., 2021). One major problem current participants discussed at length was the pace of technology change. This pace made training materials difficult to keep updated and a 'mental catalogue' of available technologies challenging to maintain, even by those who provided assistive technology training as their core job role. When asked if adoption was simply a matter of skills training, Carla, an assistive technology professional, said:

"I don't think it was necessarily willingness [from support workers] that was lacking. I think it was ... availability of technology and access to it and then access to the right kind of support with that technology."

Once the challenges of identifying and supporting technology outstripped the taught skills of disabled technology users and their supporters, it was necessary to have a community of practice of more skilled and knowledgeable people to progress past those barriers. This challenge pointed to the need for a resilient skills infrastructure as well as some backup resources and signposting.

One assistive technology professional participant, Rose, discussed teaching some technology or digital engagement skills and having 'someone to call to support us' for on-demand troubleshooting. She also mentioned the article 'What Shall We Do With All Our iPads?' which described how the purchase of tools without technical support did not have a positive impact on staff or potential technology users (Walker, 2015). All focus groups with assistive technology professionals emphasised having ways for people to access a 'backup method' or other resources (including leadership support to spend the time required to find and engage with these materials) to ensure best use of their technologies.

6.1.5 Summary

These foundational concepts influenced the causal pathways to impactful assistive technology use. Although they were not all directly necessary for the causal pathways, many of the elements described in the upcoming CMOCs depended on the presence of a stable physical infrastructure, financial pathways, technology leadership, and existing assistive technology knowledge and skills. Certainly, participants mentioned these elements when describing the ideal conditions for technology delivery or when sharing their experiences on especially smooth technology implementation or adoption.

With this broader environment described above in place, I will describe the more granular causal pathways in the following sections. Some CMOCs featured more quotes and data from a small subset of participants. In many cases, the in-depth realist interviews which concentrated on specific CMOCs generated more evidence for the final configurations than the broader focus groups and early interviews. Additionally, assistive technology professionals showed greater responsiveness towards recruitment for these interviews than disabled technology users.

6.2 Independence

In all four assistive technology professional focus groups, the impact of values emerged related to independence with technology use. Additionally, seven disabled technology users mentioned this connection, and it was discussed in six interviews with assistive technology professionals. The participants frequently discussed the word *independence*, mentioning it across transcripts 99 times. All stakeholders acknowledged the dissonance that arose when support workers were expected to promote technology as tools for independence whilst simultaneously relying on disabled people to maintain their dependency for their continued livelihoods.

Disabled technology users also acknowledged they had some difficulty advocating for more moments of independence in RCSs, with three expressing the need to move away from independence as a binary idea. From these interview discussions and evidence searches in the literature, I wrote several IRPTs related to the use of technology, personhood, control over daily life, and supports for independence.

These program theories were granular in detail and through the course of the research synthesised with others to become more abstract (middle range) to describe the contexts, mechanisms, and outcomes directly causal to independence through technology.

6.2.1 Independence CMOC

*When disabled people and support workers had a shared understanding of what independence looked like and had a basic knowledge of some assistive technologies (**context**), they found compatible assistive technology and access methods (**mechanism**) that supported the disabled person to use technology to achieve something important to them independently (**outcome**).*

6.2.2 Independence Contexts Evidence

Focus group discussions and interviews mentioned the phrase 'shared + understanding' 118 times, highlighting it as a significant concept. One assistive technology professional interviewed shared:

“The [independence] culture is about having the patient in the centre of the model and being able to do all of the things that patient requires. And not just once, and not just the things that are medically needed. And understanding the emotional impact that independence and being able to do things independently has - if somebody wants to – or can have on their well-being and mental health as well.”

This quote highlighted how support providers and support users must converge on ideas around independence to best construct supports to suit each individual. In the literature, most UK care organisations embraced person-centred approaches to care and support, prioritising individual needs, desires, and independence (Fagan et al., 2017; Kittay, 2011). The context of this middle range theory built on the previous foundational ideas; technology leadership and assistive technology skills empowered

organisations to support people differently (Rabiee, 2013). One assistive technology professional, Caroline, shared in our interview that:

“Staff are not going to support technology and the role it can play in independence if they don’t really recognise how important it was for each individual to have access to independence and autonomy and control over as much of their lives as possible.”

Another assistive technology professional, Robert, shared in the first focus group that they must ‘employ a charm offensive’ and ‘avoid the term ‘independence’ when talking about technology’ because it complicated how support workers engaged with new technology. Evidence in the literature reflects that, at a fundamental level, support workers needed the people they supported to need them, and the idea of spending support time to facilitate independence rather than supporting the person directly made them feel under serious threat of a reduced role (Katzman, 2020). Katzman's argument was that support workers and disabled people using support services generally shared the same goal of promoting independence. However, the management of these services sometimes hindered the achievement of this goal by not adequately addressing individual support needs and preferences. This argument was supported in other research conducted by White et al (2010) and Storer and Branham (2021). One participant in their research challenged ideas about independence being a core deciding factor in quality of life for disabled people (McDougall et al., 2010). In my research, Clint claimed,

“Belligerent pursuit of independence can be really isolating – it isn’t the only way to build a life, it has to be based on what the individual and their supporters all want.”

According to this quote, the convergence of ideas regarding independence and collaboration with disabled people in RCSs was necessary to establish a shared conceptualisation of independence that was beneficial and agreeable to all parties involved.

Three of my Assistive technology professional focus groups and seven disabled technology users in interviews mentioned the need for other professions to have

some base-level of knowledge about assistive technology and help identify opportunities to recommend and use it as a support. Indeed, participants mentioned the terms 'knowledge', 'training', and 'skills' 214 times across transcripts, indicating that they considered it an important causal component. This element of context had to be in place to activate the mechanisms described in this CMOC. As one support worker, May, explained, “none of us had any idea what to even ask for before that [demonstration] ... I didn’t know any of that existed.” She followed with the comparison,

“It was like being asked to order food in a fancy restaurant when they haven’t given you a menu. If you don’t know the choices, and you don’t know what’s out there, you can’t see your day going any differently than it already is.”

Other evidence in the research literature confirmed and added detail to this idea, finding that in addition to staff skills and knowledge, disabled technology users needed access to similar information:

“Lack of awareness of available technologies appears to be an issue across disability types... people who were more educated were more likely to know about technologies that might help them, to feel confident about using more sophisticated technologies, and to have the wherewithal to conduct their own research to learn about devices...” (Kaye et al., 2008: 201).

Several government reports agreed on the importance of assistive technology knowledge. These included the NHS report ‘Interdependence with Other Services’ (NHS, 2018), the ‘Technology for Our Ageing Population: Panel For Innovation’ (TAPPI) report (Beech and Porteus, 2021), and the UK policy paper ‘People At The Heart of Care: Adult Social Care Reform White Paper’ (Health and Care, 2021). In my research, every focus group conversation, four disabled technology user interviews, and eight assistive technology professionals in interviews mentioned the challenge of knowledge and skills related to technology and support, and the need for knowledge resources to fill the gaps.

Both disabled technology users and staff must have some training in both assistive and mainstream technologies. They could not construct ‘the art of what was possible’

without some basic starting points and a beginning framework of how different tools could facilitate independence. One major problem discussed at length with participants was the pace at which technology changed. Rapid development, updates, and new products made training materials difficult to keep updated and a 'mental catalogue' of available technologies challenging to maintain. When asked if adoption was simply a matter of skills training, Kasey, an assistive technology professional, described knowledge, confidence, and troubleshooting support as key factors in training success. Margaret, a disabled technology user, argued that 'it was hard for people to support things they didn't understand,' saying that it has been difficult for her to use her specialist technology ecosystem (which included an AAC device and wheelchair mounting system) since all of the support workers who received the initial training from the outside provider had since left her RCS. She did not expect for new support workers to learn about her technology on their own just to support her. She had some concerns that certain especially 'tech-fearful' support workers avoided her entirely, which she felt would be improved with more support and training to reduce fear of breaking her specialist devices. Clint emphasised how basic knowledge and skills served as a starting point for everyone in a technology journey. Evidence in literature confirms this connection; no one even knew what technology was capable of until they had seen a few demonstrations, had the opportunity to interact with some of the technology available, and seen it being used by a fluent user (ADASS and TEC, 2021; Gilbert, 2022). This knowledge gave people a starting point to explore potential technologies to trial.

6.2.3 Independence Mechanisms Evidence

Assistive technology knowledge and skills, as well as a shared view of independence, activated support workers and disabled adults identifying compatible assistive and mainstream technologies to try. One research team in the literature found that technology use by disabled adults was driven by support worker knowledge of the person they were supporting, which increased the likelihood that they would identify technologies to enable them to engage with their hobbies independently (Balasuriya et al., 2022). In the current research, Clint responded to discussion regarding familiarity between support workers and the people they were supporting saying:

Clint: “I think it [identifying tech and priorities well] is partly to do with relationships between the support staff and the person.”

Julie: “so you mean that the relationship between them is important for them to really understand their priorities?”

Clint: “yeah. It’s important for communicating priorities, and sometimes I find your priorities change in different situations ... from moment to moment, you know what I mean? I think that’s why ... some staff are more attuned than others, and some are better at certain tasks or others ... the good relationships [allow them to follow a person’s priorities better]”.

A study in the literature emphasised the importance of compatibility between technology users and their desired goals (Buchholz et al., 2020). One researcher created a set of toolkits for support workers, service managers, and disabled adults to select and use technologies which improved their independent access to activities they enjoyed (Seale, 2021a; Seale, 2021b; Seale, 2021c). This evidence highlighted the importance of ‘getting it right’ and identifying suitable and compatible technologies for the needs and goals of a potential technology user. From an assistive technology professional perspective, Carla shared in her interview:

“It’s so much more than [an assistive technology sales representative] just going into a local authority going ‘*my kit does this; how many are you going to buy?*’ It’s actually looking at long term goals and where people want to be and how they want to get there and actually letting people who are supported say ‘*this is my long term goal. This is how I wanna make those steps, and this is the technology that I want to choose to take on this journey with me.*’

This account demonstrated the connection between technology that was compatible with the goals of a potential user and what they aspired to achieve with technology. Words associated with compatibility ('match,' 'getting it right,' and 'right fit') came up 291 times in my focus group and interview transcripts with 198 of those connected with discussion about independence. This indicated there was a strong relationship between this mechanism and independence.

Disabled technology users stressed the importance of being involved in the technology selection process to avoid unwanted or irrelevant technologies. For example, Brent, a disabled technology user, described having his laptop replaced with a tablet to use as a communication device, without being given the option to keep the laptop. His supporters did not realise that even with the tablet, he may want to use his laptop for other tasks and activities. Involving him in the selection process would have allowed for a conversation about his preferences. Matching the technologies to the tasks disabled people wanted to achieve was vital in having the tools they needed to be independent when they wanted to. Janet, another technology user, was very pleased with a new kindle which gave her renewed access to library books, saying:

“They really listened to what I wanted... they took the time, if you see what I mean. Didn’t just get any old thing, they found what I would really love.”

She was happy to use this technology because it enabled her to spend time reading.

For technology to truly result in improved independence, disabled people must be able to access and use it without facilitation or support. Jason, a disabled technology user I interviewed, shared:

Jason: “And what else can I do? TV, fan, oh yeah, the lamp. When I want to turn to light on and off, and there is no one to turn it on for me, I can do that now.”

Julie: “Why has it been really meaningful for you to not have to rely on staff to do stuff like that?”

Jason: “‘cause I don't like staff doing things for me. If I can do it, I'd rather do it. No reason for them to do it if I can”.

This dialogue was in the context of a discussion of some access adaptations that the assistive technology team had made to his smart home set-up to reduce his reliance on support for performing common, daily tasks. Indeed, the term 'access' came up 138 times, indicating it was an important causal factor for independence.

Technologies must be well-suited to the preferences of a person and accessible in any ways the person wanted to interact with it. However, it was unnecessary for an assistive technology tool to be entirely bespoke to be effective. In the literature, evidence from a random sample of 25 participants from another intervention study showed that the satisfaction between bespoke devices and well-established commercially available devices was similar, which meant that it may have been the access method rather than the perfect suitability of the tool which was most impactful (Schweitzer et al., 1999). Another study found that access and usability played key roles in the full realisation of independence through technology (Agree, 2014).

Secondary evidence from a systematic review described the core components of accessibility as technology being 'perceivable, operable, understandable, and robust' (Zhang et al., 2020). For the disabled technology users in my work, that meant they gathered information from (auditory, visual, tactile) and operated the technology (with eye gaze, switch access, voice control). They also understood it (had output that was compatible with their preferences and could be modified or summarised in plain language) and trusted that it was going to be reliable (robust). In my research, for Janet to achieve independence in using her kindle, it was necessary to adjust the brightness, text size, and contrast settings to ensure perceivability. Additionally, she required an articulating mount positioned near her bed to eliminate the need for manual handling, ensuring operability. She knew what books she enjoyed and how to find them (understandable) and the device was reliable with a long battery life and consistent operation. Another assistive technology user, Craig, could only use his AAC device when mounted onto his wheelchair and calibrated for his eye gaze. He required additional assistive technologies (a button with a recorded message which said, 'please mount my communication device'). Identifying a way for him to use his technology without facilitation by a support worker would certainly improve his independence with the device and would empower him to advocate for himself for the remainder of the day. By matching technologies and access methods with the access preferences of the users, disabled adults used technology both independently and to be more independent (Turner and Berridge, 2023; Botelho, 2021; Castro, 2008).

6.2.4 Independence Outcomes Evidence

Because people had a basic knowledge of technologies and their functions and capabilities, it enabled them to engage with technology to find devices they could trial with access methods that worked for each technology user. When these elements came together, they produced an ecosystem of tools that worked for that person, giving them the opportunity to use technology to engage in tasks and activities that were important to them. Liam, a disabled technology user, described how he had the 'best days' when he had support workers who were there when his assistive technology was delivered and arranged. He used a powered wheelchair and a mounted vocal output device, both controlled from a tablet mounted on his chair using eye gaze. His technology enabled him to be most independent when knowledgeable staff confidently supported his access methods and recognised the importance of his access to it.

Golisz and colleagues (2018) found in a double baseline single case design that, with some training, every day technologies made three people more independent in daily tasks. One no longer required support for brushing his teeth (an important and empowering self-care skill), one dressed without support or reminders from staff (a key privacy improvement), and the last had a tool to support him tying his own shoes. This technology use required some training for support workers and the technology users, and the right access methods (visual timers, auditory and video cues) meant that they each had tools they could use independently to complete part of their daily routines. This agreed with my primary evidence from an assistive technology professional, Caroline, who described that the best independence outcomes occurred where "people could access their own tools, their own ways, to do things by themselves if they wanted to." One disabled technology user, Marcus, pointed out that technology was 'fussy,' and that if it did not enable a person to do something that was important to them, 'it isn't worth the effort, really.' He also emphasised that having the right access methods had reduced the effort required to access and utilise his technologies.

Marcus described technology for independence this way:

“People in care don’t think about independence as applying to them, they think of it as relating to people who have their own living space. In care, this [concept] seemed to be more about choice in their living spaces and control over both the environment and how their supports were delivered. The most sensible application of ‘independence’ might be in people having the tools to have self-directed lives, which also just means more choice ... more options for how and when they can do what they’d like to do without consideration of availability of other supports because they have the tools to do it how and when they want.”

The end of this quote pulled together how choice (from assistive technology knowledge) interacted with options (access methods) to produce independence with and through technology to achieve something the disabled technology user cared about.

6.3 Autonomy

In this research, participants mentioned the terms 'autonomy', 'control', and 'choice' (often used interchangeably or together) a total of 190 times in focus groups and interviews. *Autonomy* was described as a disabled person making their own choices, being their own person, and feeling ‘quite in charge’ of their lives. In interviews, assistive technology professionals often described autonomy as ‘being in charge’ and ‘having control,’ whereas disabled people focused more on autonomy as ‘being their own person’ and getting to live the life they wanted using support. Based on the focus groups and interviews, autonomy was not possible if someone did not first have some tools for independence. Hence, once people established moments of independence, they built upon them in a causal chain to achieve autonomy, as described in the following sections. There were multiple causal components of context, mechanism, and outcomes selected from the top survey results. All of these components interacted to produce the outcome of autonomy.

6.3.1 Autonomy CMOOC

When a disabled person controlled their technology without support and their support network believed that technology

*represented the voice of the user (**context**), people supported in a way that integrated opportunities to use technology for independence and made technology use 'feel normal,' (**mechanisms**). This resulted in disabled adults having the tools they needed to take control over how they were supported and advocate for their autonomy (**outcome**).*

6.3.2 Autonomy Contexts Evidence

Based on evidence, I cannot overstate the importance of disabled technology users controlling their technology without support. Clint emphasised the significance of using his technology without support by saying:

“it was stressful to have to ask for help for every little thing, even when support was very good ... people don't realise how freeing it can be to do stuff for yourself ... and how stressful it can be to have to keep asking for help all the time ... to be able to do stuff without going through someone else.”

Even when support was readily available, it was still stressful to advocate for himself without the right tools. This evidence underscored the need to be able to complete tasks of choice without facilitators or moderators, or at least to have the option. In the literature, Boot et al. reinforced this sentiment, emphasising that when the use of technology was contingent upon a caregiver, genuine autonomy was hindered (Boot et al., 2018: 917-918). According to that study, if the person relied on a supporter to access assistive products, the supporter needed to be convinced of the necessity of the assistive technology. In response to my interview question about what successful and engaged supporters do differently with assistive technology, Carla replied:

“I think it was their willingness to learn that technology alongside the people they were supporting and to see the value of it, I think. When it [technology use] goes well, the staff around understand the value of it. They see that it's gonna be a bit of a benefit to them as well as to the individual user. I think fundamentally they recognise how important it is to give that individual an opportunity to make progress and to enable them to reach outcomes and to push them further”.

The consequences of relying on support worker-mediated technology access for autonomy were limitations to control and the ability for disabled people to advocate for themselves. As Marcus, a disabled technology user, elaborated:

“To have the tools and support to choose yourself and not have to ‘ask permission’ for what you want was completely life changing.”

One assistive technology professional, Will, shared an experience supporting a disabled adult to use assistive technology to compose music. Determining ways to select and arrange the assistive technology for him to use without support meant that he could continue composing even when support was not available. In the literature, one evidence review agreed that technology only improved independence and autonomy when the person accessed it by themselves, supporting this element of context building towards technology for autonomy (Jamwal et al., 2022). Another researcher found accessibility to be a key barrier to technology use, which impacted the tools available to improve autonomy (Patrick et al., 2020). Independent, unmediated access to technology was crucial in ensuring that disabled technology users had the tools they wanted to advocate for their autonomy and take control of their supports. Without this, people could not effectively integrate and normalise technology use in their RCSs (Jamwal et al., 2022).

During numerous interviews, both participant groups described how independent technology use led to support workers believing that a disabled person was genuinely communicating their own thoughts and wishes. This belief that technology represented the authentic voice of the technology user was crucial for autonomy and self-advocacy. These discussions heavily focused on Augmentative and Alternative Communication (AAC) devices, emphasising their importance as tools for autonomy that people needed to be independent.

The significance lay in how support workers’ perception of technology as an authentic representation of user thoughts and wishes affected communication effectiveness. Especially regarding AAC devices, if support workers perceived the communication to be facilitated or ‘pre-programmed’ by someone other than the user, it undermined the authenticity of the message. In these instances, support workers were unlikely to fully integrate these tools into their daily routines or truly

respect users' communication, needs, and wishes. This disconnect had real consequences. When the support network did not 'buy in' to the idea that technology represented the voice of the user, disabled people were less supported to access the devices to advocate for themselves. Don, an assistive technology professional, described an AAC user who needed a paper sign to point to which said, 'put my f***ing communication device on my bloody wheelchair!' He commented further that "you need staff to realise that the device has the appropriate value and needs to be available to that person." He also told a story of a woman he supported who, after spending years becoming a fluent AAC user, communicated to support workers that she wanted to cohabit with her partner in the same RCS. Without support workers' understanding the technology she was using and feeling that it authentically represented her voice, this disabled technology user would not have been able to advocate for how she wanted to be supported. This evidence, too, reinforced the connection between believing that technology was the authentic voice of the user because it leads to actions. People better integrated and created opportunities to use technology for increased autonomy and act on the wishes they were advocating for.

6.3.3 *Autonomy Mechanisms Evidence*

The above described context conditions led into the mechanisms which could be activated, including adapting typical support routines by applying technology knowledge to create opportunities to use technology for some supports. Support workers must believe that people had the right to make choices and then disrupt daily routines of support delivery to integrate opportunities to meaningfully make choices about their own supports. Supporters must be willing and able to support differently in order to embed tools like assistive technology.

"I think for the initial part it's completely reliant on the staff and the team around that person supporting them, almost kind of embedding [technology] for them and sharing with that person *'this is the benefit of it. This is what it can do,'* and almost kind of ... not selling it, that's the wrong word, but almost kind of supporting that embedding and supporting those skills to build and then gradually recognising, *'OK, we can take a step back today because he's accessed his planner by himself or he's, you know, gone to his medication cabinet and taken his medication today by himself.'*

In the above quote, Carla described how support workers must find opportunities to integrate technology and then change how they support to use new technologies. Other evidence in literature confirmed this causal link, showing that support workers must allow the technology to change the (power) dynamics of how they gave support and must concede full management of a set of tasks that the person could now do with different support and tools (Fagan et al., 2017). Baltes and colleagues found that a staff training program around independence and turning independence into practice resulted in decreases in dependence-cultivating support behaviours (Baltes et al., 1994). This mechanism's activation opened the possibility for embedding assistive technology as a part of how someone provided support and was supported. According to Pallisera and colleagues, training staff to integrate technology into daily activities with natural supports, including assistive technology, was the most effective approach (Pallisera et al., 2018).

These conditions also activated a willingness to change support routines in order to embed assistive technologies into daily support workflows. May shared an example of a change to her daily support routines—rather than waking different people in a large RCS to support personal care routines and prepare people for the day, residents were all given a smart speaker with intercom capabilities. This way, they could alert the support staff when they were awake and ready for some support. Disabled people getting to sleep as late as they wanted without being woken simply because of the organisational construction of supports made an incredibly positive difference in their days. It also gave some independence and control back to the people being impacted by the schedule of supports.

“We had a guy called Richard who ... a classic example of someone who just needed that minimal support to take medication and to pay his bills on time. His long-term goal was to live independently, and he was really frustrated because the carers were there getting him in the mornings, taking his medications with him and they literally to the point where they were popping his pills out of his blister pack. And he would say to me, *‘I can do this. I don't know why they're doing this for me.’* And I would kind of go, *‘I don't know either, but let's put stuff in place and let's see. So, let's put this in your planner. Let's put these activities in...’* If you can kind of show and

demonstrate. ... [Technology is] the step back that they [support workers] can take ... It's enabling care providers to make meaningful interaction out of their prescribed hours, because I think it's not about reducing the hours necessarily, not about reducing the support, but making it meaningful and making it have a real impact on that individual that they're supporting."

This example demonstrated a way for support workers to change how they supported someone to control a key daily task. Evidence in the literature showed that the way to experience the benefits of an improved understanding of control over supports and the role of technology was to effectively embed these tools into daily routines (Freedman et al., 2005). Conversely, evidence in the literature showed that when workflows and leadership expectations for support delivery did not facilitate 'caring differently,' support teams were unable to deviate from the previous routines of supporting (Abdi et al., 2021; Agree, 2014; Blake et al., 2021; Peek et al., 2017; Rolfe et al., 2021).

There was a large body of work related to the Person-Centred Active Support, which trained support workers to identify opportunities for disabled people who were previously 'delivered care tasks' to engage and manage more of their own daily activities and social connections with the right tools and supports (Beadle-Brown et al., 2016; Bigby and Beadle-Brown, 2016; Bradshaw et al., 2018). This method of supporting drew the attention of support workers to daily tasks and small opportunities to support choice that were previously on 'autopilot.'

Normalising technology in a space made it more likely that disabled technology users would feel socially supported to use technology to advocate for themselves and have autonomy. Don shared:

"I think...in those contexts where I've seen [technology, routines] work really well, there's lots of people [who were using technology], and so it's really embedded into the culture that [supporting technology] needs to be a thing that was done. You need to make sure [users] have got their technology"

This quotation emphasised the significance of social support in assistive technology and the potential increased adoption among disabled people if technology integration

became a regular part of their daily routines. Another assistive technology professional, Chloë, elaborated that:

“it’s very different to support [technology] in a place where it doesn’t feel natural yet. And until it was natural, you don’t feel confident to do it.”

May, the support worker and assistive technology professional, shared:

“... once [disabled people] saw someone using [technology]—we had some who didn’t want anything to do with the technology project—but once they’d seen others using it and saw all the things it could do, it really inspired them to want to give [technology] a try...and they’ve seen the benefit and thought *‘ooh, I’d quite like that, can someone get that for me?’*”

This description illuminated the importance of having several assistive technology users to normalise technology use more quickly, which encouraged more people to find a technology that was useful for them and control how and when they used support. One disabled technology user, Margaret, found that where technology was ‘normalised and celebrated,’ it decentralised decision-making related to technology and it “didn’t take as much to talk people into using more technology.”

People supporting in a way that integrated opportunities to use technology was crucial to a disabled person using their technology for their autonomy. When support was ‘done to people,’ there was little room for trying new approaches or tools and fading back support to include a different method (like technology). An example of this connection was a disabled person who had her teeth cleaned at the same time each day, before she had eaten breakfast (which was not her preference). But if the person supporting her had not been willing (or had not had leadership support) to change that routine and acquire her a power toothbrush on a mount, she would not have had control over her care routines. One assistive technology professional interviewed described this connection, saying:

“It’s also helpful to have other people who are willing to be supportive, and also adapt their methods or their ways of communicating with you or their processes so that you can use technology to reach your goals, if that means

them changing their original plan or goals or methodology for you to access that.”

And the more people who recognised opportunities to integrate technology into how they supported throughout the day, the more people felt comfortable exploring these as tools for their own autonomy. May, the assistive technology professional and support worker, shared that ‘technology enabled me to care differently,’ explaining that she had been a support worker for over 20 years, and this was the first time she felt that she was able to listen to people instead of providing the same tick-box supports to everyone. The ideas about capturing and leveraging moments of independence and facilitating participation and autonomy in an environment which was inherently established to be dependent had reinvigorated her passion for supporting disabled people to live their best lives.

6.3.4 Autonomy Outcomes Evidence

Because of the interrelatedness of these elements, I have already given several examples of technology producing improved autonomy: the woman who advocated for cohabitation with her partner using an AAC device, the woman who cleaned her teeth at a more preferred time, and having an accessible waking system for people to control their own morning routines. The sequence here was noticeable as autonomy clearly built upon the assumption that one had tools for independence. Many focus groups and interviews deemed independence necessary for one to have autonomy and engage in self-advocacy. In the literature, some researchers described this concept as control over interdependence (Northway, 2015). Disabled people who had the tools they required and were comfortable using them could take control over how they were supported and advocate for their own autonomy. Based on my evidence from focus groups and interviews, this impression seemed especially true for AAC and environmental control technologies, which were the most common technologies for autonomy. One disabled technology user, Jason, portrayed his improved autonomy this way:

“There is always something I can do now. I'm not waiting anymore ... waiting around for someone to work my lights or my television or my music ... there's

no more waiting. And I think people listen to me more now. They didn't know I could do all this stuff, be in charge of my space, but now they listen to me.”

Trudy, an assistive technology professional, shared that when people had more control over their space, “they felt like *'oh, I'm like the other adults because this was mine and nobody just comes in and starts touching my things'.*” Empowering people to control their spaces and helping them establish credibility and lucidity with support workers was a phenomenal way that technologies built autonomy. When someone had the tools to establish their personal credibility and became trusted to control how they were supported, they had better control and could advocate for themselves more effectively.

While they were playing a prominent role, AAC and environmental control devices were not the only technologies impacting autonomy. In the literature, in a collaborative project involving Mencap, Vodafone, and Golden Lane Housing, project leaders developed a connected living solution utilising various apps and environmental control elements with an aim to enhance the independence of 127 people with learning disabilities (Baker and Richards, 2020). Their results focused on improvements to quality of life, describing how people had more control over their daily activities, schedules, and supports with reduced intensity of person-delivered supports. This literature suggested that the new technology made users feel more independent and empowered, resulting in improved communication about the supports a person wanted from their support team. The technology also had a dashboard for support workers to use, enabling them to feel comfortable balancing risk in independent activities, routines, and safety. Another study found that nursing care providers felt uncomfortable with supporting autonomy in their patients, as it raised moral questions about responsibilities for care (Jacobs, 2019). It was possible that supporting tools such as technology, especially those which were collaboratively used in the Mencap and Vodafone project, may have assuaged some of these moral and professional dilemmas.

The autonomy CMOC showed the causal connection between control over technology and supporters perceiving that technology represented the voice of the user, through activation of integrating technology in daily routines and making technology feel more normal to use. These conditions produced improved control

over supports and the tools for disabled people to advocate for themselves to a receptive support team. The next CMOC extends, though not necessarily in a causal way, these ideas about having the tools and autonomy to engage in and with local communities.

6.4 Social Activities and Participation

In this research, social activities and participation related to ideas such as meaningful ways to spend time when unsupported during the day, having socially shared leisure activities, and opportunities to be in the community with peers. I also discussed related ideas such as quality of life, quality of supports, happiness, and social isolation. All focus groups and interviews in the early stages of the realist review held these as top priorities and an important outcome of assistive technology. Disabled technology users mentioned meaningful ways to spend time more than the assistive technology professionals. They described opportunities to learn new skills, participate in education such as online coursework, and take on 'gig work' with these new skills for short-term employment. Assistive technology professionals, while agreeing to the importance of this assistive technology outcome, found that it was uncommon for disabled people to be supported to access leisure activities. In their professional experiences, it simply was not a top priority when support workers were short-staffed and had a multitude of other tasks to complete on their shift.

Based on the focus groups and interviews, independence with technology and adequate fluency with that independence to enable increased autonomy were crucial for disabled technology users to access social activities and participation without facilitation. Hence, once someone became independent because of and with their technologies, they better advocated for themselves (autonomy) and demanded support for leisure and social goals. The following sections describe the CMOC in its most final form, followed by the evidence to support the context, mechanisms, and outcomes of social activities and participation.

6.4.1 Social Activities and Participation CMOC

*When organisations and support teams believed that meaningful leisure was critical to high-quality support (**context**),*

*disabled technology users and supporters pursued assistive technology as a tool to integrate interests and leisure into their support priorities (**mechanism**) so disabled people had control over their engagement in activities and their social relationships (**outcome**).*

6.4.2 Social Activities and Participation Contexts Evidence

Both disabled technology users and assistive technology professionals had much to discuss regarding the importance of meaningful leisure, and specifically the attitudes toward integrating leisure activities as a component of supports. Asked why disabled people in RCSs may want technology to access more activities, Marcus answered:

“If they are living a life without any technology, their days are probably slower than mine are, because they don’t have all those things and haven’t got the tech to explore new things and do things that are fun that pass the time ... actually doing something all day.”

In the literature, Sullivan and Sharpe (2006) found that recreation activities would not be successful without the cooperation of support workers. If they did not view leisure supports as one of their duties, no disabled tech users would have an improved set of choices for how to spend their time each day. Assistive technology professionals in my focus groups emphatically agreed with this idea. Carla reflected on the impact of technology in enabling support providers to foster meaningful interactions beyond their scheduled working hours. She specifically highlighted the realisation that some disabled people solely relied on support sessions for social interactions, which motivated staff to ensure they had a variety of activities to engage with in their absence. Emma, a disabled technology user, pointed out that she could not engage with any of the enjoyable activities she used to since volunteers stopped coming in during COVID. She was previously in an online book club through the local library, had video chats with her family members who did not live close enough to visit her, and played online card games with a friend. But when the volunteers left, none of the workers supporting Emma felt that was a ‘good use of their time,’ and Emma did not want to further stretch and stress her support team. If the support team, and the organisation employing them, felt that social connections and meaningful activities

were crucial to her wellbeing and support outcomes, they would have equipped Emma with tools to engage in them independently.

Trudy, an assistive technology professional, shared in an early focus group that the social connectivity and satisfaction of people she supported had totally depended on what support workers believed disabled people could and could not do.

“I think there's lots of mind set changing that needs to go on and developing staff and the people that are around the person almost more than the person themselves on the technology... 'cause without that it's [technology] not gonna work.”

This observation was in reference to how limiting support worker attitudes were for disabled adults building experiences for themselves around the barriers associated with how they were supported. She elaborated that when the manner in which people were supported dictated their activities, leisure activities were often not a high priority. The opposite was also true; evidence in the literature showed that increasing the sense of control over how workers supported the disabled people they worked with (e.g., what activities they could spend support time on beyond personal care and mealtimes) made it much more likely that they would support leisure activities (Martin et al., 2011). Other literature revealed how social support from their close network mediated the relationship between leisure activities and improved mental and physical health, and that supportive environments promoted the needs of disabled people (Duncan et al., 2017). There was even evidence in the literature connecting the impact of supporter beliefs about the importance of leisure activities, emphasising how critical both self-efficacy (independence and autonomy from other CMOCs) and social supports were in benefiting from participation (Martin et al., 2011; Peterson et al., 2008). Clint, one of the disabled technology users, described the impact of staff attitudes by saying that if support was all about being safe, rather than supporting to have fun, most people would not have access to the tools for more activities, and described that there was a “big culture change needed.”

Clearly, believing that access to meaningful leisure activities was an important component of supports was not itself a useful element—it was the actions these beliefs activated which led to improvement in how someone spent their time and

engaged in their social relationships. It was the belief that leisure activities were valuable, which engaged people to pursue assistive technology as a tool, and integrated their interests into support priorities.

6.4.3 Social Activities and Participation Mechanisms Evidence

When people believed that leisure activities and social connections were essential and worth supporting and pursuing, they often started by considering information and communications technology (ICT). Especially during COVID (and in many places since), evidence in the literature suggested technology was a valuable tool for promoting meaningful leisure and social connections for disabled people (Lancioni et al., 2020b). Lancioni and colleagues proved in multiple studies that engaging with support workers to learn about assistive technologies available directly led to their seeking tools to support disabled people to engage with activities of their choosing (Lancioni et al., 2020a; Lancioni et al., 2015; Lancioni et al., 2011; Lancioni et al., 2014). Learning about information and communications technologies (ICT) was a key enabler for disabled adults and their support workers to pursue potential technology facilitators. Participants considered in detail the strangeness of how many support workers likely used ICT in their own leisure time, yet often did not transfer that as a possibility for the disabled people they supported. May observed that numerous support workers returned home after work and engaged in activities such as browsing social media, reading humorous blog posts, or watching clips of their preferred shows or comedians. However, they somehow did not commonly perceive technology as an integral part of disabled peoples' everyday lives in RCS. In further discussion about ICT use by supporters, Trudy shared:

“It's to do with confidence, it's to do with ... [people being] sort of unconsciously competent at home to use all these things [ICT devices], but they hit their work environment and suddenly they just can't do it. They become unconsciously incompetent.”

Focus groups discussed RCSs as being ‘not quite modern’ in terms of their use of technology, with one disabled technology user describing: “moving [into RCS] was like stepping back a hundred years in time.” Two focus groups elaborated on this idea, affirming that it was nearly impossible to consider technology as a potential tool

when a disabled person cannot envision it as being a normal part of a space (like a residential care setting). Assistive technology professionals reacted to this discussion by indicating that technology was slowly being considered to empower the supporting workforce for functions such as telehealth supports, medication and care plan management, and operational tasks such as workforce performance and pay systems. These ideas proved relevant as they facilitated the normalisation of these tools in RCSs, albeit primarily for utilisation by the supporting workforce rather than disabled people themselves. Only through the incorporation of leisure activities and social participation into support plans and daily routines could one truly appreciate the potential of integrating technology into RCSs to empower people to take control of their time and relationships.

Literature on integrating supports for leisure activities and social communication and participation was difficult to find. In this research, Carla vociferously advocated for the inclusion of assistive technology in care plans because it made it more likely RCSs and adult social care organisations would prioritise resourcing those tasks, saying:

“The technology is an integral part of a care plan because then once it's there, it's embedded and it's not an afterthought. It's not, you know, ‘there's your care plan you've got 60 hours a week of X, Y, and Z, 3 days at day service... And we'll Frisbee you a piece of technology once a year.’ Having that ... whole wrap around – technology is an integral part, everything that you do is thought out with technology balancing that human care package”.

The most relevant literature was in healthcare settings and related to how formalising certain elements and processes made them more likely to come to fruition. As discussed in one focus group at length, the energy and resources of RCSs went toward the tasks that were counted and measured. If the task appeared on a quality and control checklist for the support organisation or the local authority, it was more likely to be a protected task with enough resource to perform it well. Both disabled technology users and assistive technology professionals agreed on the value of enshrining the priorities of leisure activities and social participation as part of a support plan. It gave support workers documented reasoning to spend support time on an activity otherwise perceived as ‘optional’ and gave disabled technology users

some recourse for advocating for supports beyond personal care and activities of daily living. Indeed, several disabled technology users recommended that social participation and having meaningful ways to spend their time should be considered activities of daily living. The literature shows that consistently linking relevant elements of support, such as social participation and meaningful leisure activities, to better outcomes across support settings signalled agreement of priorities and promoted improved continuity of care across providers (Lorenzetti et al., 2018). Sequist noted that improved clinical documentation, such as reminders and feedback for audits, enhanced support worker documentation, which could enhance patient care (2015). This documentation was especially important in RCSs, which frequently used agency staff who were not always familiar with each disabled person they were supporting. Jason, a disabled technology user, said that he wanted everything that was relevant to him to be in his care plan, and that “half the time I have no idea who the person supporting me is—a stranger.” He felt confident that consolidating all pertinent information regarding his preferred supports in his support plan would make his preferences more accessible to agency and new staff.

Boot and colleagues described the connection across the CMOC elements, saying that disabled adults relied on supporters to signal both a need for assistive technology as well as what specific products to seek (2019b). This connection required supporters and disabled people to agree to leisure as a support priority, to have knowledge of assistive technology, some willingness to try it out, and to use technology in a goal-directed way for leisure (Boot et al., 2019b; Lancioni et al., 2017; Stasolla and de Pace, 2014). In many RCSs, having agreed supports related to meaningful leisure and social participation authorised workers to support the activities collectively agreed as a top priority for the disabled person.

6.4.4 Social Activities and Participation Outcomes Evidence

Disabled technology users agreed that without their support time including both solitary and group leisure activities, they would not have the skills or knowledge to find tools to engage with hobbies and maintain relationships with friends and family. Both assistive technology professionals and disabled technology users used the term ‘meaningful leisure.’ When I discussed meaningful leisure in my focus groups and interviews, assistive technology professionals felt the term meant going beyond

passive daily entertainment (like sitting in front of a television in private or common spaces) to having tools to engage with different social as well as solitary activities. Disabled technology users (Marcus and Janet) shared that it was important for them to be able to *do* something—both groups used the word *do*, emphasising active engagement rather than passively consuming entertainment.

The first key outcome produced in this CMOC causal pathway was that disabled people had control over their engagement in activities and how they spent their time during the day. Based on the interviews conducted, this outcome was especially important to people with multiple physical disabilities, who felt limited by their mobility or dexterity. Candace, who used a wheelchair and controlled an AAC device with eye gaze, described how bored she used to be without the assistive technology she now has. She used to wait to be (passively) entertained. Her main social engagement was having conversations with her support worker while they were dressing, cleaning, and eating. But in between support times, she was often in front of the television, watching shows she was not interested in for lack of other choices. She admitted, “I spent a lot of time waiting, ... I was bored all the time.” But now that she had more activity options because of collaborative work with an especially tech-savvy service manager, she now had a number of options available to her. She had games she could play on her iPad, smart speakers to play music, and had two social media accounts she accessed to keep up with current events, topics she was interested in, and to message friends. She clarified it was not necessarily that she did not know how she wanted to spend her time (she knew what she enjoyed), but that she had never had the tools and the right mode of access to engage with them until she obtained assistive technology. In the literature, many researchers found that assistive technology unlocked access to enjoyable activities and ways to spend time for people—it was simply a matter of access (Lancioni et al., 2019; Lancioni et al., 2017; De Pace and Stasolla, 2016; Bache and Derwent, 2008). Indeed, while not directly addressed in the CMOC, there was substantial evidence that a key barrier to leisure activities was access. People had to be able to use the tools to engage with their hobbies. In a series of toolkits for supporting learning disabled people to use technology, Seale described a pathway for disabled people feeling that they had the ‘right to a meaningful life.’ She emphasised that the purpose of their supports was to build that life, and that they should have opportunities to use technology to achieve

this meaningful life because of the variety of access modalities which made independent leisure activities possible (2021c). Another study discovered that a significant obstacle in utilising assistive technology for leisure activities was the lack of alignment between user requirements and device functionality. Peoples' access and preferences did not align with the chosen tools, hindering their ability to use the technology independently (Howard et al., 2022; Bache and Derwent, 2008; De Pace and Stasolla, 2016; Smith and Mountain, 2012).

As assistive technology professionals often discussed social engagement and relationships alongside 'meaningful leisure activities,' disabled technology users agreed this idea was another outcome from the same causal pathway. Information and communications technologies (ICT) was a natural focus in this area, as the tools precisely lent themselves to connecting people in a variety of ways. Working with young adults, Ramsten and colleagues found that the provision of ICT enabled young people to develop and maintain social relationships, each using different communication modalities (text messaging, video calls, audio calls, and emails) facilitated by their technology (2020). In their discussion, the team also confirmed connections between outcomes for disabled technology users living in RCSs, specifically how their technology outcomes were more impacted by the attitudes and organisational support structures than people who were supported in their own homes (Ramsten et al., 2020; Ramsten and Blomberg, 2019). Marcus (disabled technology user) confirmed this when he encountered some difficulties moving from his own flat into an RCS. He relied more heavily on his technologies for social connection because living in an RCS limited his independent movement around the community. For him, these technologies were a vital portal for continued inclusion in his social and family groups which were not located in the community he moved to for support. In literature expanding on this idea, another study found that disabled people using ICT also used technology for interactions based on mutual interests and amusement. This finding provided additional evidence of how technology facilitated connections between disabled people in RCSs and their peers which would otherwise not have been possible (Ramsten et al., 2020). Seifert and colleague added that modern ICT usage relied heavily on data and internet connectivity, which was often problematic in RCSs (in some, establishing internet was the responsibility of the disabled adult; in others the RCS management provided

it; and having multiple internet systems in small spaces created disturbances and interference between technology ecosystems) (Seifert and Cotten, 2020). Martin and colleagues found that the use of ICT was associated with increased social inclusion with family, friends, and employment or volunteering activities (2021), while Barbosa Neves and colleagues cautioned that adaptation periods delayed outcomes because of the change in interaction format (Barbosa Neves et al., 2019).

The social activities and participation CMOC showed the causal connection from integrating meaningful leisure into quality support through pursuing assistive technology as a tool to integrate interests and leisure into support priorities. These conditions provided disabled people with more control over the availability of and their engagement with activities and over their social relationships. The final middle range CMOC will describe how these previous CMOCs connected to form a trajectory toward wellbeing and satisfaction for disabled technology users.

6.5 Wellbeing and Satisfaction

In this research, wellbeing and satisfaction referred to the general level of happiness people felt and how satisfied they were with their daily lives. This notion encompassed ideas such as meeting personal goals, being equipped to expand beyond their expected daily routines, feeling a sense of accomplishment, and having pride in learning new skills and concepts with technology. We also discussed the link between happiness and social activities and participation. All focus groups and interviews found that accomplishment, pride, and a sense of achievement through learning to use technology had a positive impact on wellbeing and satisfaction.

Based on the focus groups and interviews, the more fluent a disabled technology user became with their technologies, the more easily they accessed new activities available to them (communication with family and friends, online games, and social media platforms), and the more confident they became. Both disabled technology users and assistive technology professionals noted these activities as core contributors to having high satisfaction with their daily lives and an overall sense of wellbeing. Hence, having tools which allowed people to meet their goals, achieve something new, and give them a sense of pride and accomplishment directly connected with wellbeing and satisfaction. The following sections will describe the

CMOC in its most final form, followed by the evidence to support the context, mechanisms, and outcomes of wellbeing and satisfaction.

6.5.1 Wellbeing and Satisfaction CMOC

*When assistive technology was well-matched to the user and encouraged them to become more fluent with technology (**context**), disabled technology users gained a sense of pride in learning new things and achievement in doing things they previously did not have the tools or skills to do (**mechanisms**). These combined to cause an improvement in wellbeing and overall satisfaction (**outcome**).*

6.5.2 Wellbeing and Satisfaction Contexts Evidence

An idea that came up several times in focus groups and interviews related to the ‘fit’ of technology with a user. When asked to elaborate, assistive technology professionals Will and Carrie, shared that technology being ‘well matched’ meant that the access preferences ease of use, activities for using the tech, and current skills and comfort level of the user were all taken into consideration to ensure there were as few barriers as possible. In an interview, Will elaborated:

“It was really important how much effort [users] were expending just to get the [technology] to work. So, if that was eye gaze versus switches at the complex end of things, [try each one] ... ask the person, ‘how tired did you feel at the end of that?,’ how much effort was that?”

He was describing not only the connection with determining the right fit or access method (eye gaze or switch access) but also how cognitively taxing each access method might be to the user. In his professional experiences, effort had a substantial influence on motivation to persist through challenges. Disabled technology users also discussed access methods and fit of assistive technology. Aidan, Margaret, and Liam all showed the vastly different ways that they used the same technology (tablets) to communicate and move: one with eye gaze, one using a sip-n-puff joystick, and another using a set of switches on spectacles activated with cheek

movements. Without these access methods, matched to each user's strengths and effort preferences, the tablets would be an ill-suited tool for all three of them. Clint also described his access methods, saying:

“Someone designed my specialist joystick for my chin, and it gives me mouse controls when I get tired of using eye gaze. Without that specialist support, I wouldn't have the things I need to access tech.”

Jamwal and colleagues confirmed links between activity limitations and wellbeing for disabled adults, specifying flexibility and customisability as key components of successful technology use (2022). As computers and other kinds of technology were increasingly relied upon for civic engagement, employment, and social activities, access to these tools was increasingly critical to the satisfaction and access to citizenship for disabled adults (Chiang et al., 2005).

Technology that failed to meet someone's specific interests or accessibility preferences resulted in negative outcomes. Assistive technology was required to provide people with the necessary tools to accomplish their significant goals. Otherwise, the endeavour to understand, integrate, and advocate for technology did not yield a significant enough outcome to justify the effort. In a realist (later-stage) interview, one assistive technology professional discussed this correlation, emphasising that simply having a suitable fit or user-friendly interface was insufficient in guaranteeing motivation. Rather, the access method to technology must enable people to pursue goals that deeply interested them and could not be accomplished without the use of such technology.

“It really does have to align with wanting to do an outcome, and especially the initial use for the first time that you are getting to grips with technology. You really do have to have some motivation to kind of use it to achieve your goal. Without that motivation or understanding, then technology sometimes ... if you don't have a reason for using the technology, then it quickly becomes abandoned or not useful”.

Mentioned 99 times in focus groups and interviews, this linked to the idea of motivation as a key causal factor in positive outcomes. Will, Mary, and Carla (all

assistive technology professionals) each spoke at length about motivation, and how, when the task was important, people learned to use the tools that brought those goals within reach. Carla shared a story about a migrant student from Syria who was learning to use assistive technologies to access coursework at a local college. The student spoke and read little English and was not a confident computer user. But the young man was motivated to access the coursework to enable him to secure a job and provide for his family, spending countless hours understanding the language learning software, practicing using it, and requesting support.

“And he learned Jaws and using Victor Stream and all this stuff, like and eBooks and things because his drive was HUGE to [access the education, use the tool], he just would not... He wouldn't give up [even though it was incredibly difficult]”.

If accessing the course had not been as motivating, she felt he would surely have given up and withdrawn because of the extreme effort required. Will described a disabled adult who acquired a head injury and missed composing and producing his own music. He, too, spent countless hours and considerable effort learning to use the assistive technologies and access methods required to use the software he preferred prior to his injury. Disabled technology users Clint, Marcus, and Janet each spoke about how persistence with a tool ‘even when it was a bit twitchy’ was important because the persistence enabled them to access an activity that was meaningful to them—transportation, online games, and audiobooks, respectively. Carla completed this point by saying “it's actually looking at long-term goals, and where people want to be, and how they want to get there...” before choosing assistive technology.

Ease of use with technology enabled people to become more fluent technology users. Marcus described how his technology skills had ‘fed on themselves,’ leading him to build on his taught assistive technology skills to cultivate new, untaught skills. After grasping the initial steps, he proceeded to thoroughly investigate all features, functions, and capabilities of the technology at his disposal. As he found more features that were helpful to him, he accomplished even more with his technology, further increasing his skill level. Carla corroborated this story, saying:

“When you put [meaningful and repeated engagement] together ... I think that genuinely opens the pathway then to make you want to do more ... and to attain more and to almost push [yourself] more and to see what else [you] could achieve.”

This contribution confirmed the connections between motivation increasing engagement time, which improved the skills of the technology user. Evidence in the literature showed how fluency with devices increased confidence both in using specific tools as well as in achieving something meaningful, increasing the likelihood that users experienced benefit from technology (Ramirez-Hernandez et al., 2022). In action research involving the social use of ICT by residents in RCSs, researchers confirmed that introducing computers and other technologies along with skills classes improved the digital capability of technology users, suggesting a link between engagement and increasing confidence (Hasan and Linger, 2016).

6.5.3 Wellbeing and Satisfaction Mechanisms Evidence

While well-matched technologies made it easier to become fluent technology users, disabled technology users also gained a sense of pride in learning new things through the use of these tools. Some literature found that this pride stemmed from better social inclusion, while others found that there was pride in feeling more similar to non-disabled adults (Näslund and Gardelli, 2013). Other evidence in literature indicated that becoming fluent technology users led to pride in performing tasks and solving problems more effectively, made users feel more secure and in control, and made them feel more empowered (Mezzalana et al., 2021; van Dam et al., 2024). Clint highlighted how “adults don’t want to ask for help all the time,” validating with Marcus that after having high support needs for numerous years, it made them each proud to find ways to accomplish things they wanted to accomplish. For Heather, another disabled technology user, learning new things such as how to use technology to access important activities made her proud because she contributed more to her book club. She previously attended meetings and listened, but often could not contribute to discussions because whilst she could not access the materials they were reading, she loved hearing about the books the group read. Now having the tools to access books in an access mode that suited her, she was pleased to share her thoughts on the most recent reading selection for the group.

The sense of pride connected with the achievement people felt when they had the tools and skills to accomplish feats which previously felt unattainable. Linking on from the previous elements, evidence in learning science literature consistently showed that technology fluency significantly contributed to a sense of accomplishment from achieving goals. One research team found that self-reported progress toward achieving personal goals was associated with increased satisfaction, though the difficulty of the goal also had a moderating effect (Wiese and Freund, 2005). More literature confirmed that full goal attainment was not the only way to achieve increased wellbeing and satisfaction. Much of the happiness came from the process of making steady progress (Klein and Fishbach, 2014; Hennecke and Brandstätter, 2017; Wang and Milyavskaya, 2020). More literature connected 'authentic pride' with achievement outcomes by motivating people to further engage with technology (Weidman et al., 2016). All participating disabled technology users confirmed these connections, each describing how they were astonished at what they achieved once they 'got the ball rolling' with learning and using their technology. Emma (a disabled technology user) was in her late seventies and was thrilled to be pursuing a history qualification, an interest she had always carried but never thought she would be able to pursue. Her wellbeing and satisfaction lay not in the attainment of the finished degree, but in each incremental assignment and course she had the tools to engage with. Marcus added that he 'just felt like he gets to do something useful' and that felt like a 'really big deal' for someone with his level of support need. He had even secured paid contracting work with the graphic design skills he learned through online courses. The fact that he achieved this employment opportunity with his assistive technology gave him a tremendous sense of accomplishment. Every assistive technology professional who participated in this study underscored the significance of technology that advanced a disabled person toward their personal objectives as a crucial factor contributing to favourable outcomes.

6.5.4 Wellbeing and Satisfaction Outcomes Evidence

The Association Of Directors Of Adult Social and Association (2021) described wellbeing as people having the best lives they could, with high emotional and social satisfaction. Other research showed that wellbeing was created by satisfaction which went beyond amelioration of discomfort due to impairment or illness and demanded

positive psychological experiences (Howard et al., 2022). Research for aging populations described wellbeing as contingent on the level of the person's independence, whether they remained in their own homes, and the degree to which they had control over their daily lives and supports (Rolfe et al., 2021). In the current research, there were clear connections between fluency in technology to achieve things that were important to people and their levels of wellbeing and satisfaction. All disabled technology users agreed that their lives felt better on a daily basis because of their technologies. Clint, Marcus, and Milo felt that being able to fluently use technology had improved their satisfaction with how they used supports because they could do more things independently. Aidan, Margaret, Liam, and Jason described their improved sense of wellbeing and satisfaction as a result of having more control over their days and the activities they could engage in. Many assistive technology professionals explained how important assistive technology had been in enabling people to engage with activities they loved but stipulated that these outcomes were only achieved with some independence and fluency with their technology skills.

The literature gave evidence for a range of factors which closely contributed to the wellbeing and satisfaction of disabled adults in RCSs. While some researchers found that the provision of activities (which could be enabled by assistive technology) influenced satisfaction, they also included positive coping strategies (like meaningful activities), opportunities for making choices, and participation in meaningful occupations (Rourke et al., 2004; Hsu and Tung, 2010; Heller, 2002; O'Sullivan and Hocking, 2006). While there was sparse evidence in this space, there were links between goal setting, achievement, and learning new skills to improve wellbeing and satisfaction through increased self-efficacy (Levack et al., 2015; Keenan et al., 2014). As described by Kayla (assistive technology professional), accomplishing meaningful goals contributed to a sense of purpose, control, and fulfilment. "People thought '*if I could do this, I wonder what else I could do!*'" This primary evidence highlighted the importance of the engagement of disabled adults in their support planning. It was important to ensure the team was structuring supports that built toward goals that had value to the disabled person (Giovannetti et al., 2021; Turner-Stokes et al., 2015).

6.6 Summary

In this chapter, I outlined the details comprising the foundational context extracted from the evidence in the realist review and evaluation. These context elements encompassed various factors, including physical infrastructure, funding sources, technology leadership behaviours, and assistive technology knowledge across support levels and healthcare professions.

The findings of this realist research illuminated the precise dynamics between disabled adults and how they were experiencing technology in RCSs. Through the described CMOCs, I described middle range level details that offered actionable insights for professionals and disabled technology users. The significance of policies, professionals, and disabled technology users collaborating to develop an implementation model was emphasised by these details, as they established the necessary conditions for favourable technology results. More broadly, both disabled technology users and assistive technology professionals agreed these middle range CMOCs were applicable not only in RCSs but in higher education, independent living, and in younger age groups. At the level of abstraction provided here, stakeholders could leverage these insights to drive positive changes for disabled technology users. The first CMOC described how shared understandings of independence and a basic knowledge of assistive technology enabled people to find compatible assistive technology with access methods that resulted in a disabled technology user having technology to achieve goals independently. The second CMOC described how having independent control over technology was crucial in order for supporting networks to believe the voice of the user. This engaged workers to support in a way that enhanced opportunities and normalised technology use. These interactions resulted in disabled adults having the tools they needed to control how they were supported and to advocate for their autonomy. The third CMOC described how social activities and participation were a result of interactions between the belief that meaningful leisure was critical to high-quality support and the pursuit of assistive technology as a tool to integrate interests into support. These produced more control over how people engaged in activities and social relationships. The final CMOC illustrated how disabled technology users gained a sense of pride and achievement in learning and doing new things when ignited under the conditions of

well-matched assistive technology encouraging increased technology fluency. These interacted to produce improved wellbeing and satisfaction in disabled technology users.

In the next and final chapter, I will discuss these findings as they relate back to my research questions. I will also describe the unique methodological contributions I have made through this work, and how these contributions are poised to impact (and have already impacted) literature, policy, practice, and the fields of adult social care and disability studies. In the limitations section, I will highlight some considerations related to this work, followed by recommended future directions for research.

Chapter Seven: Discussion and Conclusion

In this final chapter, I will describe the application of my findings and discuss some of the wider implications of this work. I have already highlighted some takeaway conclusions and calls to action in numerous invited presentations at NatSpec TechAbility (2021, 2022, and 2023), at the Master of Science in Educational Assistive Technology graduate seminars at the University of Dundee (2022 and 2023), and at the Zero Project: For A World With Zero Barriers at the United Nations in Vienna, Austria (February 2023). These insights will empower disabled people, professionals, and adult social care organisations to better support disabled people to construct the lives they aspire to using the tools of their choosing, including technology. This concluding chapter outlines the resolutions to my research inquiries, analyses the significance of my findings, examines certain limitations of this study, and outlines future prospects and actions for further research.

7.1 Answering the Research Questions

Based on the CMOCs and evidence described in Chapters Five and Six, the critical realist disability research methodology and realist research methods I selected gave me a framework to explore the research questions:

1. How were disabled people in RCSs using and experiencing technology for daily life?
2. What contexts and mechanisms of change led to positive outcomes for disabled technology users within RCSs?

The following sections will describe the primary concepts that contributed to a comprehensive explanation of how disabled people engaged with technology. Disabled people experienced technology use through interactions and entanglements with their support network, which functioned within a wider context of policy, funding, and the organisational values of their employers. Their exposure and access to technology triggered a series of subsequent causal chains which determined their individual experience and the beneficial outcomes they could derive from technology.

For the investigation of these questions, I collected, analysed, and interpreted primary and secondary evidence from focus groups, interviews, a survey, and academic and grey literature. The final CMOCs in response to these questions were:

1. When disabled people and support workers had a shared understanding of what independence looked like and had a basic knowledge of some assistive technologies, they found compatible assistive technology and access methods that supported the disabled person to use technology to achieve something important to them independently.

2. When a disabled person controlled their technology without support and their support network believed that technology represented the voice of the user, people supported in a way that integrated opportunities to use technology for independence and made technology use 'feel normal.' This reaction resulted in disabled adults having the tools they needed to take control over how they were supported and advocate for their autonomy.

3. When organisations and support teams believed that meaningful leisure was critical to high-quality support, disabled technology users and supporters pursued assistive technology as a tool to integrate interests and leisure into their support priorities to create opportunities for disabled people to control their engagement in activities and their social relationships.

4. When assistive technology was well-matched to the user and encouraged them to become more fluent with technology, disabled technology users gained a sense of pride in learning new things and achievement in doing things they previously did not have the tools or skills to do. These combined to cause an improvement in wellbeing and overall satisfaction.

These CMOCs gave a nuanced and actionable explanation of how disabled people were experiencing technology in RCSs, as well as the key mechanisms which, under the right context, activated to produce the outcomes of interest to stakeholders. As this research was conducted using a Critical Realist Disabilities methodology, the findings were described within the context of and in relation to the academic literature. As the CMOCs were constructed to further explain and elucidate covert

relationships between causal elements in some existing literature, there was already deep engagement between this work and the broader fields of study. In the next sections, I will directly answer the research questions and highlight additional connections with the academic literature.

7.1.1 Research Question One

The evidence I presented and elucidated in Chapters Five and Six unmistakably demonstrated how interdependent and entangled disabled people and their personhood were with their support teams, especially in larger-scale RCSs. The arrangement of their supports in RCSs created layers of systems and structures through which disabled people experienced technology. Due to the physical distance between disabled people and their communities, those RCSs often relied more heavily on a paid support network to enable and support them in their daily activities, participation, and overall integration into society. The experiences of disabled people with technology were deeply impacted by the beliefs, values, and actions of those around them, including family members, friends, and caregivers or support staff. This finding tied back to the Critical Realist Disability Studies theoretical framework, requiring that the perspectives and actions of multiple stakeholders be accounted for to produce a more comprehensive understanding of the causal pathways through these entangled systems (Pawson, 2013; Wong et al., 2013b). When a support network demonstrated a positive attitude towards technology and actively participated in integrating technology into the daily routines of a disabled person, the users were significantly more likely to exhibit enthusiasm towards technology and derive substantial benefits from its use. If support workers did not recognise the value of technology for the disabled people they supported, they (deliberately or not) discouraged its use. It was important to apply these insights by considering how technology was introduced, supported, and used as a tool for disabled people to construct the experiences they wanted. In consideration of this insight, it was essential that professionals incorporated efforts to nurture emotional connections and knowledge with support networks, allowing them to fully grasp the potential of technology for the people they supported. These insights were in accordance with the realist response to project ‘failures’ being attributed to poor implementation fidelity; it was not the implementation activities which determined positive or negative

technology outcomes, but rather the underlying response mechanisms to the new resource offerings from all key stakeholders involved (Astbury in Emmel, Greenhalgh, Manzano, et al., 2018). The beliefs and values of key stakeholders could be cultivated and supported to create the conditions which activated causally relevant responses under the right circumstances.

Including disabled people in demonstrations and skills trainings that were often reserved for staff ensured they had better experiences with assistive technology. As an illustration, one organisation made extensive efforts to evaluate the training and knowledge requirements of their staff. However, it was not until both staff and disabled people acquired certain skills and knowledge that disabled technology users truly experienced the advantages of technology. This insight related closely to the interactional approach in CRDS and was a practical application of the value between individual and structural factors, acknowledging both individual capabilities (knowledge of AT) and structural modifications (skills training) necessary for participation. Disabled people in RCSs had the most optimal technology experiences when they actively co-developed skills and knowledge sharing, enabling them to collaboratively develop the desired ecosystems from the outset. This statement, in keeping with the CRDS approach, recognised that the experiences of technology were not solely determined by individual characteristics but how people reacted to program components (Shakespeare, 2018).

The foundations outlined in Chapter 6.1 played a pivotal role in elucidating the experiences of disabled people using technology. Factors such as the physical infrastructure of RCSs and communities, financial constraints on the use of assistive technology, technology leadership in organisations, and assistive technology knowledge and skills all contributed to how disabled people experienced their technology. There were ways in which each of these was either a facilitator or barrier to satisfactory assistive technology outcomes, described in more detail in the answer to question two below.

7.1.2 Research Question Two

When discussing technology use by disabled people, I carefully analysed the circumstances in which they experienced technology within RCSs. I described these

findings as context elements and mechanisms of change in the activating causal pathways generating positive outcomes from technology. These combinations were exact and contingent upon one another; hence, each element held the most value when precisely connected with others as I described in Chapter Six.

The core context elements that led to change included a shared understanding of independence, basic AT knowledge and skills, the ability for the disabled technology users to have control over their technology without support, believing that technology fully represented the voice of the user, and including leisure activities as a critical component for high-quality support practices. Although each of these factors belonged to separate causal pathways, there was a broader pattern regarding the elements that organisations could foster prior to technology implementation, which contributed to increased success in technology utilisation. The foundational skills and knowledge about AT ('the art of what was possible') had to be an investment for both the support workforce and potential technology users. This element built a shared understanding about the technologies available and facilitated a collaborative process between potential technology users and their support network.

Shared ideas about independence between adult social care organisations, support workers, and disabled people using support were incredibly impactful to outcomes. Misalignment in these ideas and among stakeholders resulted in the support workforce performing routine job-related support tasks which were expected by their organisations as conditions of their employment. The lack of widespread awareness and acceptance of the concept of integrating independence opportunities into support practices posed a significant threat to disabled people, as they might have been over-supported and experienced a decline in their skill set as a result (Beadle-Brown et al., 2012). To this end, it was critical for there to be ways for AT to be controlled by the users themselves without facilitation or mediation from support workers. Cultivation of these ideas and actions ensured that AT access and use were not contingent on staff availability and could then be less reliant on compatible staff beliefs about technology.

Nevertheless, it was clearly helpful when support networks understood enough about assistive technology and the role it played for each disabled technology user. This understanding made it more likely that support workers would acknowledge and

respect how technology represented the voice of the user. If a disabled person used an assistive technology to support their communication, the people who received that communication had to be receptive to the idea that the person possessed the skills and capacity to exert some control over how they were supported. Finally, shared ideas about how leisure activities related to support ensured that planning included support for meaningful engagement in hobbies, socialisation, and how a person wanted to participate in their communities. This tied back to the CRDS emphasis on recognising agency for all stakeholders, and especially for disabled adults who had the right to tools and supports to advocate for themselves.

More broadly speaking, these context elements highlighted the importance of facilitating alignment across stakeholders to best lay the foundation for the actions that generated positive outcomes. In the absence of a common understanding regarding technology, its role, and the non-binary nature of independence, there was a potential risk of failing to activate the necessary actions for achieving positive technology outcomes. This misalignment could have resulted in a causal gap between the optimal context and the desired outcomes.

Activated by these core context elements, the mechanisms which sparked included determining compatible assistive technology and access methods, integrating more opportunities for independence into supports, making technology use 'feel normal,' pursuing assistive technology as a tool to integrate leisure into support priorities, pride in learning new things, and achievement through doing things a disabled person previously could not do. Ensuring the discovery of compatible assistive technology and access methods empowered disabled technology users to engage directly with tools, without the need for mediation. Support that was structured in this manner allowed for moments of independence, even within routines and activities when a person also required person-delivered supports. Supports which included and prioritised support for leisure activities and meaningful engagement, and considered technology to be a more 'normal' daily integration, generated more positive technology outcomes. While the sense of pride and accomplishment in using technologies to achieve something meaningful seemed like itself should be an outcome, it was instead an activated element which led to the described outcomes. Technology contributed to a positive change in wellbeing and satisfaction by

facilitating a sense of pride in learning new things and engagement in activities they could not access otherwise.

The described context activated technology to empower disabled people, enhanced their autonomy, and improved their wellbeing. Merely holding shared beliefs about independence was insufficient for technology to achieve true independence; it necessitated both aligned beliefs *and* the practical implementation of those beliefs within a support system. Minimum awareness of assistive technology fell short; it was imperative to pair disabled people with the suitable access methods to ensure technology's efficacy as a self-advocacy tool. It was not enough to hold the belief that appropriate support processes involved leisure; those beliefs must activate a deep understanding of the priorities of the disabled person, the pursuit of assistive technology, and respect for the importance of relationships and meaningful activities. It was under those conditions that technology contributed to improved social participation. Technology being well-matched to the user to reduce effort and increase fluency was not enough; it must enable learning, achievement, and pride to create a substantial difference to wellbeing and satisfaction.

7.2 Methodological Contributions

There were several distinct methodological contributions from this research. I conducted the realist review and evaluation concurrently, used primary evidence both for the realist review and the realist evaluation, and this work represented an early use of the realist theoretical approach for the study of disability experience and technology.

7.2.1 Concurrent Methods

My most notable methodological contribution to the field of CRDS and realist research was conducting the realist review and the realist evaluation concurrently and iteratively. Realist research was a distinct method of primary and secondary evidence synthesis that guided a theory-driven, interpretive approach to analysis, using the relationships between contexts, mechanisms, and outcomes to explain how and why a phenomenon of interest was behaving as it was (Greenhalgh, Greenhalgh, Pawson, et al, 2017a). Realist reviews were a systematic and rigorous

process of searching, selecting, and appraising existing academic literature to elicit existing causal CMOCs in relevant materials and developing initial rough program theories (Pawson, 2006a). This process enabled me to identify the underlying mechanisms and contextual factors that influenced the outcomes of both technology interventions and how disabled adults experienced change in RCSs. The focus in realist review was not solely on extracting secondary evidence regarding the effectiveness of assistive technology, but rather on using retroductive analysis to peer beyond the observable reported evidence to produce inferences as to the unobservable forces that shaped the success or failure of a reported intervention (Emmel, Greenhalgh, Manzano, et al, 2018). In contrast, realist evaluation used primary data to test and evaluate CMOCs. This method involved collecting new qualitative or quantitative evidence by conducting interviews or observations or using checklists, rating scales, or surveys to collect relevant evidence to evaluate CMOCs for fitness to the evidence (Pawson and Tilley, 1997b). Realist reviewers sought to identify the relationships between causal elements – realist evaluators sought to explain those relationships in depth (Greenhalgh, Greenhalgh, Pawson, et al, 2017a). For this research, I conducted focus groups, interviews, and realist-focused interviews to collect primary evidence to evaluate the fitness of CMOC relationships built in the realist review.

The unique feature of this research was how I conducted these two methods concurrently, iteratively moving between developing CMOCs with secondary evidence in the realist review, and testing and refining them with primary data in the realist evaluation. Conducting these processes simultaneously allowed for a more comprehensive understanding of how and why technology interventions worked in specific contexts, going beyond traditional outcome-focused evaluations. These concurrent processes also enabled me to better utilise limited resources, including my primary dataset. In the realist review, I built initial rough program theories from early interviews and focus groups with stakeholders to shape the direction of the research and to define a starting point for my investigation through the literature. I then searched through academic and grey literature and extracted relevant evidence to refine my IRPTs with additional details or connections to move toward more nuanced descriptions of causal elements. In the realist evaluation, I brought the refined CMOCs from the review to new stakeholders in interviews to collect primary

evidence and evaluate and interrogate the details of the refined CMOCs, capturing any additional nuance relevant to the causal pathways or new ideas which warranted further exploration. I then returned to the realist review inquiry cycle and, using the primary evidence collected in the evaluation and interviews, generated more fruitful search terms to re-search the literature and extract any newly relevant evidence to support or revise my CMOCs. With the review informing the evaluation, and the evaluation informing the review, I expanded the usefulness of both my primary and secondary evidence. The iterative and concurrent methods helped me generate much more precise search terms, yielding the most targeted and relevant evidence for each stage of CMOC development.

By running these methods concurrently, I generated insights from both macro (review) and micro (evaluation) perspectives simultaneously. By employing a synchronous and iterative approach, the rigour and depth of my conclusions were enhanced, thus contributing to the advancement of realist research methodology. While realist reviews were attractive because they could be conducted on a tight timeline and with limited resources, this simultaneous approach was an important methodological development for conducting iterative, highly targeted research whilst being respectful and responsible stewards of time and resources. Especially for the purposes of researching technology use by disabled adults in RCSs, this concurrent approach enabled me to extract the most value possible from the evidence I collected from a limited pool of participants. Rather than needing to return to previous participants or undertaking continuous recruitment activities, I used primary data both for the review and evaluation, producing interpretations which were already scrutinised by and agreed with stakeholders to be precise, relevant, and actionable.

7.2.2 Evolving Evidence Collection

Another innovative aspect of this project was the methods for collecting the primary evidence. The nature of the focus groups and interviews with stakeholders evolved from broad discussions to targeted teacher-learner cycles in realist interviews. I structured the early focus groups and interviews to be more open and exploratory discussions about the priorities for technology usage and what outcomes were important to which stakeholders. As the iterative research cycles progressed, these

discussions turned into more meticulous realist interviews. These realist interviews were informed by materials from the Realist And Meta-Narrative Evidence Syntheses: Evolving Standards (RAMESES) projects and involved creating precise questions to test assumptions made in CMOCs (Westhorp and Manzano, 2019).

While these materials described a realist approach to interviewing, I expanded this method to tailor questioning to each individual CMOC I was evaluating at different stages of development. For example, when I was collecting evidence for an IRPT (early CMOC) related to how knowledge and skills training created the context where motivation and staff engagement activated, rather than asking generic questions such as ‘what do you think had to be in place for a disabled technology user to have accessible technology?’, I asked ‘why was motivation important for disabled technology users to have accessible technology?’ and ‘how did knowledge and skills turn into a meaningful fit with technology?’ The purpose of the focus groups and interviews evolved from establishing the important outcomes to a more focused ‘how do these exact elements fit together?’ In comparison to the existing literature on focus group and interview methodologies, this approach may be perceived as risky due to the potential difficulty for other researchers to accurately replicate the process when questions and formats are altered during the course of and across discussions (Friedman, Wyatt, and Ash, 2022).

In my realist research, replicability of findings was not as high a priority as producing a replicable *process* to be followed. This evolving focus group and interview method also produced some discordant data, but realist research valued the breadth and depth of relationships explored rather than comprehensiveness of the area of interest. This process supported justification of evolving and responsive methods as the best method for collecting relevant evidence (Jagosh and CARES, 2020). This method also provided more opportunities for stakeholders to deliver feedback on generated CMOCs until the theories were in their most finalised forms. This process ensured that insights tightly fit with the perspectives and evidence from multiple stakeholders and maximised both accuracy and comprehensiveness.

7.2.3 Realist Research for Disability Studies

Finally, this realist research encouraged a more nuanced and multidimensional perspective, which was critical for producing insights that were useful for multiple stakeholder groups. As an example, Baker and Richards (2020) reported on progress during a technology implementation and captured before and after measures such as impacts on quality of life, support intensity the person required, and technology usage during the trials. Similar to other project reports, while this research gave clear evidence from a variety of qualitative and quantitative sources, there were a limited number of stakeholders feeding into the work. The inclusion of multiple stakeholders both in planning, contributing to, and co-analysing evidence to shape findings in research including disabled adults would ensure findings were well-aligned with the knowledge needs of broad audiences.

Many disabled people had access to supports which were not always compatible with their support needs. Occupational therapists, physical therapists, vocational specialists, speech and language therapists, and many other professionals engaged with disabled people regularly, giving different (and sometimes discordant) advice and support. I applied realist research methods to integrate multiple perspectives, support components, and sets of values and beliefs with the precise processes required to turn these elements into mutually desirable outcomes. I began to untangle how technology contributed to independence for disabled adults in RCSs, even while each stakeholder group saw independence differently. I asked people to describe their interpretation of independence, what independence looked like in practice, and their opinions of the role of independence for disabled adults in RCSs. From there, I determined different important attitudes toward independence, and how attitudes led people to actions which had a positive or negative impact on technology outcomes. For example, support workers supported independence in theory but often not in practice because the technology threatened the necessity of their support roles. Disabled adults in RCSs responded that they were 'not independent at all' because they felt that independence was not a sensible goal for someone with their support needs. In this case, describing technology as a way that a disabled person could 'be more independent' (interpreted by reducing support from workers) was not easily received by any stakeholders. Disabled people feared that increased

independence equated to an inevitable reduction of support. Understanding the interpretations of different stakeholder groups gave me evidence to construct further exploration that would be applicable for both groups. CRDS methodology enabled a nuanced exploration of relationships between multiple factors, improving explanations and producing more useful evidence for all involved stakeholders. When applied to research in disability and technology, realist research helped to avoid reductionist views of 'what worked about this technology' and gave a more inclusive picture of the causal processes and components involved.

7.3 Contributions and Potential Impacts

This research has wide-ranging potential impact because of the synthesised nature of both the needs and priorities of multiple stakeholder groups. Exploring the causal mechanisms as CMOCs not only clearly described the conditions under which the best assistive technology outcomes were possible but also engaged multiple stakeholders as contributors to outcomes. In the CMOCs, there were some elements which causally impacted positive technology outcomes for disabled adults that were completely out of the control of the disabled person. Therefore, while this research focused on understanding how disabled people experienced and used technology, I could not have achieved this aim without acknowledging and addressing how the construction of support and accommodations in RCSs interfered with positive outcomes. By unpicking complex spaces in this way, I developed an action plan for different stakeholders to address the inadvertent barriers and strengthen the facilitators for the factors producing positive technology outcomes. One disabled technology user, Marcus, described that while he had a complex assistive technology setup which he constructed himself and was happy with, there were many elements impacting his technology use that were outside of his control. Whether the Wi-Fi was working, whether the signal reached his room, whether he could procure the support to post back a broken device for repair, whether his support workers thought his 'just for fun' computer was not a priority for support or maintenance ... all of these things impacted his personal technology outcomes. I endeavoured in this work to describe causal pathways at a middle range level of abstraction for the resulting CMOCs to have maximum applicability and increase the potential for positive impact across diverse settings.

7.3.1 Current Impact to Adult Social Care

These findings have the potential to transform how social care organisations plan and deliver assistive technology for use by the disabled people they support. One social care charity has already used these insights to strategically plan their expansion from a single technology project site to two new regional AT hubs. The most impactful insights informing these plans were the need for skills infrastructure, knowledge building, acquisition of long-term funding for sustainable technology processes, and integrating assistive technology with IT supports.

To establish these AT hubs successfully, the organisation used this research to identify the professional skills infrastructure required for sustainable technology acquisition, support, and maintenance of skills and devices. This included a tiered training curriculum whereby different staff received different arrangements of newly created professional development based on their job roles, the amount of contact they had with disabled technology users, and their personal interest in supporting AT for potential users. All direct support workers received introductory trainings on communication techniques and the basic functions of commonly used devices. Some staff (team leaders or voluntary ‘technology champions’) received more advanced and detailed training related to the installation and daily functionality of the common devices. A smaller set of staff became the regional Assistive Technologists and are currently undergoing the Master of Science in Educational Assistive Technology (MScEduAT) program at University of Dundee. New assistive technologists were recruited and trained to support additional AT regional hubs which would include person-driven assistive technology planning, delivery, training, and support for new users. I have included a visual depiction of the staffing structure and role descriptions created based on my work in Appendix I. These impacts were a direct result of the nature of the realist research framework, producing interpretations that were precise, widely applicable, and actionable.

The organisation has also recognised the need for knowledge-building among both staff and users. Based on my conclusions, they have structured a new training program by coordinating with expert agencies such as Communication Matters and the ACE Centre to create 20 minute training modules for support workers. These trainings were created based on a synthesis of project learnings and this research

and cover a variety of topics including shared values and beliefs about independence, basic device knowledge, modalities of communication, and how to identify opportunities to use assistive technology for the people they support. At the time of writing, nearly 100 staff members had completed these modules and preparations were underway to produce the modules for use by other organisations.

Additionally, the primary adult social care organisation I worked with has acknowledged the importance of long-term financial resources to both support current technology and continue to offer assistive technology to existing and new customers. In addition to successfully obtaining multiple competitive external funding grants to sponsor assistive technology delivery to specific sites or small regions, the organisation has created an internal pathway for the Fundraising and Partnership teams to seek ongoing support to sustain the assistive technology delivery and expansion. At the time of writing, this organisation had secured more than £1.6 million in funding to enable the recruitment of two additional Assistive Technologists to support assistive technology in a new region of services.

Moreover, the organisation recognised the significance of tying support services with organisational Information Technology infrastructure. As the current IT support was easily accessible and responsive to support requests for current enterprise technologies and devices, further investments have been made to include support for troubleshooting AT and related issues such as network, bandwidth and signal capabilities, and ecosystem compatibility. This inclusion of assistive technology in IT processes has ensured more seamless access to assistive technology resources and efficient service and support delivery.

Overall, the organisation has utilised these insights to develop a comprehensive plan that addresses the skills infrastructure, knowledge-building, long-term financial resources, and IT infrastructure necessary for the successful expansion of AT support to regional AT hubs. These plans are being actively shared at industry conferences, with additional publications and materials being created for broad and cost-free distribution.

7.3.2 Potential Impacts on Literature

Literature on assistive technology for independence corroborates my evidence that there were substantial barriers to use in RCSs. Many technologies claiming to be used to increase the independence of disabled people were either for, or had to be facilitated by, the supporting workforce because of inadequate or poorly matched access arrangements (Aslanzadeh and Keating, 2016; Howard et al., 2022). My research built on this idea, using primary and secondary evidence to substantiate the importance of assistive technology knowledge (context) turning into determining compatible assistive technology and access methods (mechanisms) in order to equip disabled people with tools to be more independent. The evidence confirming this causal relationship highlighted the importance of understanding and leveraging access methods, whether they be in-built accessibility features on mainstream devices (such as audio output or high contrast), or specialist devices which increased the optionality for input and output methods to engage with a device (eye gaze or switches for input, as examples). These insights were important for social care organisations and professionals contemplating the integration of technology as a tool to equip the people they supported to be more independent. They must not simply purchase everyone an iPad or an Alexa smart speaker. There must be processes for determining access preferences and coordinating alignment between preference and available tools and accessories, all of which take knowledge, skill, and time. Policy and direct practice must support these crucial elements to ensure that investment in technology is not wasted due to being ill-suited for the intended users.

While there was sparse literature on how technology used by disabled people could directly influence autonomy, my findings followed logically behind related literature on accessibility and autonomy. In publications examining technology for autonomy, both support workers and disabled people were wary of any delivery of technology which put person-delivered supports at risk (Ragot et al., 2013; Moyà-Köhler and Doménech, 2022). Not only did my current findings demonstrate the importance of the relationships between disabled technology users and those who support them, but they also showed the causal effect that collaboration had on autonomy. These current insights are crucial to assure both disabled technology users and support

workers that technology cannot be used to replace person-delivered support; there are too many elements of success contingent on collaboration, shared knowledge, and mutual engagement with technology. Indeed, this evidence proves that, for disabled people to use their technology for increased autonomy, they must have support workers who support them differently. Rather than imposing care activities on disabled people, the adult social care sector must continue to re-arrange activities of support and encourage support workers to identify and capitalise on opportunities for people to use tools to control their own support. By combining technology as an available tool together with a reconfiguration of how disabled people are supported, technology can enhance autonomy. My findings also confirmed the evidence in the literature that while technology had the potential to facilitate autonomy, the benefits could only be realised through the residual power structures still prevalent in RCSs (Welford et al., 2010; O'Brolcháin, 2018; Brennan et al., 2016). My research expanded the existing evidence beyond whether or not technology produced autonomy to a more in-depth explanation of how and under what circumstances technology facilitated autonomy.

Technology generated improvements in social activities and participation by broadening the scope of available activities and offering optionality related to access modes. Juul et al. (2019) found that successful technology-enabled social engagement depended on environmental, organisational, and managerial factors, which aligned with my conclusions. These factors included integration into daily routines, the social relationships between staff and the people they supported, and management endorsement for using support time to promote social engagement. These findings aligned with my own discoveries regarding crucial context-sensitive factors, which researchers in the literature have also recognised as vital for effective utilisation of technology. Other research findings suggested technologies reduced loneliness and isolation (Srivastava and Panigrahi, 2019), but that a lack of staff support or engagement negatively impacted these outcomes (Ramsten and Blomberg, 2019). My conclusions agreed and built upon this idea that support networks (which included paid support workers along with close friends and family members) must actively engage with technology, possess some level of technology knowledge and skill, and not be intimidated or avoidant.

My findings demonstrate to organisations that they cannot disregard the culture and values components of technology delivery and expect positive outcomes for disabled technology users. The engagement of support workers is contingent on their knowledge, skills, and confidence with technology. Delivering technology directly to disabled people without addressing these barriers does everyone a grave disservice by failing to cultivate the beliefs and values required to activate their knowledge, skills, and confidence. Knowledge of this relationship is also crucial for policymakers and quality commissions in the adult social care sector. Having evidence to justify allocating resource to training and professional development related to technology is not simply an attractive addition, it is *essential* to the success of the broader investments in technology for the sector. Neglecting this culture and values work cultivating beliefs and confidence misses a causal element for positive outcomes.

Technology was not what created or produced wellbeing and satisfaction; instead, it acted as a catalyst to enable the activities and engagement which improved wellbeing and satisfaction. People were not automatically 'more satisfied' or reporting enhanced wellbeing because they *had* technology; they were more satisfied or reported enhanced wellbeing because the technology *enabled* them to connect with hobbies, friends and loved ones, and meaningful work in their communities. Much of the literature discussed in Chapter Two considered how technology for the workforce improved the quality of care, which in turn improved wellbeing and satisfaction. This research contributes further detail to how technology empowers the disabled technology user to construct their own wellbeing and satisfaction by igniting their independence and autonomy and connecting them with more social experiences and meaningful activities. In Walker's article 'What Shall We Do With Our iPads?' (2015), they described the folly of simply providing technologies of interest. When consumers buy technologies for their homes, they have a broad idea of what they want to achieve with the new tech. But social care organisations eager to demonstrate that they are 'doing technology' are at a midpoint rather than at the beginning of the process. To employ technology with the ambition to improve wellbeing and satisfaction, organisations must know what challenges they are addressing, which can only be discerned after consulting with all stakeholders. While there was evidence in the broader literature that the communication functions of technology were the most impactful factors for technology to facilitate wellbeing and

satisfaction (Chiu and Wu, 2019), my evidence differs in that, aside from serving an AAC function, the entertainment components of technology most often led to wellbeing and satisfaction. These insights demonstrate that achieving improved wellbeing and satisfaction is not about giving disabled people more technology. Exemplary technology outcomes are achieved through the precise combinations of shared values and priorities; resources such as knowledge, skill, and infrastructure; and tailoring processes to optimise the inputs from each unique setting.

7.3.3 Potential Impacts on Policy

The critical realist disability studies research process provided more precise contextual analysis for policy impacts, highlighting the key causal elements necessary to achieve what was important for disabled technology users. My findings described the unique and dynamic environment of RCSs, the underlying processes by which technology impacted disabled people, and the effects of technology that were important to technology users and those who supported them. Policymakers should consider these details in designing effective policies to address disparities in technology access and usage for disabled people in the UK. They should focus on designing policy to more precisely facilitate critical elements such as infrastructure, social care staffing, prioritisation of communication and safety, and outcomes that are important to disabled people, support workers, and support organisations. As an illustration, recognising the significant impacts of data and power infrastructures as fundamental components for success should entice policymakers to prioritise investment in data coverage and adapting electrical standards as causal factors for promoting inclusion and disability equity through technology. Regarding social care staffing, it is critical to know the skill and support requirements necessary to integrate technology as a support tool well. The investment in these elements ensures that policymakers do not inadvertently over-prioritise technology as a staffing support solution without the critical factors which will ensure that these changes are a safe, effective, and acceptable solution for all stakeholders. Without the right training and skills infrastructures FIRST, technology can be a part of, but not the entire, solution to staffing challenges. And while communication and safety must be at the forefront of discussions related to the structure of the adult social care sector, policymakers must consider a balance between stakeholder priorities. Safety as a liability deterrent

is important for care organisations, but physical safety is often less of a concern to disabled people in RCSs than social engagement and inclusion. Policymakers should design policies that meet the needs of both care organisations (deterrence of risk) and prioritise the outcomes that are important to disabled people.

Government policies and structures related to adult social care provision, funding, and best practices for support directly impacted disabled people, caregivers, supporting staff, and support organisations. Organisations directed energy and resources to the priorities government had identified and allocated funding. Indeed, the support tasks which the Care Quality Commission directly measured were often given priority. Especially when these resources were constrained, organisations shifted their perspectives and, therefore, their prioritisation of support tasks from building vibrant lives to keeping bodies clean and safe. Under these conditions, even when support workers held values and beliefs compatible with supporting technology for daily living, they could not perform their jobs in alignment with these beliefs if it was not underpinned by appropriate resource and leadership encouragement. The accessibility of resources for the procurement and maintenance of technology and for training and support, alongside organisation-wide policies aimed at integrating technology into daily support practices, either facilitated or hindered disabled people in their pursuit of technology.

7.3.4 Potential Impacts on Practice

Various stakeholders supportively challenged me in interviews that I simply should not be enabling the provision of disability supports in large RCSs—and that conducting research to force constructions of supports to ‘work better’ was an inappropriate role for research evidence. Many felt I should be producing and using evidence to dismantle these arrangements for care and support, and instead supporting organisations to de-institutionalise the structure of their support delivery. From my position within this research and based on my time in the United Kingdom and the United States as a consultant, practitioner, and disabled person, this opinion assumed a highly privileged perspective. I agreed that based on this research, truly individualised and person-driven support (which differed greatly from a slightly tokenistic ‘person-centred’ approach that the disabled person was not truly in charge of) was challenging to provide at scale whilst managing conflicts of constrained

resource, inadequate descriptions of the application of quality standards, and in the confines of performance management across a support workforce.

The Critical Realist Disability Studies (CRDS) perspective recognises the undeniable reality that disabled adults currently reside in RCSs. Therefore, it is imperative for CRDS research to address the oppression they face within these settings. One significant aspect of this oppression is the lack of support from support workers in accessing technology in a manner that suits their individual needs. By investigating and challenging this issue, CRDS research contributes to dismantling the barriers that restrict disabled people from fully enjoying the benefits of technology. This dismantling includes advocating for the provision of accessible devices, ensuring that disabled adults have control over the technology they use, and promoting the development of inclusive technological solutions that cater to their specific requirements. Through these efforts, this CRDS research aimed to empower disabled adults living in RCSs and enhance their quality of life by fostering greater independence, autonomy, social activities and participation, and wellbeing and satisfaction.

This research produced a more granular understanding of the purpose that technology served for disabled adults in RCSs. Technology was not used to fix the physical functionality of a person, it was not to replace support workers, it was not even to increase independence (though it often did that). The purpose of technology in this context was to empower and equip people to live the lives they wished, unrelated to the level or nature of their support needs. To that end, this research could impact practice by demonstrating the importance of support workers communicating with and understanding the people they are supporting. We certainly cannot expect support workers to support a disabled person well if they do not know what that person prefers, the activities and hobbies they enjoy, and what they value to construct their personal identity. In my experience, all disability support is *person-centred*; professionals providing supports are well-versed at determining where there are unmet needs and matching them with processes and routines to reduce the impact of that gap. Professionals should take these findings as evidence of the importance of *person-driven* supports; supports which position the disabled person in a decision-making role to co-develop the supports they are using. Constructing a life

using technology alongside person-delivered supports must be a collaborative effort, with support workers mindful that the voices of disabled adults should be equally or more prominently featured than their professional expertise.

Training and awareness of assistive technology were challenges being addressed at national and international levels by organisations such as the World Health Organization, the Global Disability Innovation Hub, AbilityNet, Scope, the All Party Parliamentary Group on Assistive Technology, and dozens of universities and charities. These findings connecting assistive technology knowledge and skills with positive outcomes confirmed other research in the fields of technology implementation, policy, and adult social care whilst adding the crucial additional pieces: the nuanced understanding of how those skills turned into actions, and outcomes and under what circumstances they activated (Vabulas, 2021; Hamblin, 2020; ADASS and TEC, 2021). While technology companies have long held the bulk of public training responsibilities through their informative advertisements highlighting technology functions and features, it is time for a new and more proactive approach to technology knowledge-building. Based on these insights that positive outcomes are contingent on the knowledge of the supporters of a disabled person, a minimum level of coursework and trainings on assistive technology is justified across professions. As the world improves disability inclusion, increasing the number of people with knowledge of assistive technology and the potential for technology as a support tool increases the likelihood that disabled people will have someone with whom to collaborate to start the technology exploration process.

Finally, professionals should ensure that they integrate both opportunities for moments of independence and encourage the use of tools such as technology to close any support gaps a disabled person is experiencing. RCS managers and support workers must collaborate with the disabled people they support to enshrine assistive technology goals in their support plans and ensure there is some documentation of a desired trajectory for technology integration. In some instances (organisation-dependent), capturing a goal or priority in a care and support plan ensured the allocation of resources to supporting toward that goal. This formalisation process also increases the likelihood that monitoring the functional status of technology would become a routine part of support planning conversations. This

enables support workers to quickly detect changes in technology access needs or assist in facilitating and supporting any repairs, maintenance, or troubleshooting required. The most crucial component that support workers can glean from these findings is that, even when all other factors are optimal, disabled people face barriers to building positive outcomes with their technology if they are denied the opportunity to utilise it. Support workers are impressive professionals, operating in difficult roles which require both skill and compassion. These adjustments are in response to evidence that positive outcomes are contingent on creating opportunities for disabled people to use their technology for daily activities.

7.3.5 Potential Impacts on the Field

It is unfortunate that there has been inconsistent utilisation of realist research methodology to investigate the experiences of disabled people in complex systems such as RCSs. In uncovering the underlying mechanisms and context that influences outcomes, realist research generates contextually precise causation pathways, ensuring a tailored approach to change. These findings demonstrate the elements of preparation and implementation which social care organisations must include (e.g., values work, resilient skills and IT infrastructure, and leadership support) and how they interact with resources and cause actions (e.g., determining compatible tools, integrating opportunities for independence, normalising daily technology use, and pursuing assistive technology as a support). Realist research emphasises understanding the broader contextual conditions where interventions or technologies operate. Specifically related to how disabled people use technology, this contextual understanding leads to a more nuanced knowledge of what influences outcomes and optimal pathways to change. Particularly in resource-constrained fields of study, applying realist research methodology extracts the most pertinent and precise causal factors required to generate the changes of interest. Realist research enables researchers to peer beyond the observable evidence and examine actions, beliefs, and resources which are responsible for causing changes.

7.4 Limitations

There were limitations to this research related to both the process and output. These included challenges with balancing multiple perspectives, misinterpretation of consent policies, and recruitment barriers for a key stakeholder group.

7.4.1 Perspectives

The first limitation had to do with the perspectives. I aimed for this research to have all the vantage points around the complex phenomena of disability and technology in RCSs. The lower involvement of disabled people as the most critical stakeholders in this work was disappointing. Following a CRDS framework required amplification of these few voices to balance the opinions of assistive technology professionals who did not have lived experience of being disabled technology users in an RCS. Disabled technology users were the only experts in their own experiences with technology. This research would lack the robustness necessary for generating causal descriptions without their perspectives. I had to be intentional with balancing the authority and power among perspectives. It was a tricky and continuous effort to collect evidence from experienced professionals and balance their input with that from disabled technology users. There was difficulty accessing disabled people in RCSs, often as a result of the digital divide which impacted remote recruitment methods through social media. Especially with the focus on disabled people living in long term RCSs, there were some predictable layers of protectionism blocking direct access to unfamiliar and nonessential people (me as a researcher). Consent was another challenge; I struggled to recruit a heterogenous group of disabled people because some disability categories were still more protected and differently supported than others. For example, a major barrier to accessing learning disabled technology users was the process of consent; or, more precisely, the lack of site leadership understanding regarding the process of obtaining consent. I described the process of informed consent and encouraged a support worker familiar with potential participants to help determine whether the person understood the materials and processes well enough to provide their own consent, but ultimately, I was unable to involve any learning-disabled participants because of both the objections of their support teams and lack of access to recruit.

7.4.2 Recruitment Challenges

Another limitation involved the challenge of recruiting disabled technology users in RCSs. In numerous ways, I found there was still substantial gatekeeping involved with accessing people in RCSs. Managers and support workers were unclear on how privacy and data protections were to be implemented. Most managers and support workers agreed that disabled people were key stakeholders whose perspectives must feature prominently in work regarding disabled people, but the practice of connecting disabled people to researchers without being present still felt too risky to most. Many RCSs I contacted for recruitment were uncomfortable connecting me directly with residents if the site managers could not be present, facilitate, and participate alongside them. I struggled to convince RCS leadership to share recruitment materials with disabled adults living there; most chose to hand-select those they perceived as 'a good fit' or told me this research was not relevant for the disabled people they supported. For this project, though I prepared visual supports and other communication aids to facilitate focus group and interview discussions, I could not include the heterogeneity of participants that I would have preferred. The disabled technology users who participated were largely social media users who saw my recruitment materials online, could give consent without support team involvement, and had completely independent command of a way to communicate with me by producing complex responses without support. This requirement to use social media to access participant information and recruitment materials severely limited the pool of potential participants, as disabled people living in RCSs often had more complex support needs and less access to technology compared with disabled people using supports in their own homes.

7.4.3 Retrospective Considerations

If I conduct similar research again, there are a few elements I would adjust for better impact. In retrospect, a more effective approach to the survey process would have been to conduct it later in the research timeline. This shift would have given me more opportunities to further refine the mechanisms and connections to evaluate, enabling me to include more refined details and actions. The ability of the initial survey to capture the nuances of the CMOCs whilst still developing them had value in showing participant perceptions of some connections. The survey captured perceptions at a

moment in time, and in response to CMOCs that continued to change. A later survey implementation would have provided the opportunity to incorporate additional insights from the research cycle, leading to more targeted and relevant causal connections to evaluate. In future studies, I would conduct the survey with finalised CMOCs, then use the survey to refine those final CMOCs. It was my intention to conduct the survey near the end of my research, but in response to the needs of the research I conducted it earlier to support my analysis process.

In the future, I would also start with broader ideas at the middle range level of abstraction and move into more refined details at a program level only if relevant to answering a specific research question. By carefully defining ideas at a program level first and then synthesising the program level CMOCs into broader, more generalisable middle range theory levels, I performed this process in the reverse order. It was difficult to define careful details and then remove key specifications when I transitioned to a higher level of abstraction. In the future, starting at the middle range theory level would allow for a broader understanding of context, more flexibility in adapting the CMOC to evidence collected, and improved transferability. From this middle range CMOC framework, I could write more detailed and tailored theories should the research require. The broader middle range framework could be applied in its final form, while program theories are sometimes too specific to apply as readily across settings.

Another limitation related to the relatively small sample size of disabled technology users. While realist methodology does not necessitate a large volume of evidence to establish significance or validate relevance, a larger sample size would have enhanced the robustness and generalisability of the insights. A larger sample size could have provided a more diverse range of experiences and perspectives, enriched the data set, and offered a more nuanced understanding of how disabled people used technology in RCSs.

7.5 Future Directions, Next Research Steps

As an organisational consultant and clinical practitioner, I will pursue additional research to address some limitations and advance the application of these findings. For example, if I were to manualise these CMOCs and use them as a guide for

technology implementation—encompassing cultivating organisational values and shared understanding of the role of technology through to community partnership and workforce development—could I confirm these causal processes in practice? This research included an evaluation component, but assessing the CMOCs in practice was out of my current scope. Evaluation of the application of CMOCs is the next practical step in gathering evidence to demonstrate that these guidelines could maintain validity and explanatory power across different settings. I envision this evaluation as a checklist to assess whether the relationships in my CMOCs are present across implementation sites. I am also interested in investigating whether the number of relationships present at these sites correlates with the degree of perceived success of a technology implementation. This comparison would give me more detailed feedback on whether the CMOCs I produced in this work truly reflect realistic integration processes and provide a practical method for organisations to prepare for technology projects.

I am also interested to see how these CMOCs may change with the inclusion of disabled technology users utilising a broader variety of configurations of support and accommodation. As realist CMOCs are never static—they simply stop developing when a researcher no longer seeks evidence to refine them—I would like to take these last CMOCs and return to the inquiry cycle with new parameters. After moving back to the United States while conducting this research, I met with many disabled technology users here and identified clear similarities but also intriguing differences in how these CMOCs would apply. I am interested to discover whether these CMOCs hold internationally or if I could conduct additional evidence extraction and synthesis to better situate CMOCs in more cultures and contexts.

As mentioned above in the limitations, in future research I will start from a more abstract theoretical framework rather than the more detailed program level IRPTs. This more abstract starting point will help me better organise my thoughts under a broader framework, minimising the number of revisions to the IRPTs. A broader framework may also expose more knowledge gaps, which could both inform future research plans and eliminate and further focus concepts under investigation. This process will lead to improved efficiency in the research process while still allowing for an exploratory and iterative course.

In terms of recruitment for future research, I will employ a few new strategies to ensure that more disabled people have the opportunity to participate. Enhancing collaboration with organisations that serve disabled people may facilitate improved recruitment and foster engagement from senior leaders and local managers, increasing access to potential participants. I will continue to ensure that all aspects of the research process are accessible in different formats to maximise ways for participants to engage with the research. I have confirmed that social media platforms such as Twitter and LinkedIn are an effective way to engage with professionals but is not a fruitful place to find disabled technology users. That said, I did not utilise Facebook as a recruitment tool, which I now understand is the most commonly used social media platform among disabled technology users.

7.6 Overall Conclusions

This study has made a substantial contribution to an incomplete body of evidence. By synthesising and interpreting evidence from different sources and fields of study, I have produced findings to be used as a practical toolkit for organisations to implement technology-empowered support in RCSs. The application of technology for disabled people to construct the lives they want and pursue their desired experiences is an area of notable and ongoing interest. This trend is emerging due to the heightened emphasis on integrating technology into RCSs, with the broadening purpose of empowering and assisting disabled people in addition to the workforce. The methodological approach explored and evaluated the causal pathways to build positive technology outcomes and produced a unique and practical action list of elements to consider when embedding technology in RCSs. This research utilised established realist methodology in an innovative, concurrent process of reviewing and evaluating, using primary evidence both for development and evaluation evidence against the last forms of the refined middle range theories. The refined CMOCs deliver a precise and nuanced explanation of the functioning of technology in RCSs and offer valuable insights to apply across support settings to ensure successful integration of technology.

The profound significance of this research is undeniable. Even before its publication, I have presented and discussed these insights at numerous conferences, my

findings resonating with disabled people, professionals, and leaders in the fields of assistive technology and adult social care. The reception of this synthesis of existing evidence and generation of new evidence and insights has been remarkably positive, especially as they use evidence to justify investment in frequently overlooked aspects of technology delivery and implementation. This research has filled a critical knowledge gap for adult social care, employing a unique methodology to analyse and describe findings. It provides a compelling argument for the allocation of resources and time to invest in organisational and societal values, striving for alignment from policy development to the daily experiences of disabled people using supports.

My findings have illuminated the transformative potential of technology in enhancing the everyday experiences of disabled people. The implications are far-reaching, with the power to inform policy, shape social care practices, and empower disabled people to advocate for their needs. The impact of this research extends beyond academia; it has the potential to bring about a tangible change in the real world. This is a testament to the power of rigorous, empathetic, and dynamic research, embodying the spirit of academic excellence, social impact, and commitment to improving lives. It is my hope and intention that this work will continue to inspire and inform efforts to create a more inclusive and empowering landscape for technology for all.

Appendix

Appendix A. Ethics Approval Documentation, 1



University of Stirling
Cottrell 3B1
Stirling
FK9 4LA

10/12/2021

Dear Julie

Ethics Application Form : [Technology for Disabled Adults in Care Settings 3532](#)

Thank you for your submission of the above ethics application.

The ethical approaches of this project have been approved subject to the following comments or recommendations.

Title	Comment
GDPR_DPIA Questions	The Panel believe that application is not using new technologies to process personal data, more discussing them with participants.
Data Storage	Normally 10 years from last access or publication - so a minimum of 10 years
Consent Sheet	The consent forms are good but need to specify that research data will be kept for a MINIMUM of ten years.

Please note that should any of your proposal change, a further amendment submission will be necessary.

If you have any further queries, please do not hesitate to contact the Panel by email to ethics@stir.ac.uk

Yours sincerely,

General University Ethics Panel

Figure 13. Realist review and evaluation ethics approval

Appendix B. Ethics Approval Documentation, 2



University of Stirling
Cottrell 3B1
Stirling
FK9 4LA

25/08/2022

Dear Julie

Change request form : [Technology for Disabled Adults in Care Settings 3532](#)

Thank you for your submission of the above ethics application.

The ethical approaches of this project have been approved subject to the following comments or recommendations.

Title	Comment
Amendment_PIS	It says the survey will take 10 minutes in the application but 8 minutes on the form. Perhaps consider rewording where it mentions about offering 'professional' expertise, as technology users may not feel this applies to them.

Please note that should any of your proposal change, a further amendment submission will be necessary.

If you have any further queries, please do not hesitate to contact the Panel by email to ethics@stir.ac.uk

Yours sincerely,

General University Ethics Panel

Figure 14. Survey ethics approval

Appendix C. Theory Development Diagrams

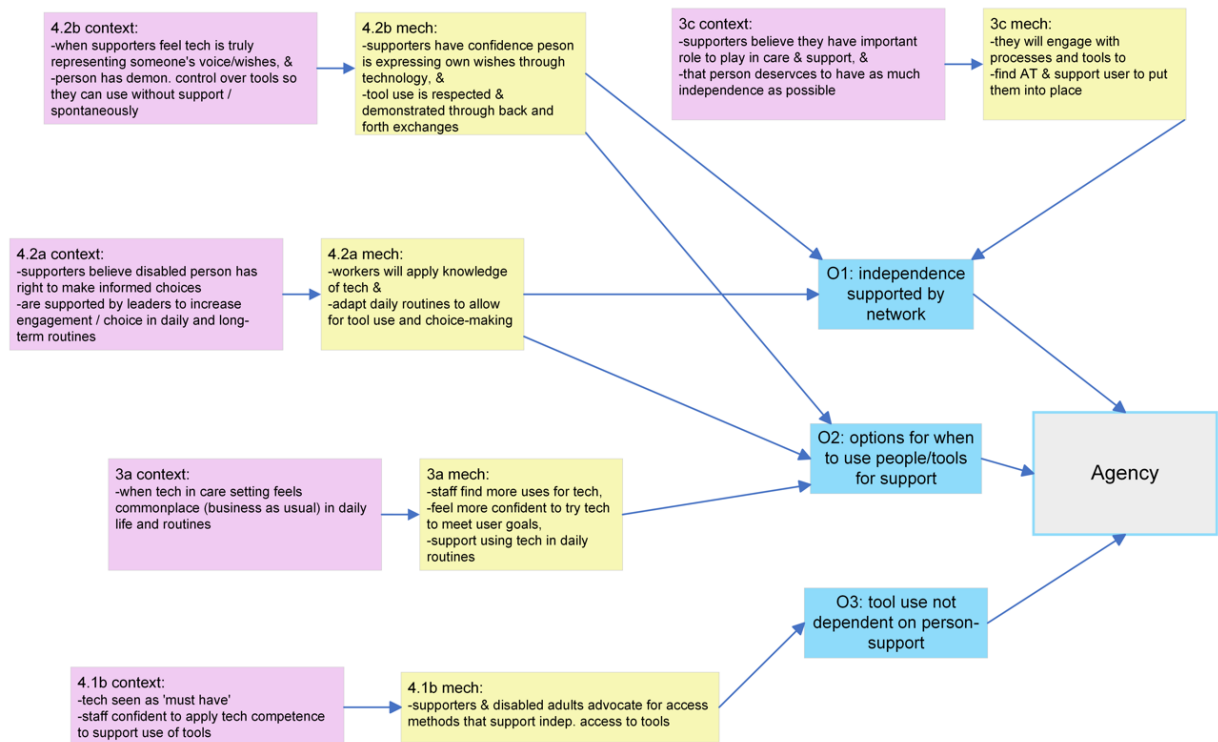


Figure 15. Agency IRPT relationship map

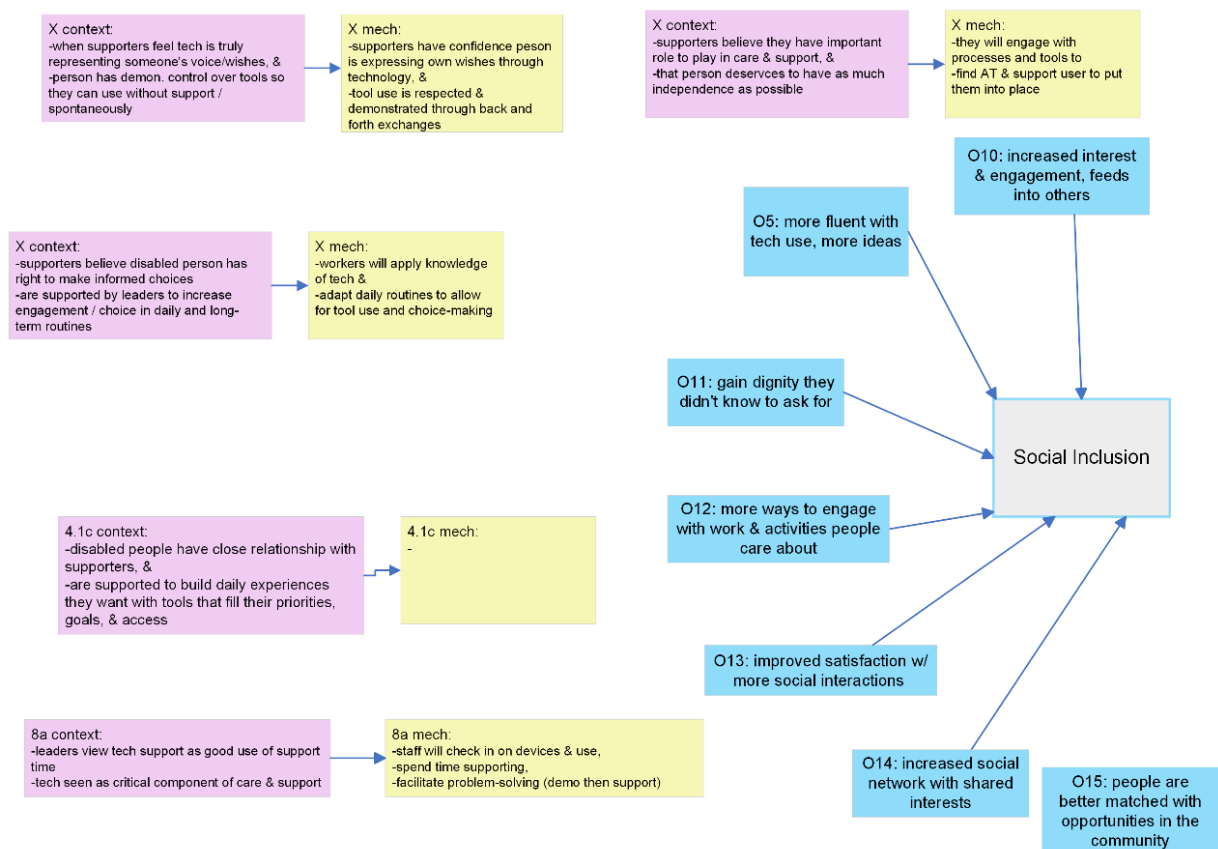


Figure 16. Social Inclusion IRPT relationship map

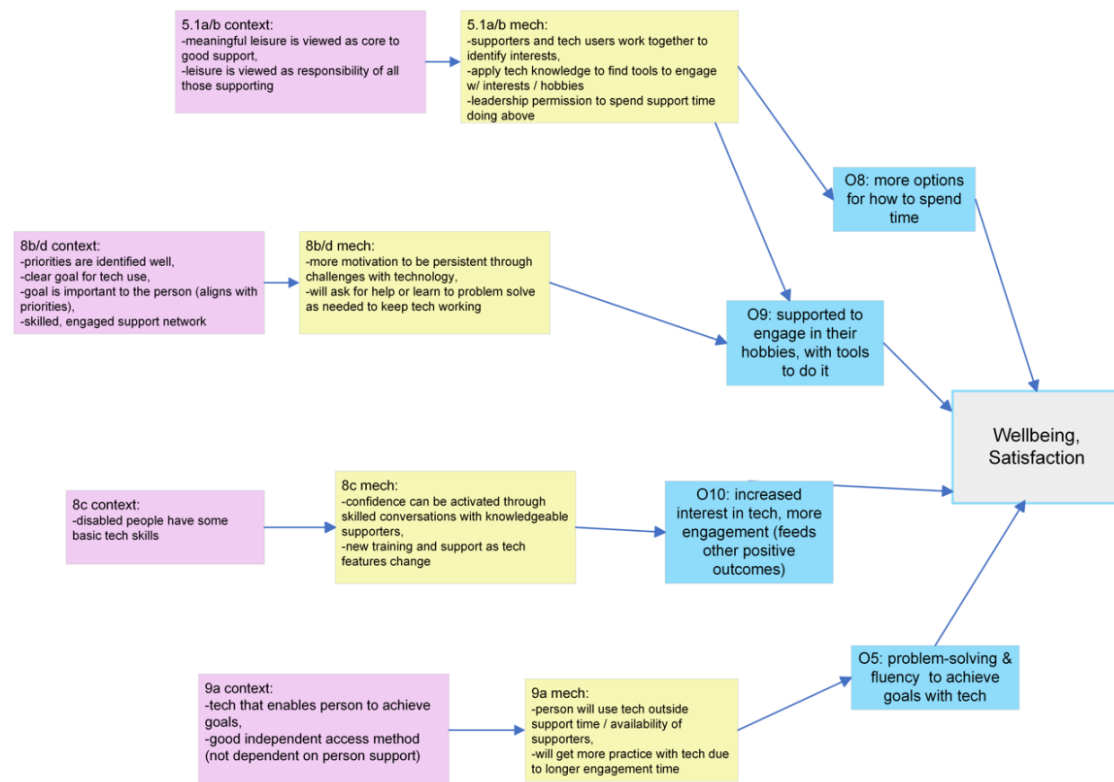


Figure 17. Wellbeing and satisfaction IRPT relationship map

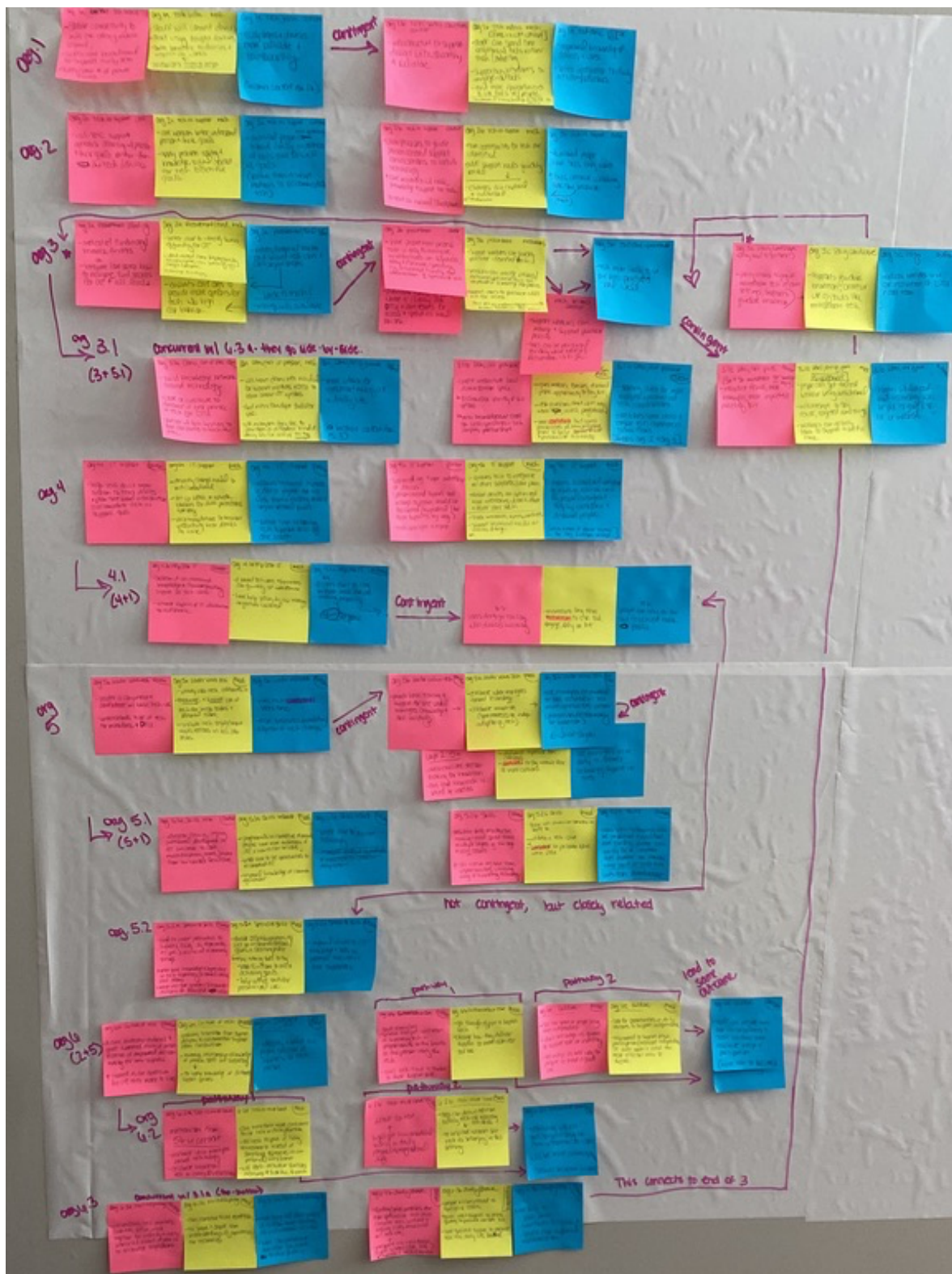


Figure 18. Detailed IRPT mapping

Appendix D. Exploratory Google Jamboards

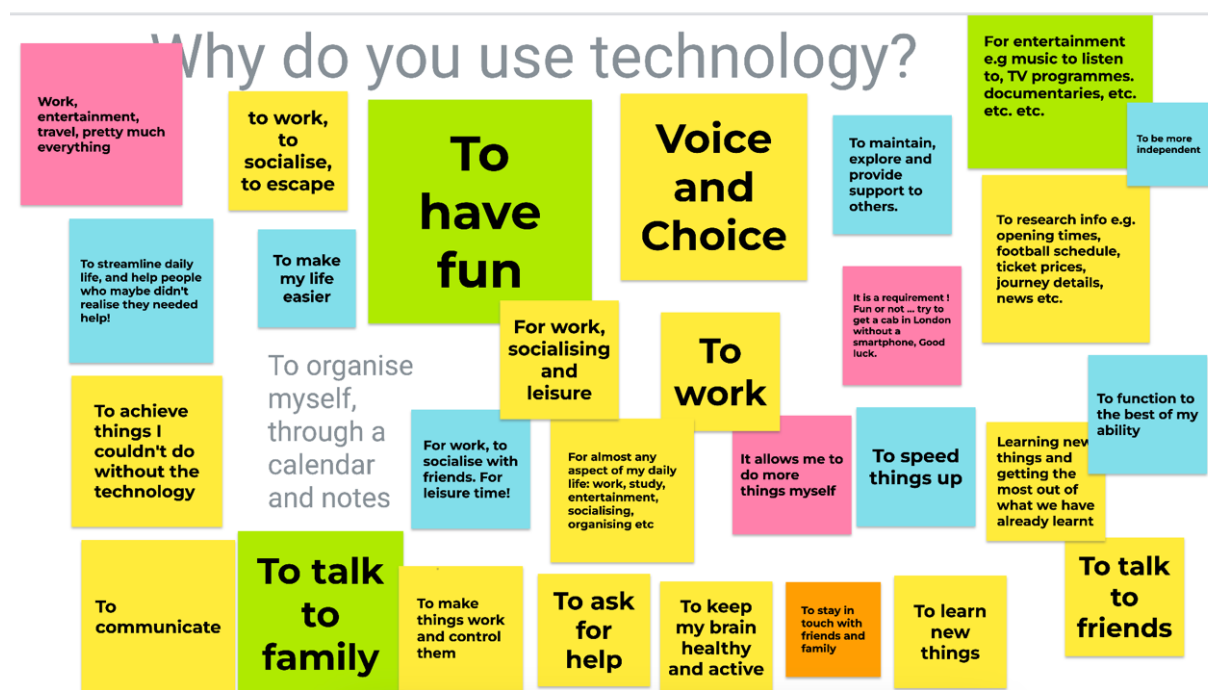


Figure 19. 'Why do you use technology' idea board

What does technology make possible for you?



Figure 20. 'What does tech make possible for you' idea board

What are the 'right conditions' for tech use?

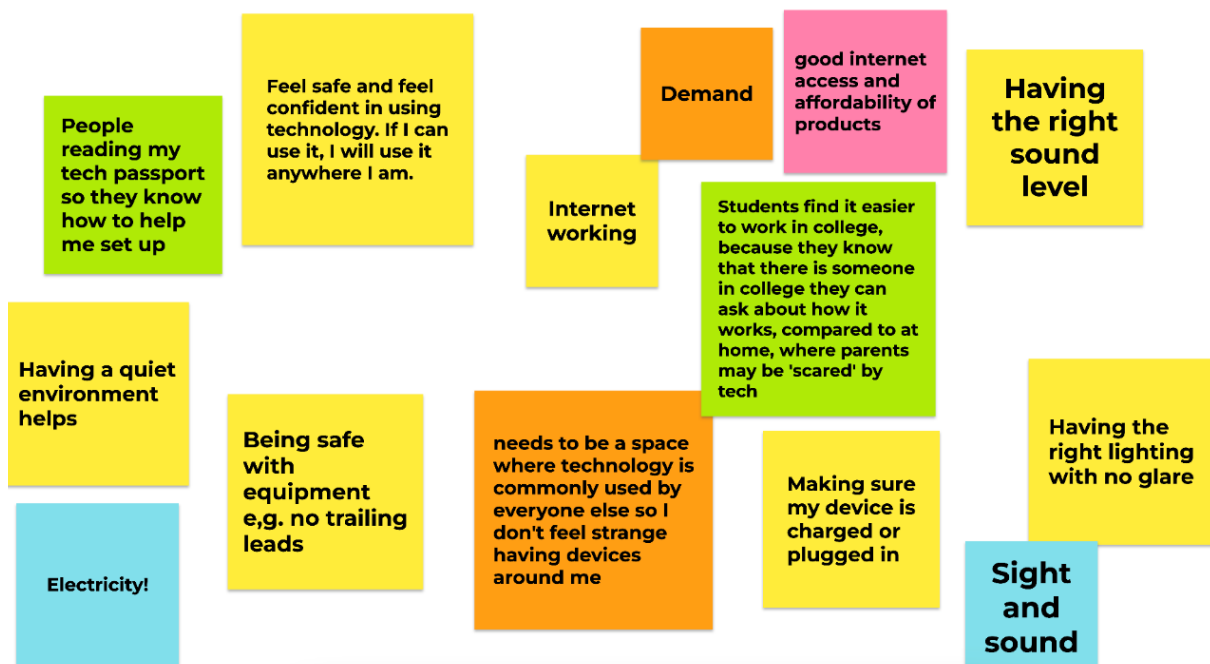


Figure 21. 'What are the right conditions for tech' idea board

What do you need from others so you have the tech you want, and that it is working well?

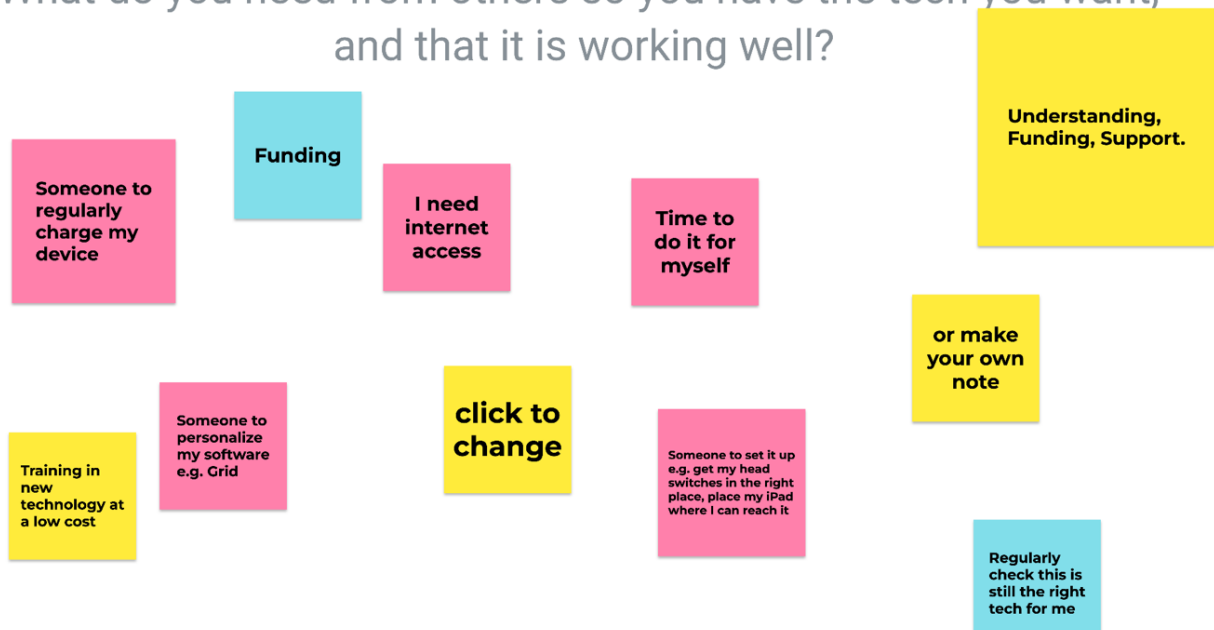


Figure 22. 'What do you need from others' idea board

Is there anything else you want me to know about how you use tools like technology to build the life you want?

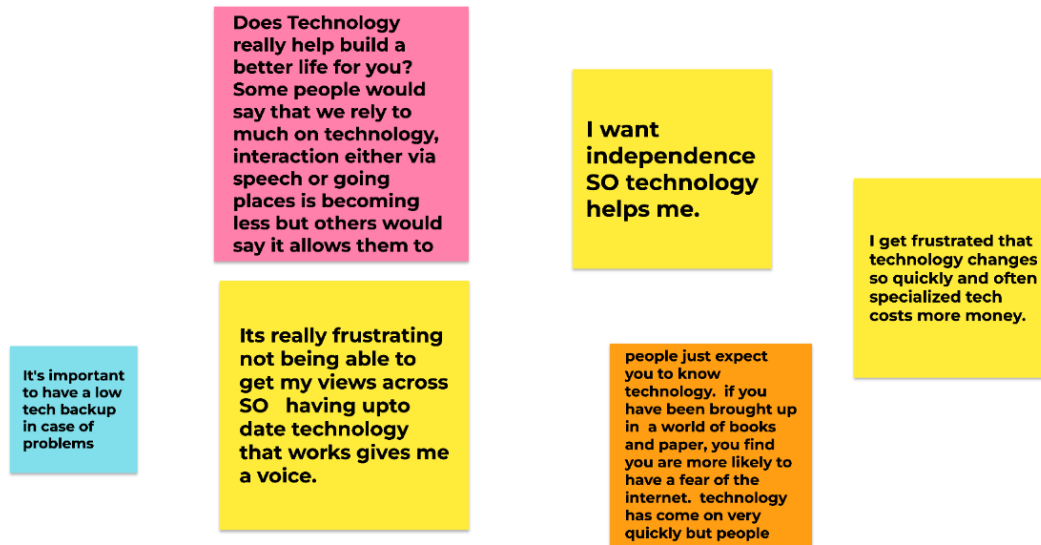


Figure 23. 'Is there anything else' idea board

Appendix E. Data Collection and Analysis Framework

IRPT 1: Technical Infrastructure (connectivity, power mains, data)
<i>Context-Mechanism-Outcome Statement</i>
Initial rough program theory: theory to bring together the ideas related to technical infrastructure and how context activates mechanism elements to produce outcomes. e.g. When infrastructure to support devices is reliable & trustworthy (context), staff can reallocate the limited time they have for engaging with technology (mechanism – resource) to becoming more familiar with the tools (mechanism – resource), discovering new functionality (mechanism – reasoning), supporting residents to engage with the tool in more and different ways (mechanism – resource), and identifying more opportunities to use these tools in more ways and with more people they support (mechanism – reasoning). This will result in improved knowledge of devices and uses (outcome) and better integration of devices into daily activities and routines (outcomes) because of improved knowledge and trust in the technology (mechanisms, resource and reasoning).
<i>Evidence</i>
List of direct quotes or passages from literature and transcripts
<i>Thought Process</i>
To document justification for evidence included, logic notes that connect the evidence with the theory and other ideas
<i>Supporting Quotes</i>
“Covid-19 has highlighted the extent of digital inequalities in the UK and how digital exclusion is having a negative impact on many people who use care services, both in lost opportunities for wellbeing but also the wider benefits” (ADASS and TEC, 2021: 18)
Refined Organisational Level Programme Theory 1
Document changes made later in processes... what is it changed to, what happened, etc.

Table 10. Data collection and analysis framework

Appendix F. Full Realist Survey Questions

Impact of Technology for Adults in Care, AT Professionals Survey

This survey will explore and test the impact of technology used by disabled people in care settings. This is part of a research project conducted by Julie Eshleman for fulfilment of requirements for a Doctor of Philosophy in Sociology and Social Policy from University of Stirling. This survey should take around 10 minutes to complete.

Please read the Survey Participant Information at the top of the webpage:
<https://linktr.ee/JulieEshlemanAT>

Consent to Participate

1. Electronic consent: Please select your choice below. Clicking on the 'agree' button indicates that:

- 1) you have read and understood the above information
- 2) you are 18 years of age or older
- 3) you voluntarily agree to participate

Agree

Disagree

Technology for Adults in Care

Please respond to this based on your experiences of what has worked while delivering or supporting technology to be used by disabled people in care settings. I am looking to understand the impact of assistive technologies by looking at the factors that might cause change. I recognise that everyone responds to technology differently and outcomes are strongly based how well individuals are matched with technology. It may be helpful to consider a person you have directly supported to use technology in your work, and to respond based on that person and your joint experiences.

In this survey, technology refers to any electronic devices that disabled adults personally use like a smartphone, smart watch, smart speaker (like Alexa, Google assistant, or Siri), tablet (iPad or android device), laptop or computer, home control switches (like smart plugs or speaker-managed appliances), video gaming systems, and other electronics. This does not include telehealth or support systems used by support workers to provide support to disabled people.

Autonomy. This means someone being empowered and equipped to make their own choices, be their own person, and feel quite in charge of their life.

2. In your experience, which of the following best describes how much a disabled person using technology in care gets to make their own choices and be their own person (autonomy)?

- Very much (things are great)
- Enough (things are good)
- Not very much (things are bad)
- Not at all (things are very bad)

3. If that disabled person stopped using any technologies in care, which of the following would best describe how much they would get to make their own choices and be their own person?

- Very much (things would be great)
- Enough (things would be good)
- Not very much (things would be bad)
- Not at all (things would be very bad)

4. What factors do you think have influenced how technology may impact disabled peoples' ability to be their own person and make their own choices (autonomy)? (choose all that apply):

Support network (support workers, close friends, family) feel that technology represents user voice / wishes
 The person can control the technology without support
 The person's use of technology is respected by those around them
 The person's support network believes they deserve as much independence as possible
 Supporters have some knowledge of tech to help people find what they want / need
 Support workers support them in a way that they can do quite a lot for themselves when possible
 Person feels comfortable using technology in daily routines because it feels 'normal' where they live
 Supporters / care staff try to help the person with their tech when needed
 Technology is viewed as an important part of how disabled people are supported
 Other (please share details below)

5.If you selected 'Other' above, please share any details you would like:
 Enter your answer

Independence. The idea of independence for disabled people living in support and care settings is complex. I want to understand whether and how technology may be a tool that increases opportunities for moments of independence where it is possible and wanted by the person. In the following questions, independence may mean moments when a disabled person can do things for themselves when they would like to, even when they use care and support for other parts of their day and activities.

6.In your experience, which of the following best describes how independent a disabled person using technology in care may feel each day?
 Very much (things are great)
 Enough (things are good)
 Not very much (things are bad)
 Not at all (things are very bad)

7.If that disabled person stopped using any technologies in care, which of the following would best describe how independent they might be?
 Very much (things would be great)
 Enough (things would be good)
 Not very much (things would be bad)
 Not at all (things would be very bad)

8.What factors do you think have influenced how technology makes disabled adults in care more independent? (choose all that apply):
 Those who support them knowing enough about technology to help them find tech to try
 The disabled person knowing enough about technology to find things they want to try
 Those who support navigating purchasing processes with me
 Finding the right access methods / way for people to use the technology
 Having a process for those who support checking in on the technology and how it is working for people (setting goals, capturing tech in care plans)
 Those who support disabled people understanding how important it is that technology work well for them
 The technology allowing people to achieve something important to them
 The support disabled people use includes time spent supporting their technology
 Other (please share details below)

9.If you selected 'Other' above, please share any details you would like:
 Enter your answer

Wellbeing and Satisfaction

In the following questions, wellbeing and satisfaction refers to a person's general level of happiness and how satisfied they are with their day to day life in a care setting.

10. In your experience, which of the following best describes the wellbeing and satisfaction of a disabled person using technology in care?

- Very much (things are great)
- Enough (things are good)
- Not very much (things are bad)
- Not at all (things are very bad)

11. If this disabled person stopped using any technologies in care, which of the following would best describe their wellbeing and satisfaction?

- Very much (things would be great)
- Enough (things would be good)
- Not very much (things would be bad)
- Not at all (things would be very bad)

12. What factors do you think have influenced how technology may impact the wellbeing and satisfaction of disabled adults in care? (choose all that apply):

- Technology has given users interesting things to do during the day
- Supporters/care workers have helped them find technology that allows them to continue hobbies / interests they enjoy
- Supporters know the disabled people they support very well, which has helped find daily activities they enjoy
- Disabled people must have some basic technology skills
- Disabled people must have some interest in trying new technologies
- Disabled people have learned a lot about technology that has made them more confident users
- They have found technologies that allow them to do things they enjoy so they are motivated to work through challenges
- They can use technology independently because they found the right access method
- Other (please share details below)

13. If you selected 'Other' above, please share any details you would like:

Enter your answer

Social Activities and Participation. The following questions refer to access to friends and family, activities that people care about, and how much disabled adults get to participate and engage in their local community outside of their home.

14. In your experience, which of the following best describes the social activities and participation of a disabled person using technology in care?

- Very much (things are great)
- Enough (things are good)
- Not very much (things are bad)
- Not at all (things are very bad)

15. If that disabled person stopped using any technologies in care, which of the following would best describe their social activities and participation?

- Very much (things would be great)
- Enough (things would be good)
- Not very much (things would be bad)
- Not at all (things would be very bad)

16. What factors do you think have influenced how technology may impact the social activities and participation of disabled adults in care? (choose all that apply):

- Technology gives them access to more activities they enjoy

Tech users have met new people in online spaces, games, or social media because of technology
 Technology allows people to stay in contact with people who do not live near them (maintain relationships)
 People feel more involved in their local community because of tech
 Their supporters and care setting have lots of connections with the local community
 People have found ways to participate in the local community because of technology
 Engaging through technology makes people feel like social interactions are more equal than in-person
 They have built a bigger network of peers and friends through technology
 They have learned more about technology through the friends they have made
 They have benefited from partnerships between their care setting and local community
 Other (please share details below)

17.If you selected 'Other' above, please share any details you would like:
 Enter your answer

Participants. The following questions will help me understand the context of your answers. All are anonymous and optional.

18.How long have you been involved in the (assistive) technology, disability, and / or residential care space?
 0-5 years
 6-10 years
 11-15 years
 16-20 years
 21 years or more

19.How would you describe your gender?
 Men (including transgender men)
 Women (including transgender women)
 Prefer not to say
 Prefer to self-describe (below)

20.Please share your preferred gender description:
 Enter your answer

21.Which of these statements describe you? Please select any which may apply:
 I am an assistive technology provider
 I am an assistive technologist who coordinates AT services and supports
 I am a residential care worker or manager
 I am an assistive technology policy expert
 I am an assistive technology or disability researcher
 Other (please describe below)

22.If you responded 'other', please share any details you would like below:
 Enter your answer

23.Which of these describe your expertise and practice in this area? Please select any which apply.
 I have directly supported disabled people to use technology
 I have directly supported staff teams to implement new technologies
 I have been involved with a technology delivery project with disabled people
 I work for a technology company that develops products for disabled people
 Other (please describe below)

24.If you responded 'other', please share any details below:

Thank you for participating! I appreciate your contribution to this work! For more information or to see research updates, please see my LinkTree page at <https://linktr.ee/JulieEshlemanAT> or follow me on Twitter at <https://twitter.com/JulieEshlemanAT>.

Figure 24. Full text of realist survey pages

Appendix G. Participant Pseudonyms

Disabled Technology Users	AT Professionals
Clint	Robert
Marcus	May
Janet	Clint
Aidan	Carla
Margaret	Kayla
Liam	Will
Jason	Caroline
Milo	Carrie
Heather	Don
Emma	Chloë
Candace	Trudy
Stan	Marcie
Mary	Aaron
Marietta	Ginnifer
Scott	Janet
Brent	Norm
Craig	Heather
Harold	Roger
	Rose
	Kasey
	Mary
	Amy

Table 11. Pseudonyms from realist review and evaluation

Disabled Technology Users	AT Professionals
James	Amanda
Daviana	Geoffrey
Kevin	

Table 12. Pseudonyms for open responses to realist survey

Appendix H. Overall Survey Responses (Combined)

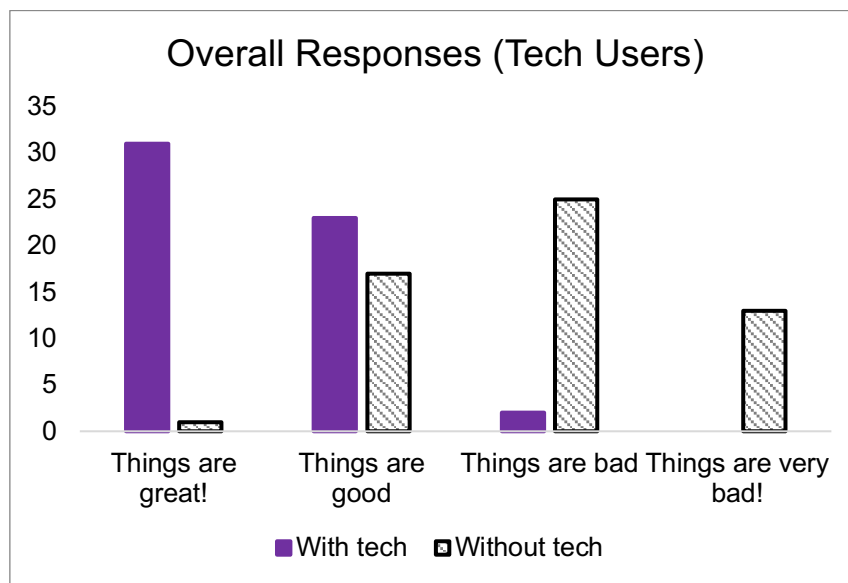


Figure 25. Combined survey responses, disabled technology users

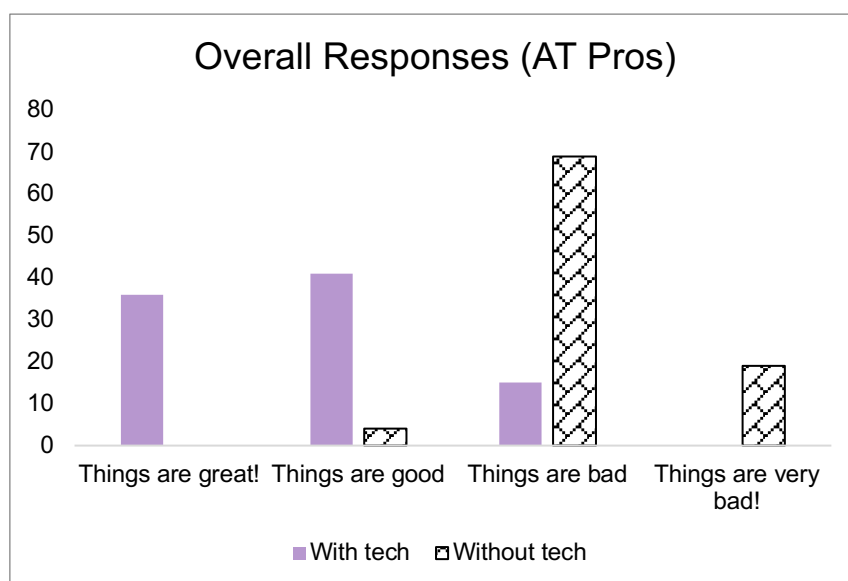


Figure 26. Combined survey responses, assistive technology professionals

Appendix I. Organisational Assistive Technology Planning Diagram

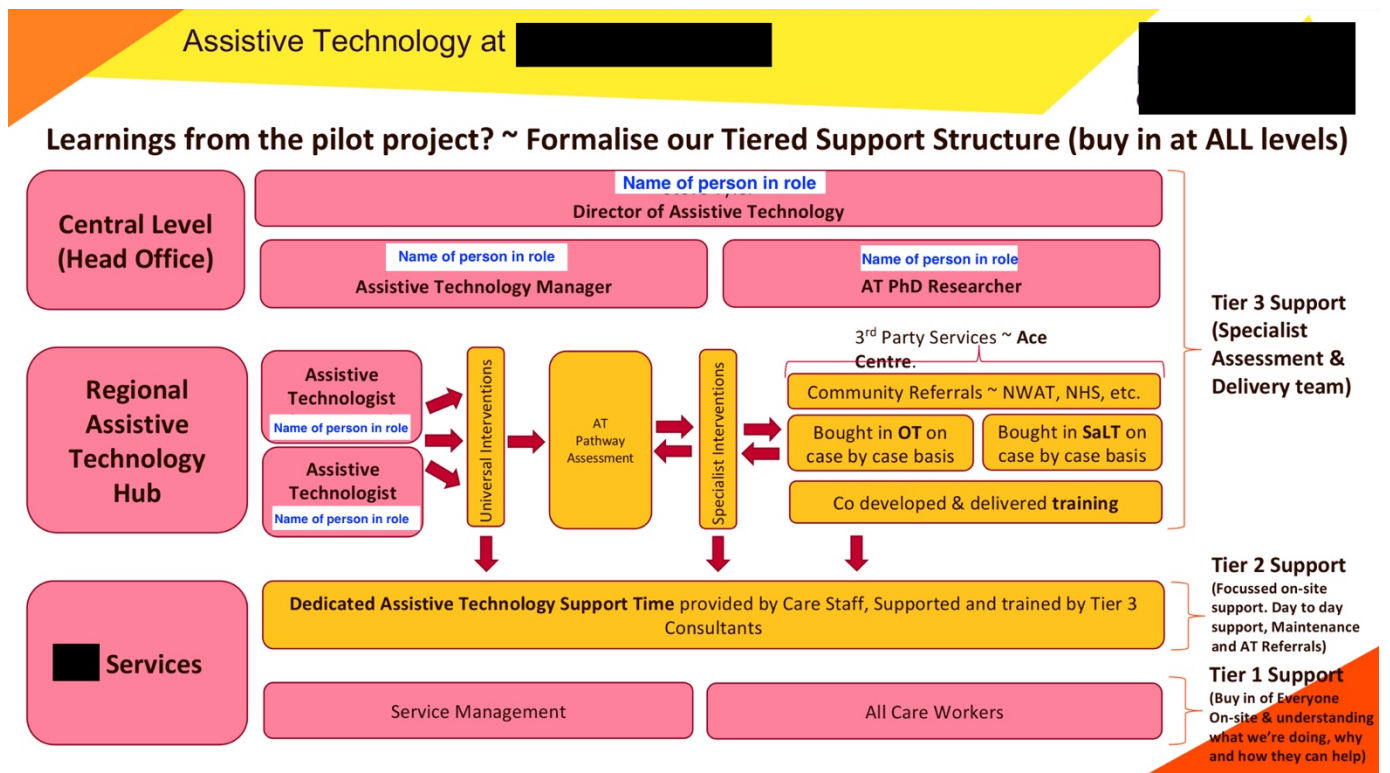


Figure 27. Organisational assistive technology planning diagram

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