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Promoting Inclusive living via Technology- Enabled support

The INVITE Project

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2022

In partnership with



Funded by



Foreword



The focus of this study was driven by increasing interest within health and social care policy in assistive living technologies as tools to enable older people to retain independence within their own homes.

Stonewater proudly provides care and independence to residents at our retirement living schemes and I am enthused by the results and insight the INVITE project has revealed following the collaboration between the University of Stirling and Stonewater, thanks to funding from the Longleigh Foundation.

I was fascinated to hear the thoughts of our residents on how they perceive various technology and how they think it could help them, or not. This report has found that technology can play a key role in promoting positive outcomes in people's lives, but effective implementation requires focus, investment and ongoing support as people's needs and technology change. It is part of our role across the sector to implement the findings of this research for the betterment of older and sometimes vulnerable people living in our homes.

It is important to recognise and thank the following people for their dedication and expertise from the University of Stirling - Dr Vikki McCall, Dr Grant Gibson, Dr Steve Rolfe, Dr Regina Serpa, and Julia Lawrence.

I would also like to express my gratitude to our staff, residents, and their families of the four Stonewater retirement living schemes for giving us their time and energy as without them, this valuable piece of research would not have been able to be undertaken.

The recommendations of the report put forward a clear case for more focus and investment in the role of housing in facilitating, introducing and supporting ongoing technology intervention that can improve people's lives. The new model for housing provision that is put forward highlights a bundle or package of activity that ranges from an interesting 'bits and bobs' fund to advice hubs and demonstrator kits that bring the potential of technology alive to residents. The report calls on the UK and devolved Governments to consider this learning and support the social housing sector to enable and sustain the potential of technology enabled support.

A handwritten signature in black ink that reads "Nicholas Harris". The signature is written in a cursive, slightly slanted style.

Nicholas Harris,
Stonewater CEO.

Acknowledgements

The INVITE team would like to thank the participants who took part in this project, with a special thank you to the residents and staff at the case study sites for their assistance and time. Thank you also to Helena Doyle, Emma Tobin and Joanne Morris from Stonewater Housing Association for their motivation, enthusiasm and support of the project. Furthermore, thank you to Andy Peers and the Loughborough Foundation for funding this project and being so supportive through the evolution of the project when impacted by the Covid-19 pandemic.

Thank you to the INVITE Project advisory group who have helped steer this project, including Rose Gilroy, Richard Best, Katie Brittain, Colin Capper, Jeremy Porteus, Martin Quirke, Stuart Wright, Pat Harvey, Ryan Macdonald and Debbie Abrahams. This longitudinal project has taken two years to complete, and we want to say a special thank you to original project leads Jane Robertson and Guy Stenson who have been an important part of the INVITE project journey.

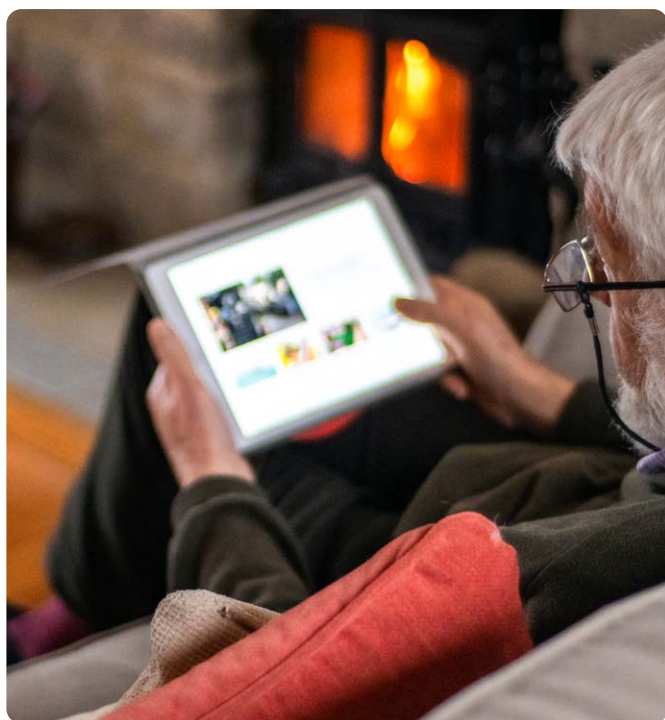
Executive Summary

The INVITE project offers evidence and recommendations on how to promote inclusive living via technology-enabled support. This report, led by the University of Stirling in partnership with Stonewater Housing Association and funded by the Longleigh Foundation, explores how to maximise opportunities to help social housing residents to live well and safely through facilitation of technological solutions. The new empirical evidence highlights that high-tech and low-tech solutions can both play a critical role in day-to-day living and supporting individual well-being, social connectedness and feelings of independence. The project provides insight into the value of building relationships at the ground-level of housing delivery and how co-production and inclusive approaches to understanding, introducing, facilitating and maintaining technology can improve outcomes for all stakeholders.

The INVITE Project Process

The INVITE project utilised a mixed method, longitudinal approach that explored the co-production of technology solutions to support everyday living. This approach included interviewing staff and residents at four case study sites across England to identify ways in which technology might improve living and working conditions. The project examined the whole process, from matching 'gadgets' to people, through to implementing these technology solutions in practice. We then asked people about their experiences: the good, the bad and the indifferent.

The list of technology solutions that were examined covered a variety of categories including supporting time and place orientation, lighting, kitchen gadgets, eating, drinking, physical and digital technology. The specific devices falling within these categories ranged from voice-activated smart speakers to simple jar openers.



Key Findings

Challenging what we see as technology

The co-production approach embedded in this research enabled a widening of what was considered and understood to be technology. The most popular items included Fitbits, hot water dispensers, a range of jar openers, tablets (Apple and Android), radios, inclusive gardening equipment, magnifiers and Alexa voice-activated technology. Each tech intervention was based on tackling real life barriers and challenges, as well as perhaps enhancing social opportunities and connectedness. This re-conceptualisation of technology – to include low-tech gadgets alongside state-of-the-art digital technology – is highlighted throughout the report and shows that person-led approaches to understanding need and support can enhance the impact of the technology intervention.

Technology as a process

The technology is important, but forms only a part of the overall process when looking for effective solutions that improve wellbeing. The process begins with exploring understandings of technology, needs and solutions, then setting up the right environment. After choosing the tech, it must be introduced carefully with ongoing support to address issues that arise. Often people start with 'the gadget', but the INVITE project shows that people-led solutions can lead to unexpected and impactful low- and high-tech support opportunities.

Creating 'small but huge' impact on day-to-day lives

The key outcomes identified in the study were as follows: facilitating social connectedness; staying connected digitally; maintaining relationships; exercising control and autonomy; improving mental and physical health; enhancing safety and security and finally improving opportunities for educational activity and entertainment. The evidence highlights a strong and recurrent theme where minor improvements to day-to-day living can have a transformative impact. This can be anything from making a cup of tea independently, to joining a 'Fitbit' walking group, or receiving medication reminders on a tablet.

Importance of an inclusive living approach

A number of barriers to using technology were identified, including concerns about privacy, annoyance with advertising, and a need for help in setting up and maintaining the technology. There is a clear need for extra support to be able to use devices and software more effectively. Technology that was seen as well-designed was the most popular, that people could integrate into their day-to-day lives.

The role of staff, friends and family in supporting technology intervention.

Housing staff play an important role in assisting residents to become more familiar with technological aids and comfortable with online systems. Support staff also play a role in providing information and advice to residents, generally signposting residents to resources where they might secure additional support. Family, friends and neighbours were also a key group in introducing, facilitating, building trust in, supporting and maintaining technology interventions. Negotiations and interactions to build trust, improve confidence and support problem-solving were part of the process of enhancing connectedness and familiarity with technology. The evidence suggests that this ground-level interaction and co-production of solutions is an effective way to establish the relationships needed to decide on technology solutions, introduce and maintain support with the technology process. What was clear from the study was the role that technology can play in facilitating (rather than replacing) face-to-face interactions.

People know what they need. They just don't know what they don't know

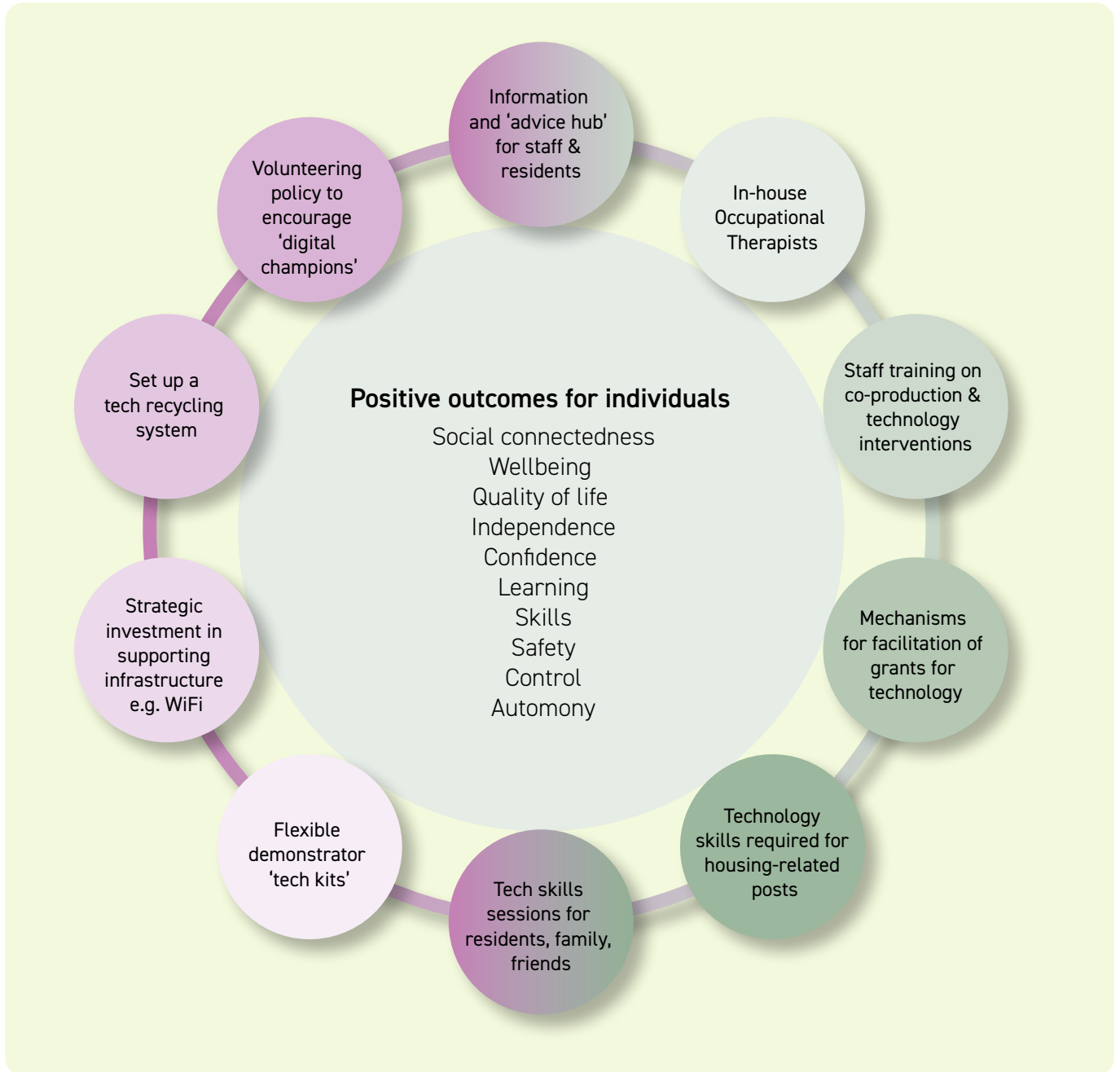
Residents, family and staff were generally interested and motivated around technology solutions but often 'did not know what they did not know'. The project found that co-production, demonstrating low-tech gadgets and building supportive networks around technology can act as a catalyst to building trust in technology. This process also includes investing in solutions to overcome common barriers related to resources and infrastructure, such as staff training, WiFi and mobile connections.



Importance of support via housing provision

Available support processes for technology are fragmented and sporadic, which underscores the important role of housing services in providing this vital form of support. The report suggests that current pathways are not always the most appropriate in determining what can be supplied; the process needs to be quicker for adaptations that are less complex, to help individuals sooner and more effectively. Support can be provided by involvement in the formal adaptations process, facilitating individual grants, building alternate support mechanisms, creating inclusive environments and integration of tech-solutions. The evidence in this report informed the following model of housing delivery around assistive technology:

A model for housing delivery



This model notes the wide variety of support that would enable positive outcomes for individuals and help organisations promote inclusive living via technology-enabled support. These key support mechanisms all have important parts in the facilitation of technology as a process and enabling person-led solutions. The model provides a framework for implementing the strategic and operational recommendations set out below.

Recommendations

Strategic recommendations	Responsible Partners
Increase investment at UK government level for housing providers to be effective facilitators of tech support including an ongoing 'tech fund' to be made available to housing providers and/or third sector organisations to systematically enable them to facilitate technology across the housing sector.	UK, Scottish and Welsh Government, Northern Ireland Executive, Housing Associations, Local Authorities, NHS, Health Boards, Third Sector organisations
Create nationwide housing sector support posts that focus on technology support , sharing best practice and information and advice that can focus on 'what works' with tech alongside promoting and publicising information and advice.	UK, Scottish and Welsh Government, Northern Ireland Executive, National Federation of Housing Associations (NatFed), Scottish Federation of Housing Associations (SFHA)
Increase investment into the connectivity infrastructure to encourage the uptake of digital technologies to support independent living, improve health and wellbeing and reduce social isolation.	UK, Scottish and Welsh Government, Northern Ireland Executive, Housing Associations, Local Authorities
Review and revise procurement processes relating to technology to support purchasing low-tech, low-cost items quickly.	UK, Scottish and Welsh Government, Northern Ireland Executive, Local Authorities
Widen the Disabled Facilities Grants (DFG), social work and NHS adaptations processes to include a wider variety of lower-level technology, based on wider consideration of support needs within the home.	UK Government, Local Authorities, Health Boards, Social Work, NHS
Provide individual grant mechanisms – something such as a 'bits and bobs fund' for accessing lower-level technology support via simple application processes, accessible to residents, staff, family and friends.	Housing Associations, Third Sector organisations
Improve evaluation processes and existing outcome measures to generate robust evidence linking technology to positive outcomes, to build business cases for investment in adaptations.	UK, Scottish and Welsh Government, Northern Ireland Executive, Local Authorities, UK Universities, UKRI, NatFed, SFHA
Increase support for effective partnership working between housing, health and social care to encourage person-led solutions, data sharing and reduced waiting times for support.	NHS, Local Authority Housing and Social Work departments, Health Boards, Housing Associations, RCOT
Create consistent language in information and advice around technology to circumvent the wide variety of understanding around assistive technology, from high-tech devices to low-tech gadgets.	UK, Scottish and Welsh Government, Northern Ireland Executive, Local Authorities
Operational Recommendations	Responsible Partners
Integrate strategic staff training on co-production and technology interventions to facilitate the recognition of tech-based solutions and support the maintenance of tech.	Housing Associations, Local Authorities, Health Boards
Create information and advice hubs for staff and residents to facilitate knowledge exchange around technology within organisations.	Housing Associations, Local Authorities
Create flexible demonstrator 'tech kits' to support information and advice about what is available, updating them as technology changes and more is known about what works.	Housing Associations
Set up technology recycling systems so residents can donate their tech for use by other residents.	Housing Associations
Hire and/or set up secondments for in-house Occupational Therapists within housing organisations to support the wider staff base in identifying possible tech solutions.	Housing Associations
Embed the requirement for technology skills into hiring processes for housing-related posts.	Housing Associations, Local Authorities
Set up consistent tech skills sessions for residents, family and friends to engage residents at different levels.	Housing Associations
Create a volunteering policy for residents, friends and family to be official 'digital champions' for ongoing successful technology introduction, facilitation and support.	Housing Associations
Take a proactive Inclusive Living approach to planning for housing and adaptations to integrate inclusive design and prevention into cyclical planning, repair, maintenance, void management and other housing provision.	Housing Associations

The report offers detail on these recommendations and a new model for housing provision that could support services and individuals using technology. This model involves an increasing role in sustaining inclusive communities for social housing residents and beyond. Overall, this report has found that technology can play a key role in promoting positive outcomes in people's lives, but effective implementation requires focus, investment and ongoing support as people's needs and technology change.

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Introduction

The INVITE project aims to investigate how assistive and everyday technologies can be implemented in retirement living properties to improve residents' quality of life and sustain inclusive communities. The research has been led by University of Stirling, in partnership with Stonewater Housing Association (funded by the Longleigh Foundation) to explore how technology can maximise opportunities to support residents to live well and safely.

This report offers evidence and insight from the perspectives and lived experience of staff and residents of Stonewater Housing Association, across four supported accommodation sites within England. The report focuses on investigating how assistive and everyday technologies can be implemented in the social housing sector, to improve quality of life and sustain inclusive communities.

The evidence offered in this report complements and builds on a series of outputs produced from the INVITE project, including:

Scoping review on co-production of technology solutions with older people

The scoping review looks at the evidence around co-production, to understand what works in terms of involving older people effectively, the types of technology available and the current evidence base regarding barriers and facilitators in relation to the use of technology by older people.

The Do's and the Don'ts in facilitating person-led technology solutions – a practitioner focused quick help guide

The best practice report is aimed primarily at those working in the social housing sector and will also be useful for those

working across housing, health and social care delivery. The guidance in the report will be helpful to those who are planning to support, introduce or facilitate high- and low-level technology solutions (which we also call gadgets, equipment and/or items) for residents or service users.

This final project report offers an in-depth examination of:

- The evidence of the impact of technology
- An understanding of the process involved in introducing technology within housing practice
- Investigation of different models of support
- Consideration of the barriers to and facilitators of person-led solutions and co-production

The report concludes by providing key recommendations for a range of audiences, to help integrate effective technology support for older people within policy and practice in housing, health and social care sectors.

Figure 1:
INVITE Project outputs



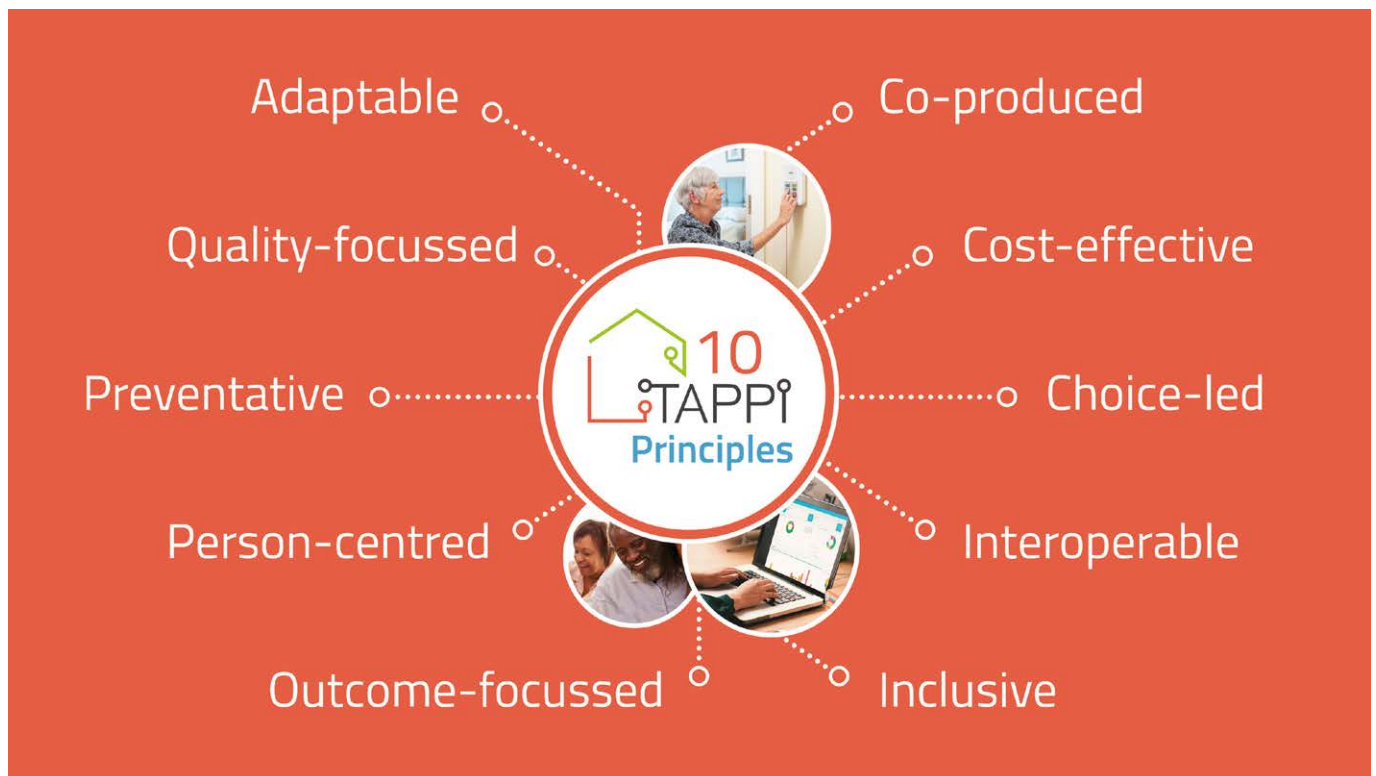
Taking an Inclusive Living approach

The adoption and promotion of technology has become increasingly important within housing, health and social care delivery. The UK Government, for example, has published a programme of reforms involving digital technologies that support health and social care, to increase long term sustainability [1]. These reforms include a plan to promote the potential of technology to personalise health and social care support, and to play a role in the prevention and reduction of health disparities.

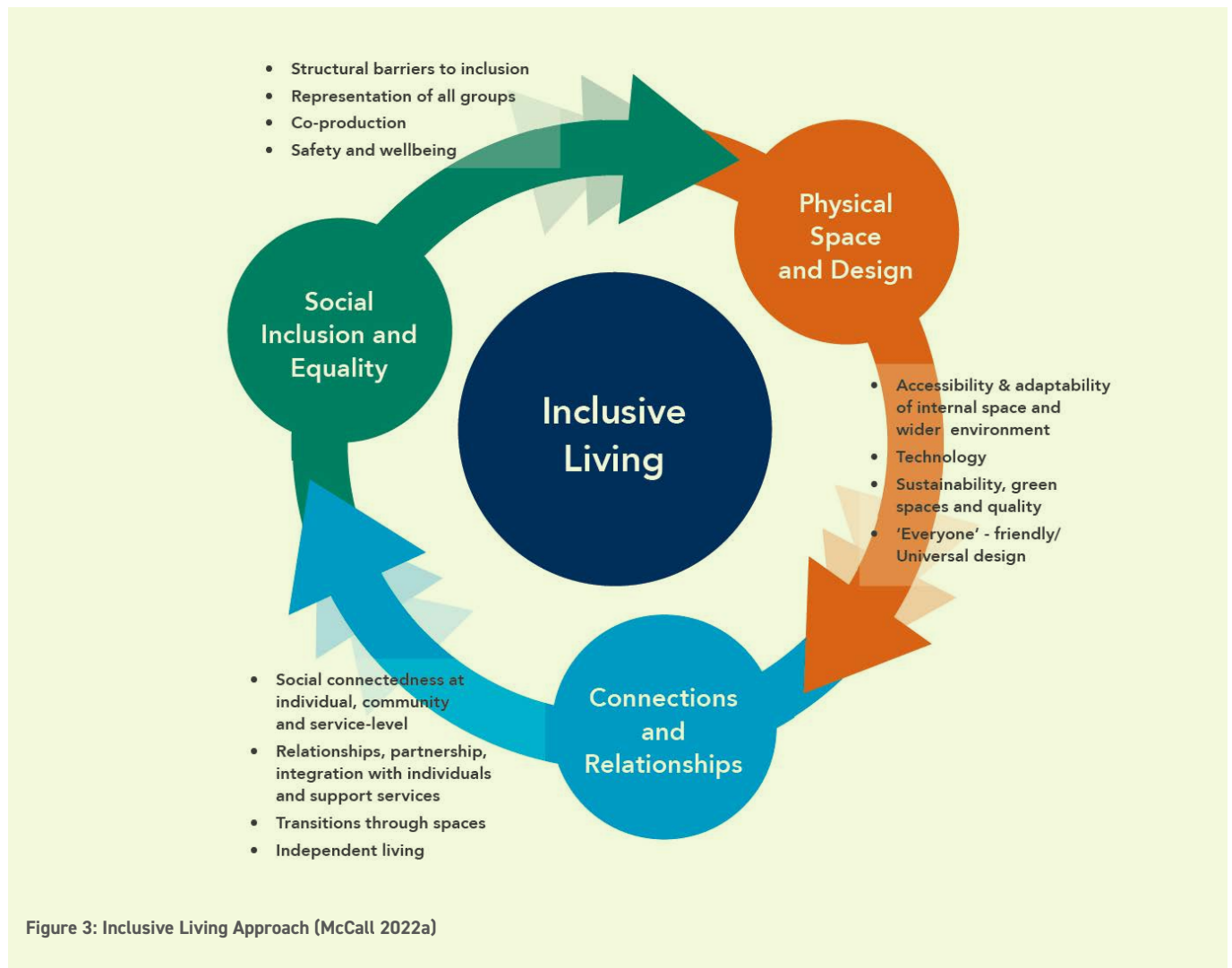
The Future of an Ageing Population report [2], identifies the important role that technology, including smart homes and improvements in connectivity, can play in planning to support the UK's ageing population. Additional elements to support older people, such as the health and social care integration White Paper (2022), are reflected in the Health and Care Act (2022), focusing on changing local systems alongside the 'Levelling Up' agenda [3] that outlines infrastructure investment and the aim to improve wellbeing in every area of the UK.

However, the role of the housing sector as a provider and facilitator of technology that supports health and social care is less clear. The Housing our Ageing Population Panel for Innovation (HAPPI) reports [4] provide clear pathways for information and advice, focusing on the role of technology via the *Technology for our Ageing Population: Panel for Innovation (TAPPI)*. TAPPI 1 outlines principles of and benchmarks for good practice in technology for housing, advocating a more joined up approach – or 'digital integration' – with health and social care [5]. TAPPI proposes 10 key principles (see figure 2) to make promoting technology in housing more effective [6]. These principles are now being implemented and tested in case study sites across England in TAPPI 2 [7].

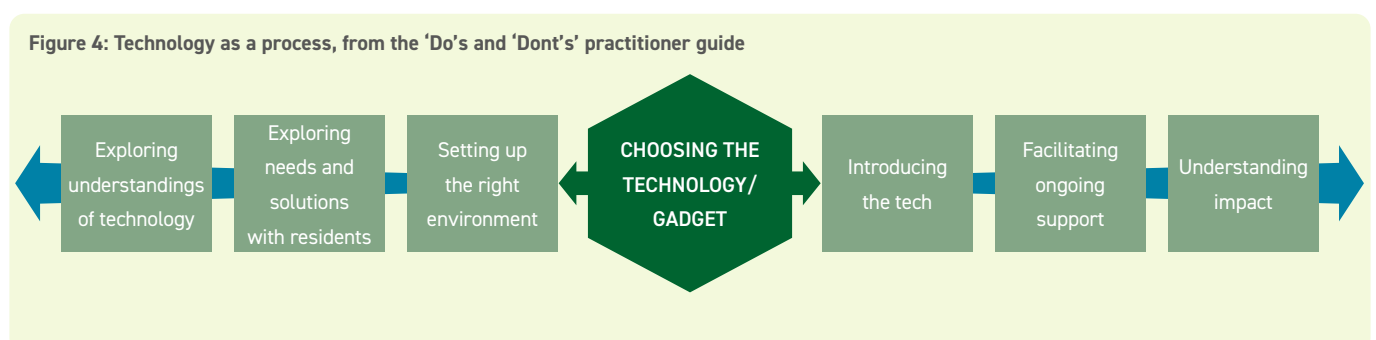
Figure 2: TAPPI Principles



The TAPPI principles highlight the important role that housing plays in developing inclusive, person-led and co-produced solutions. What is clear from the current policy landscape in housing is that supporting technology solutions requires an outcome-focused, flexible approach. The concept of Inclusive Living (see figure 3) supports the promotion of technology by demonstrating how it can be integrated into housing sector delivery, through linkages with adaptations, sustainability, inclusive design, partnership working, co-production and more (McCall 2022a).



The Inclusive Living approach shows that technology is an integrated element of front-line delivery. The 'Do's and 'Don'ts' practitioner guide [9] makes it very clear that any intervention is not just about 'the gadget'. The technology being introduced is of course important, but is only a part of the overall process of finding effective solutions that improve wellbeing. Often people start with 'the gadget', but the INVITE project has shown clearly that people-led solutions can lead to unexpected and impactful low- and high-tech support opportunities. Technology as a process is developed through an analysis of the key elements involved in understanding the use, value and benefits of technological development.



The INVITE Project takes an 'Inclusive Living' approach to exploring the day-to-day lived realities of people, focusing on person-centred solutions co-produced with residents and staff. The structure of the current report is as follows:

Section 1	Section 1 focuses on the evidence from residents who were INVITE Project participants. This places residents' experiences at the heart of the report, outlines the co-production approach, describes the inputs and activities of the project, and offers insights into key impacts of the project concerning wellbeing, control, independence and health.
Section 2	Section 2 offers an overview of facilitators and barriers that support or hinder the take up and use of the technology. It focuses on highlighting technology not just as a 'gadget' but how it is understood, used and managed. We provide evidence of what facilitates and motivates people in using technology, alongside the key barriers that make people reluctant or resistant to using these forms of support.
Section 3	Section 3 provides further depth in understanding co-production and the people involved in the facilitation process, including residents, friends, family and staff who are central in developing effective support mechanisms. The evidence here highlights the need for ongoing person-led solutions in the area of technology and adaptations.
Section 4	Section 4 investigates the different pathways available to housing providers to facilitate technology provision in residential settings. This section examines the ways in which formal adaptation pathways work, and how these routes are supported by the vital role of information and advice, staff facilitation, training and wider support pathways. Finally, section 4 recommends a model of support for social housing providers.

Methodology

Research objective

The research aimed to provide evidence that would assist housing providers across the UK to understand how far technology is sustaining inclusive and supportive communities in their retirement living schemes, and to develop their support service offering for residents.

The research investigates how assistive and everyday technologies can be promoted and implemented. To support this objective, the project matched and introduced demonstrator technologies in four different Stonewater retirement living schemes in England. These case studies adopted various approaches to maximising opportunities to support residents to live well and safely, including those who develop long-term conditions, such as dementia.

Research questions

The following six research questions (RQ) were identified to assist the aim of enhancing support for older people in retirement living schemes:

1. How are technologies being used in the schemes: 'what works' currently for residents and the staff/volunteers/families/agencies who support them?
2. How could the physical environment be adapted to incorporate technologies in ways that increase engagement amongst residents?
3. What new assistive and everyday technologies - or new approaches to using existing technologies - could be used to enhance support?
4. How can partnership working with health, social care and third sector agencies support the application and implementation of technologies?
5. How does the adoption/adaptation of technologies influence the wellbeing of residents, including social wellbeing in terms of connectedness with the wider community?
6. How can the creative adaptation and adoption of technologies be integrated into longer-term customer offerings in retirement living schemes?

To answer these questions, the project team utilised participatory methods to involve residents, staff, volunteers and partner agencies in the co-production of strategies to integrate assistive technology within residential settings. In each of the four retirement living schemes where the case studies were conducted, the research examined how technologies can be used, adapted and implemented in accessible and inclusive ways. The project utilised a co-production approach to exploring different technology interventions to understand how engagement with technology can be enhanced. This final report highlights good practice

identified in the case studies and offers recommendations for making retirement living schemes more inclusive and accessible, via engagement with technologies.

Conceptual framework: Inclusive living and technology-enabled support

Assisted living technologies have been identified as a key goal of health and social care policies which seek to enable older people to 'age-in-place' - i.e. remain independent within their own homes, including supported housing, for longer (see Golant 2015, McCall 2020). However, a number of barriers to the mainstreaming of technologies have been identified. These barriers include a lack of co-production in the design and implementation of products and services with older people and an overwhelming focus on risk management via activities-monitoring, which restricts the introduction of technologies which can enable people to continue engaging in activities meaningful to them. Further challenges include a lack of consideration of the role of everyday consumer-based technologies, poor awareness of technologies amongst both older people and staff, and limited staff training regarding the person-centred delivery of technologies in care. These barriers commonly lead to poor uptake and high rates of abandonment amongst older people who may benefit from using assisted living technologies, and to lower levels of referral than might otherwise be achieved (see the INVITE scoping report for more detail, Rolfe et al. 2021).

To overcome these barriers, this research advances the concept of 'inclusive living' to 'reset and centralise important areas such as adaptations, accessibility and independent living' and 'bring inclusivity to the forefront of housing' (McCall et al. 2019:3). This approach extends the notion of a 'dementia-friendly' or 'dementia-enabling' community with a focus on supporting a place-based approach that emphasises equality, inclusive design and linking people together within inclusive environments.

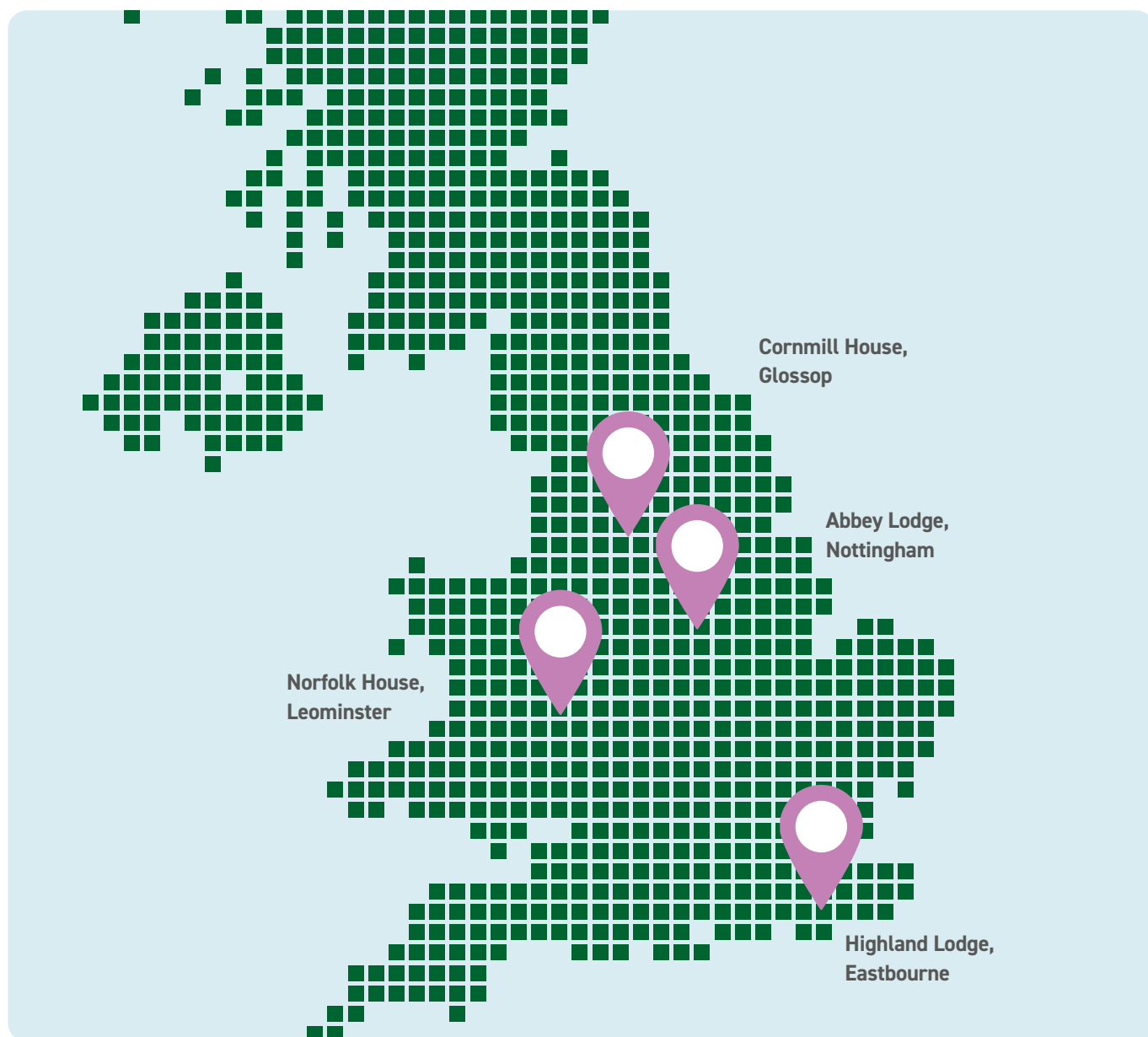
Fieldwork was conducted across four schemes in different geographical locations in England with variations in the size of the scheme (covering 212 properties), proportion of residents with diagnosed/suspected dementia, the size/rurality of the place in which the scheme is based, and previous design development activities at the scheme (as part of Stonewater's rebranding work). The project spanned more than two years, engaging over 100 residents and 30 staff members in total, via interviews, workshops and coffee mornings. The longitudinal part of the study involved data collection on site over two 'waves'. Wave 1 of the research occurred immediately following the lifting of Covid-19 restrictions in 2021 from June to October and

Wave 2 took place over the four sites between January to May in 2022. In total, 82 residents and 8 staff participated in in-depth qualitative interviews. These took place across four supported accommodation sites in England.

To facilitate the participation of residents with cognitive impairments in the study, in Wave 1 researchers used 'Talking Mats' - a bespoke visual communication method that explores joint housing and health issues, providing a housing-focused, holistic, visual tool that establishes clear and nuanced lines of communication. Narrative data from individual and group interviews with residents and staff, in addition to the data collected via Talking Mats, was analysed to understand feelings and perspectives on the use of technologies from the varied stakeholders who

support residents, as well as from the residents themselves. Observational and visual data also provided evidence about how technologies are used in practice in everyday situations. Data generated from the in-depth interviews and field observations offered original insight into how technology can be integrated into longer-term customer offerings within other retirement living schemes.

The main aim of this longitudinal approach was to explore the impact of the interventions over time. We therefore focused on following a 'theory of change' approach, outlined below. Section 1 focuses firstly on residents and their understandings and experiences of technology to establish overall impact of the interventions on the health and wellbeing of residents.



Section 1:

The impact of technology on health and wellbeing outcomes

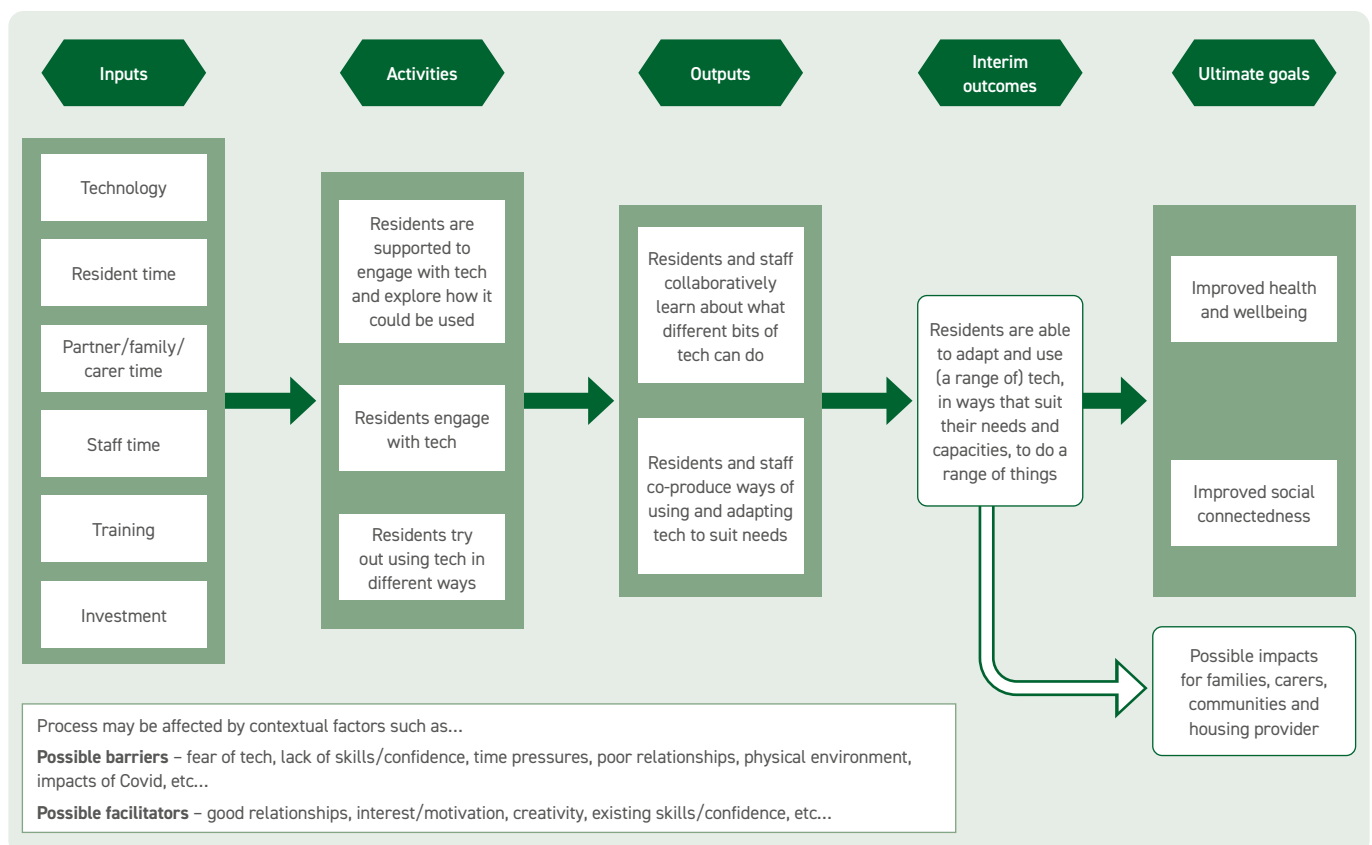
The aim of the research is to understand how technology can impact on wellbeing, social connectedness, quality of life, and feelings of independence. This section outlines the different ways that technology was understood, used and experienced by residents across the four case study sites. To generate these insights, a theory of change and co-production process was followed that put residents and staff at the centre of the research. This approach generated evidence about the nature of 'inclusive living' alongside the facilitators and barriers in using technology in people's everyday lives.

Assistive technology, inclusive living and the theory of change

The research deploys a 'theory of change' to analyse the inputs, activities, outputs, interim outcomes and ultimate goals of utilising assistive technology (see figure 5 below). The theory offers a simplified model of the processes involved, showing what needs to be in place for technology to facilitate positive outcomes, whilst acknowledging the barriers to change. This model offers an understanding of impact that outlines 'demonstrable and/or perceptible benefits to individuals, groups, organisations and society'

that are linked to the research (Reed et al. 2021). The use of technology can bring positive benefits for residents, family members, housing providers as well as the wider community. At the same time, potential barriers include a lack of confidence in using technology, a reluctance to make use of support and frustration with the effectiveness of resources. By utilising a co-production approach, the study analyses the responses of residents and staff, drawing on interview data to consider ways in which goals of inclusivity, improved health and wellbeing and wider social connectedness can be achieved.

Figure 5: The INVITE Project 'Theory of Change' (Rolfe et al. 2021)



Inputs and activities

The INVITE Project provides insight into the value of building relationships at the ground-level of housing delivery and how co-production can improve outcomes for all stakeholders. At its core, co-production entails building equal and reciprocal relationships with an action in mind, usually to improve a service or outcome (Realpe and Wallace 2010). As this research demonstrates, taking a co-production approach can increase the quality of life of those taking part in the process and support community interdependence. In turn, co-production can assist in driving positive change in policy making and practice (Robertson et al. 2022). Therefore, the INVITE Project aimed to build trusting and equal relationships with residents and staff where inputs were encouraged to find the most effective technology solutions. In practice, this approach involved tangible activities such as site visits over a longer period of time, coffee mornings with residents and check-in calls over the period of the project. In the end, we were able to simplify the co-production process to include:

1. Interviewing staff and residents in the case study sites to identify ways in which technology might improve living and working conditions
2. Suggesting and discussing different interventions with staff and residents to facilitate the use of assistive technology
3. Facilitating technology interventions at the case study sites, through a variety of different methods including staff support, peer support from residents and academic team expertise
4. Employing the academic team, staff and residents in supporting and implementing different tech solutions when appropriate (i.e. being responsive)
5. Asking people about their experiences: the good, the bad and the indifferent

The person-led approach to working hand-in-hand with both residents and front-line staff was a key element in establishing trust and positive outcomes. From this interaction, we built a list of technology solutions, assisting residents in the following ways:

- Time and place orientation
- Lighting
- Kitchen utensils
- Eating and drinking
- Dealing with doors
- Staying connected
- Entertainment and leisure
- Medication management
- Physical aids and adaptations
- Furniture
- Gardening
- Memory aids

The specific devices, or 'assistive technology', falling under these categories ranged from [Smart Speakers](#) (Amazon Alexa) to simple [jar openers](#) (see appendix a). Each tech intervention was based on supporting real life barriers and challenges, as well as enhancing social opportunities and connectedness (such as the [Nintendo Switch](#)). The co-production approach adopted in this research generated a range of interventions not previously discussed by the academic and Stonewater Housing Association teams and working with staff and residents enabled a widening of what was considered and understood to be technology. This re-conceptualisation of technology – to include low-tech gadgets alongside state-of-the-art digital technology - is highlighted throughout the report and shows that person-led approaches to understanding need and support can enhance the impact of technology intervention.

Impact: Outputs, interim activities and ultimate goals

This section presents an analysis of the interview data, based on responses from staff and residents, considering the impact of technology on residents' health and wellbeing. The key outcomes identified in the study were identified as: facilitating social connectedness; exercising control and autonomy; improving mental and physical health; enhancing safety and security and finally improving opportunities for educational activity and entertainment. It should be noted that there is considerable overlap between these categories; emotional wellbeing often involves a combination of the factors considered in this report. The conclusions summarise the findings, highlighting the potential for technological development to enhance the wellbeing of residents.

Facilitating social connectedness

Most participants in the study emphasised that their priority was to maximise opportunities to stay connected with friends, family and the wider community. This emphasis was particularly strong as individuals continue to deal with the social impacts of Covid-19. Following restrictions introduced during a period of national 'lockdown', people found themselves having to adapt to new forms of technology-assisted communication – most notably, Zoom and other video conferencing software. These technologies to enable virtual communication have become increasingly vital lifelines to social support, particularly for older people, who are more likely than other groups to be confined to their homes, often isolated from friends and family networks [8]. For those living in residential accommodation, such as sheltered housing and care homes (where restrictions on visiting had been particularly severe), the ability to maintain contact with loved ones, friends and family had a profound impact on health and wellbeing. Reflecting on this sense of isolation, one respondent stressed the importance of social connectedness:

we need to just think a little bit more about individual places and individual people within the block actually needing human contact and more care (Tony, Norfolk House).

Several participants focused on ways in which they, as well as their family and loved ones, actively sought technology to help them stay connected to those they would normally wish to see in person. Many spoke of having embraced new forms of communication, particularly video conferencing and instant messaging, emphasising the value of being able to immediately connect with and visually see loved ones, despite not being physically present. Many residents were already adopting various forms of technology to stay connected with loved ones, often building on tech adopted within times of the Covid-19 pandemic. This research found instead that the person-led solutions co-produced in Wave 1 focused a lot on low-tech devices that can meet existing need.



What does supporting independence and social connectedness look like?

Several participants had noted difficulties with arthritis in hands and wrists, meaning that making a cup of tea with a traditional kettle was difficult. Some relied on a spouse in the mornings and evenings, and some had experienced incidents with scalding.

One of the most popular pieces of technology was the hot water dispenser, that gives a cup of tea with a touch of a button. Participants loved the design, and it had replaced traditional kettles for some. Others had recommended it to other friends in the sites, who had bought their own version.

I mean, it's nice that I can make a drink for myself, I can make a drink for us both, and feel completely safe, and independent. It really is wonderful... It really has made a difference to my life (Nana, Cornmill House).

This device enhanced the feeling of independence for many residents. The hot water dispenser had the bonus of saving money in energy efficiency, alongside an inclusive design. It enhanced social connections, where people could invite friends over and now make them a cup of tea.

The technology in this example enabled support of an everyday routine activity that many take for granted – making a cup of tea.



The communities in the supported accommodation sites were the overwhelming priority for many of the participants. Broadening social networks more generally was identified as a need by respondents, with the need to forge connections with the wider community. However, many responses highlighted the limitations of virtual contact and emphasised the importance of face-to-face communication. One staff member explained how encouraging residents to socialise with a wider external community helped maintain a sense of social cohesion within the home:

I also think you can get quite insular if you do everything onsite and I will be quite glad when things start to open up again - and people can go to places to do things. Partly because you can defuse some of the tensions, I think, which are between tenants living in a contained place if they've got other interest elsewhere. It gives a sense of perspective. So, activities and things to do are really important (Stonewater staff member).

At the same time, some residents expressed frustration with a lack of participation by others in social activities in the home, explaining that 'the trouble is, we try to organise things and it's the same few [residents] coming down each time' (Andrea, Norfolk House). In contrast, another respondent explained how he didn't feel included by other residents in the home due to his visual impairment: '[other residents] don't really want to get involved with people who can't see... there's some stigma or something' (Rafael, Norfolk House). This latter comment highlighted the importance of an inclusionary approach, to ensure that all residents can participate in social activity.

There was also an expressed need for extra support to be able to use devices and software more effectively. One respondent enjoyed using Skype to stay in touch with her niece but had to stop using it after being unable to fix an issue and having no one else to help resolve the problem: 'I've got [Skype] on there but I don't know what to do next. [My niece] hasn't been over or anything for me to say to her, look set it up for me...So, no, we're not doing a video at the moment' (Valerie, Norfolk House).

This evidence suggests that low-tech and high-tech gadgets have a key role in supporting social connectedness, but high-tech options may need maintenance and support as long term solutions.

Exercising control

Along with a need to stay socially connected, building autonomy and independence was highlighted in Wave 1 as important for many respondents, who saw a high value in their ability to establish control over their daily life and living environment. Several residents reported using different forms of technology, including interactive voice recognition devices like Alexa and Google Dot, to manage their day-to-day activities. These included providing appointment reminders,

organising online shopping, maintaining health and fitness, and managing the orderliness and security of their homes. It was perhaps surprising to discover that many residents were already utilising higher-tech options at the earliest stages of the research to meet needs surrounding control and autonomy. For participants that were less familiar with such devices, this type of technology was distributed at Wave 2 to expand the benefits to other residents, with a number of respondents commenting on the difficulty in adjusting to an environment where they could no longer live independently. For example:

it's awful when you've been independent and then all of a sudden you have to start asking everybody to do little, tiny jobs for you that there is something out there if you only know about it, to be able to use and keep your independence (Hanna, Cornmill House).

The ability for residents to manage their own daily lives (without assistance) was particularly valued, and several participants in the study discussed using different types of technology to maintain this sense of control. One respondent underscored the significance of maintaining independence later in life, through facilitating day-to-day activities, as well as preventing major health events:

I can see such potential [of technology] in the way of safeguarding and reminding (especially for people who have memory issues), and shopping, basic things and ordering a takeaway - things like that. It is about trying to get people doing an armchair exercise once a day, you know, it could be the difference between a heart attack or not (Bonnie, Abbey Lodge).

Staff commented on the importance of 'the small changes to help them feel more confident. And make everyday life easier' (Stonewater staff member) and how routine changes can have a transformative effect. This was a recurring theme throughout the co-production process with staff and residents alike – that minor improvements to day-to-day living can have the biggest impact. For example:

I know that, especially the small gadgets, some of those small simple gadgets like the plate, with the spoon, the angled spoon [to assist with eating], amazing because it does...something as small as that which really does challenge someone, is huge in their lives, you know. So, you know, it's those little, small things which give such a...have a huge impact, that's really been, for me, amazing (Stonewater staff member).

Providing assistance with simple, routine tasks was acknowledged to make a significant difference to people. Such devices were highly valued: 'People are more independent now. They're not having to knock on each other's doors when I'm not around to open a jar of pickles, you know?' (Stonewater staff member). These routine devices were often the most highly valued forms of technology: 'I feel like they've been the smallest but the most massive impact out of everything' (Stonewater staff member).



What does supporting independence look like?

One of the most popular items re-ordered and requested by a wide number of participants across sites were jar openers. These items were simple, low-tech and made a day-to-day difference in people's lives.

The jar openers appealed to those who were both confident with technology and those who were not, as the tasks it helped with ranged from opening milk bottles to glass jars.

Interestingly, many participants were surprised by the usefulness and noted they wished they had had this item a long time ago to support their independence but did not know what was out there.

everything that's been provided has made somebody more independent. I mean it's awful if you can't open a jar...the gadget that they've got people can actually do that now, you know? And, you know, [they were] probably starving because they haven't eaten for a long time because they couldn't do their tins (Stonewater staff member).



Greater independence as a consequence of assistive technology was immensely important for residents participating in the study. The need to be in control of one's own home was a significant issue identified by participants in Wave 1 and was strongly viewed as a key contributor to wellbeing, as one resident explained:

I suppose in one way I'm quite a control freak, I like everything tidy around me, I like to know what's what and carers coming in. So, when things are as I want them generally, I can cope (Andrea, Norfolk House).

Equally, this sense of autonomy was strongly valued by many respondents in Wave 2:

Well anything like that keeps your independence. You don't have to always be asking somebody to do something for you. That's what I like about having these gadgets is it keeps my independence for me (Hanna, Cornmill House).

A common refrain in the responses was an unwillingness to rely on others and a strong need to retain personal independence:

I don't get so angry with myself either 'cause I feel more independent. Always been an independent person, I hate asking for help (Whitney, Highland Lodge).

I hate feeling useless. I might be 89, but...I mean, mentally you still feel the same as you did back then, don't you, but I suppose obviously you've got more experience and things (Ana, Cornmill House).

Many residents expressed frustration and scepticism about the use of technology; feeling that technology was limiting their independence and freedom. However, other respondents spoke of needing to trust others to help them in day-to-day activities, such as making a cup of tea or opening a jar of pickles. This finding highlights the role of technology in supporting everyday activities as a top priority, and led the research team to concentrate on lower-tech solutions to enable greater independence.

Improving mental and physical health

Many residents spoke of having unmet needs (to some degree) concerning mental and physical health, and some explained how they were using technology to meet these needs. As discussed above, wellbeing was impacted by loneliness and social isolation, which can be exacerbated by a diminishing cognitive ability, experienced later in life. One respondent observed how using the computer helped him to stay socially connected, and that being online in itself had the potential to address loneliness and depression:

I remember when I first got [my laptop] - well, this was like a different world. I remember my thought at the time was, God, if people are there, online, they can never be lonely, can they? (Nigel, Abbey Lodge).

As acknowledged above, respondents were keen to emphasise their strengths rather than highlight weaknesses. As one commented: *'Just 'cause my body's given up doesn't mean my mind's given up' (Whitney, Highland Lodge).* Residents were aware of their physical limitations and particularly valued the benefits that lower-level technology could bring:

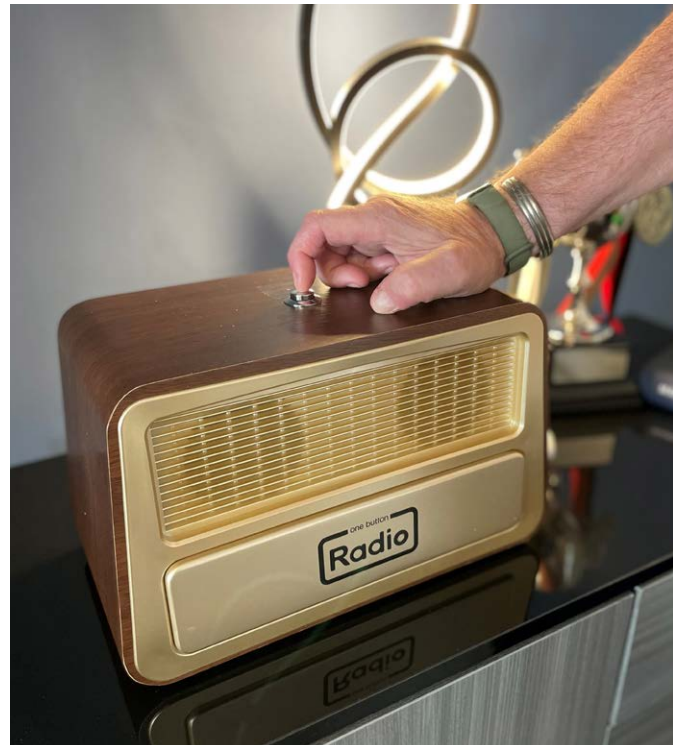
I never thought, I'd get to this stage to where I couldn't unscrew a top on a bottle or jar and you don't think you'll ever get to that stage but knowing that there's something out there or having something now that can help me, mentally it's better for you (Hanna, Cornmill House).

Managing medication was a major issue mentioned by several respondents in the study, who struggled to remember to take tablets at the right time and frequency, whether for themselves or for others in a caring capacity. Some used an alarm on their phone as a reminder, while others would rely on family, friends and support workers to collect and organise their medication. Technology can assist in this process (particularly when visiting was restricted):

When my alarm goes off [on the phone], I see on there and it says, medication, because [my carer] set it up on there for me to remind me, because...my memory's not that good at all...she says, to take your medication, have your breakfast (Imelda, Norfolk House).

I've got one of these [pillboxes] and I have my medication delivered. Up to now I can manage it. When it first started my granddaughter, they came over. Because with Covid they haven't been able to do it for me. I said my family would have been in my flat, what, three of four times per day (Josephine, Cornmill House).

For residents experiencing difficulty in managing medication, automatic pill dispensers and diary scheduling technology could reduce the burden (on them and their loved ones) of organising and managing medication. With respect to mental health, one member of staff described using various



forms of interactive technology with residents at Wave 1, to enhance their cognitive capacities and, to some extent, their physical fitness:

There are different apps and games that they can play and we've done awareness days and two or three of them might sit and play a game together. In the future, there are certain residents I would like to try and do one-to-one sessions with. One just for their mental and their brain cognitive functioning abilities, to get their brain active and look at the games of what we could do on that. And for the physical side, even if it's just getting them from their flats downstairs into a different area and seeing a different environment (Stonewater staff member).

Maintaining physical fitness later in life was a concern for several respondents in the study, particularly those who were previously active and had fitness routines interrupted by lockdown. One resident explained how she missed attending the fitness classes onsite; this was important not only for physical health benefits, but also for socialising opportunities: *'we used to do that sometimes [exercise class], if somebody comes in, I'll be there... Have a good laugh if nothing else' (Gabrielle, Norfolk House).* Interestingly, some alternative physical therapies were popular amongst participants, who found themselves unable to practice their regular activity due to Covid-19 restrictions:

I was doing Tai Chi before this closedown, and [the teacher] went on Zoom, so I downloaded it and I got online. My tablet is only a small one. I have a large entrance and I was out there and plonked the tablet up on a chair (on a tray) to see what she was doing, and it was so small, and I was doing the Tai Chi in the hall - I have just about enough room to do some of it (Valerie, Norfolk House).

However, for this respondent the quality of instruction was low, illustrating the limitations of online provision: *'it was not really good, so I stopped doing it. I will go back to it when she gets back [in person]'* (Valerie, Norfolk House). Given the premium assigned by residents at Wave 1 for technology designed to enhance physical fitness, several participants were encouraged to use technologies such as physical exercise apps and 'Fitbits' for monitoring health and motivating exercise. Fitbits were especially popular:

I do think the Fitbits are really handy, because they help you understand what your body's doing in response to what you're doing in your day-to-day...It's very important to me, because it means the difference between life and death for me (Bonnie, Abbey Lodge)

I like to be a very active person, and I like to be a very self-motivational person. I've spent all my life working where I've had to motivate people, and now, I'm having to motivate myself. And I find that with the Fitbit, it becomes a bit of a challenge because...in fact, perhaps too much of a challenge, walking around the estate at midnight is not a good chance to get 200 more points on your Fitbit. But at the end of the day, no, I do find it incredibly good. Because every day I go out, and every day I've tried to beat what I've done the day before (Paula, Abbey Lodge).

Physical exercise and fitness were viewed in very positive terms offering: *'the potential to do things that we couldn't probably normally do, which also, is not only good for us physically, it's good for us mentally as well'* (Bonnie, Abbey Lodge). This comment underscored the interconnectedness between physical and mental wellbeing.



What does supporting health & wellbeing look like?

One resident in his 60s had long-term anxiety and depression, with difficulty managing and experiencing regular and spontaneous panic attacks.

The resident was provided with a Fitbit which communicated with the Fitbit mobile application (app) on his smartphone via Bluetooth. The Fitbit allowed the resident to track their heart rate, sleep and physical activity (e.g. number of steps). This helped the resident to identify risk factors associated the onset of a panic attack (e.g. increased heart rate) before the symptoms were visible.

.....
"The watch has done a lot for me since I got it... it's changed my life!" (Harold, Abbey Lodge)
.....

The Fitbit has helped the resident to detect the symptoms of an oncoming panic attack, such as an increase in his heart rate. Furthermore, the resident has also been able to help regain control during a panic attack using the Fitbit's guided breathing session feature called Relax.



Facilitating educational activity and entertainment

Respondents strongly valued a number of activities, facilitated by new technology, such as being able to look up information, learn new knowledge and generally stay informed. Several residents mentioned enjoying using online platforms to browse television clips, listening to music and watching instructional videos. One participant reflected on the potential of her tablet, explaining how she is gaining knowledge as she becomes more familiar with its functionality: *'it can certainly teach me a few things, I suppose, when I get to know how to use it properly'* (Lisa, Abbey Lodge). As mentioned above, an important finding of this research is the extent to which residents were already utilising various forms of technology prior to project intervention. There were, however, some participants in the study who benefitted from higher-tech devices such as tablets and Kindles at Wave 2.

The Alexa device, for example, was particularly useful as a hands-free mechanism for participants with limited mobility, when otherwise pre-occupied or for those who were fearful of change:

I just find it so useful. I'll tell you what I do find it useful for more than anything. I know I'm very old fashioned and I just can't get in this day and age, I'm still in pounds and ounces and things like that, well I'm in the middle of doing, making something, and it's all in kilograms and grams and I haven't got a clue. So I just ask her, how many kilograms there is in six ounces or whatever, you know whatever it might be, I just ask her and the answer is there immediately. Helps with recipes, it's marvellous for things like that (Hannah, Cornmill House).

It's made a lot of difference, because I can look up things more easily, of course, with only one arm as well, and playing the music I like (Rina, Highland Lodge).

Interestingly, the Alexa device was also useful for staff in engaging residents in a variety of ways – whether by offering residents exercises to improve cognitive ability, to support mental health, or in adding levity during check-in visits:

Actually, the customers or residents that do come in, if there are certain questions or if we've got five minutes spare we might do a quick exercise thing, Alexa has been useful for that. Or even to make someone laugh when they're feeling a bit low, or to listen to something really calming before they leave the office (Stonewater staff member).

The portability of a tablet was also noted for helping with hobbies, such as cooking and learning languages, but also more generally when being in transit, valuing the ability to have information available at their fingertips:

The tablet worked really well because it will do...get my memory...well, things that I'm supposed to be reminded

of. So, I can take that with me wherever I go, bathroom, kitchen doesn't matter what. It also helps me to see the recipes that I need to do for when I'm cooking (Paula, Abbey Lodge).

I'm really happy – as I say – with my French in the mornings. I have it on the audio when I'm getting dressed in the morning so I'm talking to it and talking back. So I don't even have to be looking at it, I can be talking French and stuff...'Cause I've got an eldest daughter lives in France (Whitney, Highland Lodge).

Staying informed was particularly important to respondents – in addition to staying connected with friends and loved ones, technology enabled them to feel connected to the wider world.

Some residents explained they enjoyed using technology for gaming and generally passing the time with puzzles and trivia. Casual forms of entertainment were especially valued by participants with health conditions which restrict mobility:

I've actually got a game on there as well which is nice. Because especially when I wasn't doing much and I couldn't do much for six weeks, just wasn't allowed to do anything, so it just kept my mind going. It was wonderful (Whitney, Highland Lodge).

Another participant emphasised how gaming helped to lift her spirits when grappling with depression, and interestingly, gave her confidence in social situations:

If I think if I hadn't have had my laptop to be able to play my games and everything, I would have certainly, I wouldn't be sitting here now, I don't think, 'cause I was getting really down (Julia, Abbey Lodge).

Similarly, one member of staff explained how tablets filled important entertainment voids in the home when television was not available: *'And you know the amazing thing, when all the TVs went out, that tablet was their lifeline for TV'* (Stonewater staff member).

The ability to read books or newspapers was very much enjoyed, however several respondents in Wave 1 explained that failing eyesight in older age made it difficult to be able to read the printed page:

I'm not very good at reading that good, no. My friend, oh, she can read much better than me, she's much better than me, she is. Sometimes when I get news and things, sometimes she asks me, she says, "would you like me to read that to you?" (Imelda, Norfolk House).

One participant in Wave 2 emphasised the mental health benefits of audio technology on her tablet, being able to enjoy her favourite books without having to make the journey to the library, and without having to physically lift a book: *'that's been a saviour for me as well, because I was quite surprised that you can actually get a book and sit and*

read it, or listen to an audiobook without having to move... it saved my sanity so to speak (Julia, Abbey Lodge). Similarly, another participant explained how the flexibility of the Kindle enabled them to read more books than prior to participating in the study:

Well, it's brill, and I take it round with me – I don't put my books on it, because I've got three Kindles. it's better than getting my big laptop out. I can read two or three books a day...I go to the library, and I can get 24 at a time, so I pull with my trolley. I could put them on that, you know, but at the moment I just put them on the Kindle (Fay, Cornmill House).

For some residents, the value of the devices was in accessing other possibilities to incorporate technology into their daily lives. This was especially the case for residents

who were particularly resistant to the idea of something described as 'assistive'. One participant described being receptive to exploring aids that might help with day-to-day activity, after seeing the benefits of a tablet and smartphone:

[The study] made me ready to accept the aids. ...I hadn't thought about it until [the researcher] came once before and I remember saying, 'I'm not very techno. Technology doesn't play a huge part of my life' and [the researcher] saying, 'I see you've got an Alexa. Oh, I see you've got a Smartphone. I see you've got a tablet.' Oh yeah! (Phillipe, Highland Lodge).

This evidence highlights that a person-led approach is needed as people have subjective levels of understanding what technology is, and their own competency-levels.

Conclusion

Respondents viewed forms of virtual communication – such as, video chat, social media or instant messaging – as critical for remaining socially connected within and outwith the home. Many pointed to the social restrictions imposed as a result of the lockdown as a main motivation in becoming more proficient in virtual networks, although many respondents had been engaged with different types of communication technology well before the onset of the pandemic. At Wave 2 the focus of the project therefore shifted from high-tech, digital technology to giving attention to ways in which lower-level forms of tech might meet the social needs of residents. Hot water dispensers, jar openers, assistive gardening tools and Fitbits are four such examples. Unsurprisingly, there were varying degrees of confidence expressed by respondents in their technological abilities and facility with virtual communications. A number of barriers to becoming more virtually connected were identified, including concerns about privacy, annoyance with advertising, and a need for help in setting up and maintaining the technology. Respondents emphasised the importance of being virtually connected with friends, family and others within the home (such as staff and other residents), and some placed a premium on being connected to the wider community. The gaps in existing communication technology seem to revolve around facilitating connections with the wider community, especially as in-person events and activities were scaled back as a consequence of the pandemic.

There was considerable evidence in the interviews that technology generally enables the ability to offer autonomy and independence later in life. For some residents, technology such as voice activation units helped to manage day-to-day activities, but also had the potential of 'safeguarding' as one respondent described the role of tech in preventing a fall or assisting in physical fitness. Staff also highlighted a clear benefit of technology in enhancing independent living, and facilitating the wellbeing of both residents and staff. Importantly, the interviews also revealed how lower-level forms of technology – such as jar openers and hot water dispensers – enhanced control over day-to-day activities. In more general terms, staying in control of one's living environment and social life was an important factor in individual and collective wellbeing.

Importantly, some respondents in the study were adopting technology to manage their mental and physical health, for example by attending online fitness classes and using audio reminders to take medication. With respect to educational activity and learning, technology was largely used by residents to enjoy relatively low-level activities such as browsing topics, watching videos, listening to music, accessing information and playing games. Residents placed a strong value in being able to stay connected with the wider world, even if in a less interactive way and there may be scope in extending the use and development of existing technologies to enhance and develop individual and collective wellbeing.

Section 2:

Facilitators and barriers to technology

This section identifies various factors which facilitate (or inhibit) the adoption of technology in residential care settings. Understanding the perceptions, motivations and capabilities of tech users is critical to learning why some users are more enthusiastic about technological interventions in their lives over others. This section therefore presents a classification of residents, identifying four key categories which in broad terms describe the different types of attitudes participants in the study had towards **'technology'**. The first group of users involved respondents who were comfortable with technological change; who were confident in using technology and who made effective use of their **capabilities** to enhance their knowledge and skills. The second group included respondents who were **motivated** to learn new skills. This group included those who were hesitant and sometimes fearful about how to use resources, but who were nevertheless keen to utilise the support available to increase their facility with new technology. The third group were classified as **reluctant** users. These groups were skeptical about the benefits of technology, were often fearful of change and sometimes displayed resentment about the extent to which they were expected to embrace various aspects of technology. The final group were described as displaying an attitude of **resistance** to the use of technology. They were suspicious of change, described themselves as 'technophobes' and resented how technology could be used to control and monitor behaviour.

Capability

The respondents who appeared most capable of using available support described a high level of motivation and confidence in both the opportunities offered and their ability to take advantage of available possibilities. *'I'm a huge fan of new technology' (Phillipe, Highland Lodge)* as one responded. Many of these respondents explained they had initially been fearful of using technology but (partly due to the pandemic) had mastered new skills out of necessity (for example to stay connected with family and friends during lockdown). It should be noted that these users often understated their own abilities, but they had a willingness to learn. As one resident explained: *'you do, as I say, you build up that confidence then. You probably don't think about it before, but then, you know' (Danielle, Abbey Lodge)*.

The most confident residents were those who had been able to learn for themselves. As one commented: *'I just taught myself. Oh, I got on quite well with [iPad] actually... everybody tells me I'm tech minded' (Cindy, Abbey Lodge)*. Others emphasised that their knowledge and skills were basic, but they were helped by a long familiarity with certain kinds of technology: *'I mean, I'm not brilliant, but I have worked on the computer since I was 17' (Fay, Cornmill House)*. Others described how technology can assist in everyday activities, with a minimum of effort. Participants receiving low-tech interventions were especially confident in their ability to adopt and maintain using the devices. Many described how intuitive the gadgets were:

I didn't even read the instructions because it's not...rocket science to put a cup underneath and press the button and water comes out when it's boiled (Emily, Abbey Lodge).

For participants receiving more complicated forms of technology, many expressed a preference for straightforward systems which were easy to use with voice activated systems seen as particularly helpful for many older residents:

When I got it the first thing I did, I went online and downloaded the app, and got all the information I needed, how to set [Alexa] up, and had it running in five minutes (Harold, Abbey Lodge).

Because I had an iPad before, you see, and basically the [tablet is] the same thing. [A member of staff] helped me out and transferred all my stuff onto that before I had to get rid of it, so there was enough left on it for that. Yeah, so I'm quite conversant with it, yeah (Jose, Abbey Lodge).

A key theme with more capable users was overcoming an initial fear about their own ability to make effective use of technology:

I think that's the attitude of a lot of people, that they're frightened of breaking it. You can't break it, you just switch it off and switch it back on, if you do something wrong, don't you, you know? But yeah, I think a lot of people are missing out, and interacting with family and stuff like that, you know? I mean, I've not seen my family for ages, apart from my daughter, but yes, as I say, just to be able to send them a message (Julia, Abbey Lodge).

This group of users sometimes emphasised how their use of technology had become automatic, to the extent that some were no longer able to imagine functioning without assistance from the technology:

I don't know how I managed without it [smartphone] to be honest. But, as I say, you do...as you're older, you do sort of think, you have to stop and think and then, if something [scam] comes up I would never touch it unless I've...talked to my daughter or my son. You know, like I...I left that on there because I thought, I had a feeling it was a...a thing, and I thought, no way, I'm not touching that (Danielle, Abbey Lodge).

Other residents made use of technology to assist in their own hobbies and activities:

The basics, like I say, Facebook, YouTube, emailing, messaging on Facebook. But although my wife will tell you that I do spend a lot of time on the iPad, because I'm a saxophonist I listen to saxophone on YouTube, and then because I like art I'm looking into watercolour styles, one thing or another. I've just received some ink today. I received some ink a few weeks ago and a fuday pen, which is a drawing pen. So there's lots of things going on in my life which keep me occupied. I find it difficult to get bored (Ed, Cornmill House).

This evidence illustrates that the perception of technology and its usage is subjective, and people interpret accessibility and ease of technology differently. Furthermore, the role of others – family, friends, staff – are the key points of successful or unsuccessful take-up of technology. It is not the 'gadget' that is key in many ways, but rather the people around the person to facilitate, help and motivate – a key finding elaborated upon in more detail in Section 3.



What does increasing confidence look like?

Part of the process for building confidence lay in the introduction of the technology and alignment with residents' priority outcomes.

The use of technology helped build confidence and assist with everyday activities – for example in mitigating risk. As one respondent commented on the extent to which the assistive technology helped to make them feel safer in the home:

You can't eliminate risks, it's a balancing thing, isn't it, but... I mean, we wouldn't get out of bed if we didn't want to take any risks, and even then the ceiling might fall on you (Andrea, Norfolk House).

In this way small scale interventions carried much wider significance. The 'tipper' kettles designed to prevent scalding were of particular value to staff and residents:

I think they are small but will make small changes to their lives but will benefit them dramatically. Because certainly for people that are ageing and that we've seen quite a decline in their health, down to even like the tip kettles and the Breville kettles that they have been falling or their body's becoming less useful, their hands, those sort of bits...less accidents for people and made them feel more confident in their homes. Because they've got something that they can use that they feel more confident in using...everybody uses a kettle, don't they? (Stonewater staff member).

This highlights that introducing the right gadget with the right motivation can be very impactful. This can lead to increased confidence, feelings of safety and independence.



Motivation

The largest group of respondents were classified as motivated users. These involved residents who were often fearful of their capability to use technology, but who expressed a willingness to make use of available resources and to improve their skills. Such residents would often describe themselves as having been forced to adapt due to the demands of the pandemic, when they had no other option to ensure they remained in contact with loved ones and friends.

I think that we would like to keep in touch with relatives abroad and so on. They talk about Skype and...Zoom and this face and that face and what have you and we just literally don't have a clue. I think we have managed once by luck or chance than anything else to actually talk to someone on a video call. But I didn't even know I was doing it until they popped up and said, 'oh hi dad, I didn't know you knew about this stuff'...But, I am looking forward to it, yes. You are never too old to learn are you? (Sean, Highland Lodge).

There was a high degree of fear (particularly with older residents) in using new technologies. As one staff member commented: *'I completely understand where a lot of our customers are and a lot of it is they're scared of it anyway, they're scared'* (Stonewater staff member). Part of this fear was due to the perceived high degree of risk using services (such as online banking). However, residents who were motivated to learn new skills were able to overcome these concerns:

I know my banking's okay because my kids have shown me how to do that. They are very good the banks aren't they with security, so I feel quite happy with those (Whitney, Highland Lodge).

A number of initially reluctant users described how they had been persuaded by specific forms of technology (such as physical fitness apps and wearable technology – such as the Fitbit).

Before I had my gadget, I was very 'anti' this because I think I'm still quite fit. You know, fitness is an important part of my life. So, I wasn't really prepared to embrace any of this technology. I thought it was for older, weaker people but it's made me less reluctant to accept the technology that's available. It's not a black mark against me. It's something to improve the quality of my life.... It's getting over the hurdle of it's there for my benefit. It's not there because I'm old and decrepit and can't get by without it. It's not that. It just makes my life better (Phillipe, Highland Lodge).



Many residents were keen to learn technology, but cautious about potential difficulties. Staff, friends and family were particularly important in supporting and motivating. For example, building on the Fitbit example from earlier, the technology itself was a catalyst for increasing social connectedness (see case study below). The project took place both during and in the immediate aftermath of the Covid-19 pandemic. Covid-19 related isolation and restrictions had meant that usual activities on site, such as the weekly coffee mornings, had been on hold. Although at the time of impact interviews many of the Covid-19 restrictions had been lifted, there was still some worry among residents about resuming 'normal' activities for those who had been previously identified as 'clinically vulnerable'.



What does building social connectedness look like?

Four residents were provided with Fitbits, a device worn on the wrist like a watch to track and record information about daily activities such as, number of steps, heart rate and sleep.

And this was also helping residents to regain confidence as Covid-19 restrictions were easing

"You've got people that don't leave the building because they're scared of COVID but will go to the walking group." (Stonewater staff member).

Furthermore, one of the residents who was pivotal in maintaining the gardens was delighted that residents were walking round the gardens:

"We've had four of them tramping around with their little Fitbits on going, oh, look how many steps we've done. Oh, it's so lovely to see them ... And I'm loving it, because they're looking at our gardens." (Bonnie, Abbey Lodge).

Word of mouth by residents championing the Fitbit had generated additional demand for them after the project ended.

"... [but] there's still more residents that still want to be part of this walking club ... I had them knocking on the door asking for one of them watches [Fitbit] after the feedback off Jose, what he said to other residents." (Stonewater staff member)



Reluctance

A third large group comprised those who were initially resistant in using technology, but who had come to accept the necessity of becoming proficient, due to the scale of change in contemporary life. Much of this reluctance was attributed to fear, both of their own lack of ability and also of being a victim of online crime. A lack of awareness in how technology works, combined with a fear of making mistakes (which might be catastrophic) contributed to a reluctance in using technology. Publicity about online crime and the risk of being a victim contributed to a widespread apprehension amongst older people about using technology:

I think with my age as well, being a bit scared of getting interference on the phone and I wouldn't know which knob or button to get rid of it. Scam, that is the word I wanted. My neighbour had one on her phone and she said, oh, look at this, it's a scam. I thought, oh God, I wouldn't know whether it is a scam or not and I think with my age now that scared me about using it. I thought, oh god ...Which buttons do I do? What do I do if somebody phones me? I was scared of [using it] in case I pressed the wrong button or something came in like a scam or things like that. I didn't touch it, no, no, I didn't touch it. (Fiona, Abbey Lodge).

Residents spoke of considerable fear about using online technology, mentioning the risks of spam email and scam phone calls. Many spoke of the high risk associated with online banking and their vulnerability to financial fraud:

I'm very cautious now about emails and...last couple of weeks I've had loads of scam messages come through (Cindy, Abbey Lodge).

I have been talked eventually into internet banking which I am doing now. But I am still very scared of it and I am very worried when you see all the problems about being scammed. So I would like to know more about how to stop that happening (Sean, Highland Lodge).

I am very interested, and I'd love to be able to get into it yeah, properly and be confident with it...It does make you worry yes, because I know I don't know what I'm really doing. I nearly got scammed once, which was lucky because I thought afterwards, no this is not right. But I nearly did and that's really put me off (Whitney, Highland Lodge).

Associated with a fear of fraud was a frustration with the degree of difficulty associated with setting up online systems (such as banking). In one example a staff member described the experience of one resident:

I've had several residents here that, over time, that have had the same, that banks are there, banks get robbed and your money disappears and you're best to keep it under the mattress, you know. And the most [this resident] would ever have was a post office account. And then the post office stopped paying pensions into the post office. So, they had to have a bank account. Well, trying to get something set up for him was a nightmare. An absolute nightmare.

And we got there in the end but, I mean, I had him coming down and saying to me, if they can treat me like this...I just don't want to be part of this world, part of a world that can do that to me anymore. Fortunately, he had support, a lot of support from me and we got there in the end. But yes, that was, that was a very time consuming and yeah, I can see how he doesn't want to go forward (Stonewater staff member).

A further cause of trepidation was associated with anxiety about the cognitive demands of learning and using technology (a strong factor amongst older residents).

I feel a bit negative towards it because it's a big driver in the modern world and I think people spend far too much time and...They could be something less boring instead. But also, I've got a fear of my lack of knowledge...fear of not knowing what to do, it's a lack of knowledge on my part and experience... I've not really been a technology person...I've got two computers sitting in a box doing nothing...I've got mobile phones but, again, I'm limited as to what I use them on. I'm not a great social media fan, it just seems to be self-promoting. It seems that Facebook's about bragging off to people you do know and Twitter's about bragging off to people you don't know or slagging off people you do know. I don't use it and that's what I see (Alex, Abbey Lodge).

These residents expressed a reluctance to make use of social media: *'I don't really know what I'm doing or if I'm saying the wrong thing or whatever. So no I'm on no social media whatsoever. It's the trust and confidence, yeah in using them, yeah' (Whitney, Highland Lodge).* Furthermore, the seemingly ubiquitous use of smartphones was resented by many residents:

At the end of the day, I'm old-fashioned, well, I'm not old-fashioned, but I'm an old person. And at the end of the day, if I'm doing something, I like to speak to somebody. And it really annoys me that people think, or assume, that everybody is online, or everybody is on a smartphone, or whatever, because that really annoys me. Because at the end of the day, I am fairly computer literate. So, I'm not completely a technophobe (Bonnie, Abbey Lodge).

A key theme for this group was the ability to cope with a bewildering – and often overwhelming – level of change. Many residents had experience of using technology, but this experience was often restricted to outdated systems and processes.

I'm not very good at all with technology. I've had basic training on computers but that was a long time ago with the old computers if...but I never really had any access to a normal computer really. I think mainly it is...it's in the concentration, my concentration is not very good...I do find computers difficult to handle. Some of the buttons and the mouse and stuff, I find it difficult to use. But soon as I get help I do it quite a few times, I do find it a bit of a difficulty (Earl, Abbey Lodge).

At the same time these users were seen as amenable to

change and could be persuaded if support was offered, as one resident who supports her neighbours with various technical issues explained:

My personal opinion is sometimes it's easier just to say, oh no, I'm not interested, rather than looking into the options and realising how helpful being on the internet can be (Julia, Abbey Lodge).

Therefore, the range of reluctance in technology can range from fears around safety, security, scamming and the overwhelming pace of change. This supports the need to focus on support for introduction of technology and also then support for after a gadget is given. The examples above show clearly that given a computer, for example, this may not be the element that links it to effective use.

Resistance

The final group included residents who expressed a strong resentment at the demands and expectations of technology. This group included residents who felt that technology was over-intrusive and used at times as an instrument of control (rather than support). For example, some suggested:

It's getting very difficult to have any kind of privacy or life away from technology...I worry about all these people that are not computer literate and everything else (Paula, Abbey Lodge).

In all honesty, sometimes, because it is so intrusive, you see them and they see you, but you might not have wanted to talk to them (Nigel, Abbey Lodge).

The group also included those with the strongest antipathy to technology and expressed a significant preference for face to face (rather than online) contact:

I think it's disgusting. If I was going into the fish and chip shop, it's like, I just want fish and chips. I don't want to be ordering it and then sending it to... Why have you got to queue up and put an app on your phone? (Lee, Abbey Lodge).

There appeared to be considerable resistance to the lack of choice and element of perceived compulsion surrounding technology: respondents described as being 'pressured'. Others described how they were given no alternative but to use technology:

You're not getting a choice anymore. It's assumed that everybody can do these things with technology, and it's not right. I mean, I'm 72, and I think I'm fairly computer literate for a 72-year-old. There's a hell of a lot of people my age and above that are not. We were brought up in a generation whereby you interacted with people and you spoke to people, and this is how you got information and what have you. But these days, you're just getting to the stage where you've got to embrace the fact that you need technology to progress with anything in life these days (Bonnie, Abbey Lodge).

Some staff members described residents who were strongly resistant to technology, who resented the element of what they saw as compulsion and who would refuse to be engaged in the process:

They were saying that they didn't want to learn it, they were too old to learn it, they don't want...not another box that needs charging, you know, stuff they just didn't want to do or were that interested in. A few people said, we know it's the way of the world, I'm not doing it (Stonewater staff member).

Residents in this category expressed a strong preference for earlier technologies with which they were familiar: *'I'd rather have a phone call for ten minutes' (Ed, Cornmill House)*. Others described their limited social circle and did not see the value in online interaction. Many residents only used technology as a necessity and lacked any enthusiasm for innovation: *'it is becoming increasingly difficult to actually speak to people, it really is' (Bonnie, Abbey Lodge)*. The group included residents who were not concerned at their own ability to use technology but wanted to protect their autonomy and choice in whether or not to use online services, expressing a strong preference for face-to-face contact.

I'm perfectly capable of using a computer, but I still prefer to speak to somebody. And this seems to be a dying thing at the moment (Paula, Abbey Lodge).

Older residents simply stated that their age was an inherent barrier for the challenges presented by learning technology as they lacked experience, knowledge, awareness and skills required to master new technology. This attitude that technology was not designed for the needs of an older age profile was commonly expressed. Phrases like 'too old' and 'too old-fashioned' were expressed to explain why it was just

not possible to be open to the possibility of incorporating technology in their day-to-day life. As one resident commented on their own attitude towards technology that she felt was shared by other residents:

I'm too old for stuff like that...I think unfortunately, you'll find that that is probably the attitude to a lot of people...a lot of them round here, they won't get involved in anything that involves technology. I haven't got the answer to why some people will just resist every effort to get them online and other people are open to it (Julia, Abbey Lodge).

The cognitive demands of learning new systems and processes were a particular challenge with older residents.

Yes, I mean I am not really great with computers - the first time I ever saw a computer was in 2001, and I crashed that thing I do not know how many times. The only way I learned how to use it was by having to fix it myself. So, yes, I mean I have had experience, but if you are looking at a ninety-year-old woman, with slight memory problems and mobility issues, and who has never even tried driving a mouse, she probably thinks, a mouse - what is that and I do not want any pets - you know. Trying to get them to remember the specific name of the unit and then the password to get into the account to set it up and how to pair it, these are all words that they do not understand (Bonnie, Abbey Lodge).

These findings highlight key barriers to technology usage that include lack of control and perception that it is too difficult to learn or that technology is challenging other valued forms of interaction. The barriers were mainly focused on social media and computer use.

Conclusion

This section has analysed the technology process by identifying the key issues of capability, motivation, reluctance and resistance. The study highlighted four distinct groups; those who were confident, those who were keen (but sceptical of their abilities); those who reluctantly embraced technology (often due to perceived necessity) and finally those who were actively hostile to the idea of using technology in their lives. The middle two categories included the largest number of residents, illustrating the potential for organisations to offer support, guidance and training so that residents can become more confident in enabling technology to support their needs.

The study found there was a high level of apprehension amongst older residents in particular. The key concerns for residents were: the fear of online fraud; concerns about their level of technical knowledge and a perception that the learning curve of new technology would be prohibitive. Some residents were strongly opposed to what they saw as unreasonable demands to use technology, frustrated with a lack of choice and anxious that face-to-face contact would become redundant. At the same time the pandemic compelled many residents to make use of online platforms to enable them to continue to see family, friends and loved ones. Staff play an important role in assisting residents to become more familiar with technological aids and comfortable with online systems. What was clear from the study was the role that technology can play in facilitating (and not replacing) face-to-face interactions. Those residents who increased their capacity to make use of technology greatly valued the ability to utilise technological support. The next section examines the importance of co-production to facilitate inclusive living.

Section 3: The importance of co-production - residents, family, friends and staff

The success of the INVITE project is owed to its resident-led approach to gathering evidence of impact over a period of time and working with front-line staff to build key relationships with residents. Section 1 and 2 have shown clearly a range of facilitators and barriers to people taking up and using technology. The people and connections created in this process were the key element of success in people taking up technology.

Co-production involves establishing environments where the power relationships of a group can be reset and redirected. Although now an accepted and integrated part of policy delivery, 'few studies have evaluated whether co-production achieves its promise and the conditions which optimise its value' (Redman et al. 2021: 1). Whilst democratic, co-produced approaches to community challenges can empower and increase ownership of key decision-making processes, these are difficult processes to initiate and support (Verschuere et al. 2012). There are also challenges in cross- and inter-institutional working that support efficient and effective collaboration between individuals and public organisations (Costumato 2021). In the areas of housing, health and social care there are also added policy and practice challenges of social policy integration, which emphasise the importance of activities at the ground-level of organisations (McCall et al. 2021). Therefore, this section presents evidence that gives us more insight into key groups at the ground-level that are part of the process of technology support.

The role of residents

Technology can be used in a wider sense to develop contact outside the home and with other members of the local community. Neighbours were able to help in setting up systems and providing confidence and support with unfamiliar equipment. For example:

My neighbour, she was helping me with it because I have never had a phone like that...she said, 'right, when it wants charging again come to me, I will have a look at it and then tell you what you have got' (Fiona, Abbey Lodge).

One resident described helping with online shopping as 'my babysitting job' (Nicole, Abbey Lodge) whilst others were happy to assist with online banking. The benefits of technology in developing a sense of community were described as follows:

The way I found a lot of things out is just by talking to other people in here. We're all in the same boat, we're all of a similar age, and you can say to somebody, 'I've just struggled trying to open a tin or I've just been struggling for ages trying to get a bottle top off', and somebody will say to you, 'well have you not tried, such and such a thing'. And I've picked more up from that doing that, things that way than anything else (Hanna, Cornmill House).

As the above respondent commented: *'It's surprising what a difference it does make to your life when you've got these little gadgets to help you' (Hanna, Cornmill House).* The ability to keep contact helped support residents in organising their own activities:

People have started their own walking club, with like the Fitbit watches. We didn't advise them that; they knocked on the door and they wanted to start that club and they was already on the project and we had the Fitbits, which was amazing (Stonewater staff member).

The residents with a higher level of technical proficiency were also able to support others who were more apprehensive about using technology:

Well yeah, I'm lucky enough that I can operate that machine [Tunstall], 'cause I think I'm probably one of the only people in the building that can operate it and knows how to short track things...I had 35 engineers that I ordered parts for and I picked up a lot of things through the engineers (Leah, Cornmill House).

Therefore, the evidence shows that neighbours and peers are a key part of recommending, facilitating and supporting technology. The technology itself can also be a catalyst for communication and connection between these groups and wider community.



What does supporting co-production look like?

One resident is living with severe day-to-day pain in her wrist and her back due to arthritis. The resident is a keen gardener but due to restricted arm and body strength she was having problems using non-adapted gardening equipment.

The resident was provided with two pieces of gardening equipment; an easy grip trowel and a long-handled fork. These both came with an attachable arm support cuff that alleviated the pressure on the resident's wrist.

"The trowel, I use all the time, loving it, and I'm loving the gel handle, and I'm loving the softer handle, ergonomic as you call it. I love that, I love the way it's shaped ... I can dig a lot easier and certainly deeper that way, so I'm able to get a lot of the soil out. I'd love to have a gardening fork doing that as well ... The fork thing, the rod, the actual body of the thing is very flimsy, and so, there's no way you could actually put proper force in and then twist. There was too much flexibility on the rod, so that should have been made of either angle iron, or at least a square bar." (Bonnie, Abbey Lodge).

The feedback from the resident highlights how eloquent and empowered residents are about what they want and need. The resident was very clear that the overall concept was good and was able to articulate to us how the long-handled fork could be further developed.



Person-centred provision of technology requires that gadgets be carefully matched to assessed needs, and therefore a sufficiently wide range of equipment should be available to meet potential needs. The acceptability of assistive technologies may simply be a matter of poor design of equipment or the fact that many of the solutions are standardised on the assumption that 'one size fits all' and do not allow for personalisation that meets individual needs, preferences and lifestyles.

The role of family and friends

As noted above for a large majority of residents, the greatest benefit of technology was the ability for family and friends to be involved in the problem-solving process. 'My family is my lifeline' as one respondent commented. Moreover, older residents were able to gain confidence and facility with technology by being shown how to make use of devices by their younger relatives.

My son said, 'I'll talk you through it', he was on the other line, he was at home and he was ever so patient, it took me an hour and a half to do it. But my son, because he has a job where new recruits come in and he has to talk to them and get...and he's very patient, and so he's known for being patient when people say, 'I don't understand what you mean'. So he never shouted, he used to say, 'mum, okay, we'll just start again, don't panic', and one and a half hours we did it [set up iPhone] (Sally, Cornmill House).

For those residents who had family overseas, the benefits of online contact were greatly valued:

Well, I use it mainly for talking to the children, the...the videoing. And I've got a lad lives in San Francisco and I was talking to him yesterday. And I do my shopping online, I do my banking online, pay my bills online, you know, which my daughter told me...showed me how to do and that. Oh yeah, and my son would. I've got a son in Bedford as well, and he comes over if I get stuck. Sometimes something will come up and I think, I'm a bit wary of which to press, you know. And I think, no, I'm not touching that until I've asked them whether it's right. Because you do get these things come up, don't you? And I've got one [phishing scam] on my phone actually from yesterday (Danielle, Abbey Lodge).

Without the iPad I would have gone round the bend, because that's a window on the world sort of thing. My family are very good but again without the iPad...well perhaps the mobile phone as well, they couldn't FaceTime or do message, or video or all the other things that we do. So that basic level of technology is vital to me (Andrea, Norfolk House).

Therefore, family were highly valued in supporting a wide range of technology and providing support for digital technology. However, family were also found to be important for supporting and facilitating tech solutions for day-to-day activities, such as eating, travelling, shopping and cleaning.



What does supporting families role co-production look like?

One resident in her 90s living with poor eyesight in one eye and arthritis in her hands was finding it difficult to eat independently and with dignity. Her daughter had been looking for gadgets to help her Mum but had only been able to find items which would not help (e.g. very large-handled cutlery). The resident was provided with a scoop plate and easy grip.

The resident's daughter talked about how these had made eating a lot easier for her and given back some dignity:

With the round edged bowl she can now scoop her food and it doesn't fall to the floor because the bowl is raised at one side. Previously on a plate her food could be scooped onto the floor and she would not know where the food on her plate had gone (Karen, Norfolk House).

The project had demonstrated the importance of helping families' role in know how and where to access supplier neutral information and advice on where to find solutions they have identified to support independent living. The main barrier has not been about cost so much but instead was about expertise and knowledge of where to find things, especially now that the NHS no longer provides this level of assistive items. This case study highlights the important role for family in problem-solving and need for awareness raising, and independent, supplier-neutral information on what technology is available and how to access it.



Family members were also able to assist with financial information – an area (as noted above) which was seen as carrying significant dangers:

Under no circumstances do I do any transactions, financial, or ordering goods by using them. The family do that for me. I just let the family know, and they do it for me (Colin, Abbey Lodge).

Family members were also available to provide technical support:

I've got a basic knowledge and I can find my way around the laptop with the files and the folders and all that sort of thing, so...but if it comes to anything really technical, I have to phone my nephew (Julia, Abbey Lodge).

Visits from family members were highly valued – not only for the benefits of face-to-face contact, but also their practical abilities in providing assistance with a wide range of needs.

Family was a key element of the co-production process, supporting problem-solving as well as imbuing trust in the tech and process. The role of family members in persuading residents about the value of tech was crucial and could lead to significant transformations in the wellbeing of residents, as the following example illustrates:

My daughter bought me a Fitbit and... it was just this sort of simple thing, the more you do, the more you can do... I thought I must have lost a few pounds but in actual fact I'd lost stones and stones and I didn't realise. So that's where it started from and, as I say, I was...I've been doing all my walking without my Fitbit but having a Fitbit for me – it's like I'm doing it all by myself but this is like a walking buddy or a fitness buddy and then I started integrating with most of the ladies here [in the home] (Phillipe, Highland Lodge).

When family was available and willing, this was seen as a key support mechanism. However, many participants did not have family and relied on staff or family members of other residents for assistance. There were, therefore, a variety of different informal networks of support that were vital to facilitation of technology.

The role of staff

In the examples above, front-line staff played a key role in supporting residents in their use of technology. The responses of residents highlighted the effort and energy that staff members would provide to those struggling to use new devices and equipment. The value that this assistance offered to residents was highly significant. As one respondent commented, staff were very competent in helping to transfer information and set up equipment:

He did that in 20 minutes, I think, and then it was done, and now it's set up and I haven't got a problem. But he said, if you've got any more problems... I'll come and sort it out. But I'm pretty lucky. I mean, this assisted living is alright for me here (Jose, Abbey Lodge).

Staff were greatly valued in removing some of the mystification surrounding technology and providing reassurance to residents and helping them become familiar with the available resources:

To start with, they weren't interested at all, "no, I don't need anything, I don't want anything". So we did take them down to the room where the stuff was and actually walk them through every item and how it might be useful... It had to be a visual thing for our residents (Stonewater staff member).

A particularly important role for staff members in overcoming people's reluctance to use technology was to offer advice and support to help prevent online fraud:

I think a lot of people fear the hackers and, you know, the safety online, and I think if we can just make sure that we've got really, really good, robust packages, so that people feel safe. That's what they need (Stonewater staff member).

Staff had a further role in demonstrating how technology can be used as an aid to support and develop communities, rather than something to be feared and resisted:

For us at the moment, it's about building relationships with the residents, and getting that trust factor, you know, the fact that they're getting involved with a bit more of Christmas and things like that. That's the next steps for us, digital sessions...we use IT and technology a lot (Stonewater staff member).

For many staff one of the main advantages of technology was the ability to maintain informal contact: *'it's still keeping in contact with people. It's important that you keep that relationship going'* (Stonewater staff member). For the INVITE project, staff were the key facilitator and co-producer of solutions and suggestions for technological support as they know residents well, had formed trusted relationships and were a key facilitator for support.

Importantly, support staff also play a role in providing information and advice to residents, generally signposting residents to resources where they might secure additional

support. This project expanded the existing advice and support functions of housing staff to include:

- 1) generating awareness about different options available and functionality of specific forms of technology
- 2) providing hands-on support needed to learn and incorporate technology in day-to-day life.

As a consequence, staff played a vital role in facilitating the ability and motivation of residents to engage with assistive technology by directly addressing the barriers residents faced, including addressing problematic perceptions of 'technology' as well as transforming confidence, skills and motivation.

Generating awareness through the provision of information and advice was an important outcome of this study. A low level of awareness about different forms of assistive technology was identified as a key barrier to wider tech adoption – by building trusting relationships with residents, staff were able to provide targeted support to meet specific needs, with the use of assistive technology. One finding from the study is that using words like 'technology' and 'digital' gives the impression that assistive technology refers exclusively to online mechanisms (such as tablets and smartphones); a perception which can alienate more resistant or less motivated residents from seeking support. One member of staff explained how they encouraged residents to try out different forms of tech by explaining to residents the wide-ranging forms of assistive technology available to them as part of study:

People just thought it was just going to be regarding iPads and phones and, you know, I suppose, you know, a lot of people at a certain age thinking, 'oh that doesn't interest me'...word of mouth, you know, got round did an amazing job to get so many people in the project... you know what they're struggling with like with the cushion and you needed it to raise, and...stuff like the one touch kettles and gadgets because, you know, people have got arthritis in their hands, and stuff (Stonewater staff member).

As Section 1 demonstrated, some of the low-level technology (such as jar openers) had the greatest impact on the everyday life of residents. For example, many participants explained they were unaware that assistive technology included mundane items such as hot water dispensers and two-handled mugs:

We didn't know half these gadgets existed. No, we didn't even know they existed, especially the water machine. I mean, as you can tell we're really chuffed with it. Yeah, it's really good (Ophelia, Highland Lodge).

Oh, it's made all the difference. From the moment I first starting using it, I said, oh this is wonderful. It's made so much difference to me, to be able to drink from a mug, safely, knowing that there's no chance of me burning myself, that my hands aren't shaking any more. It really is wonderful. I'd never heard of two-handled mugs before, but they're great, yes (Nana, Cornmill House).

An important outcome of the study was to increase awareness amongst residents, staff and family members about tech options. In one instance, a member of staff explained how one resident was given a mobile phone holder to attach to her wheelchair; despite being defective, it inspired her family member to be more involved in procuring other types of technology:

I mean, now, having had one [wheelchair phone holder] now, I mean, and the family have, are aware, you know... her son is quite proactive. You know, he could perhaps look out for something like that for her, 'cause it probably wasn't something that had been thought about (Stonewater staff member).

Another member of staff acknowledged that she was unaware of many of the items that were trialled during the study, noting the profound positive impact the more basic forms of assistive technology, such as jar openers and tipper kettles, had on the wellbeing of residents:

What's definitely out on the market, and things like that, you know, I think it's shocked...quite a few people – myself included – in what gadgets were available...So now they've got those gadgets to help...that makes that person, you know, feel like more capable of doing things, where before they might have struggled, and...whatever has helped it [has] improved their, you know, wellbeing (Stonewater staff member).

The availability of staff to provide practical, hands-on support greatly encouraged the uptake of assistive technology amongst residents, as Section 2 demonstrated. Support staff involved in the project described varying degrees of assistance provided to residents, ranging from setting up a hot water dispenser to installing and programming voice-activated technology. Several residents gave credit to specific members of staff in providing (at times) intensive support to residents trialling new technology, for example:

Kettles and bits and bobs, I've seen other bits here and whatever and he [staff member] helps with that so he connects them to the computer. Yeah, I think he is doing quite a lot of supporting (Alex, Abbey Lodge).

[Staff member] is good at anything, like, you know, a tablet, phone and stuff like that, if something was wrong or what have you, you know, he'll come and show you, and he'll also sort out you for you, you know. He does it with everybody in here, he's good like that (Isaias, Cornmill House).

One resident explained how a member of staff went so far as to physically test the reliability of the tech to ensure a fall detector was effective, prior to giving it to a resident:

[He] had to try [the fall detector] out because I couldn't fall and demonstrate it. He fell several times and once from the door right across the room and he flung himself and there

was no response whatsoever...He said I'll put it on, and I'll have to fall and see if it works and he did it so many times, bless him. I said to him, 'you'll be black and blue!' He threw himself from the door right across and banged his arm down like this and nothing happened (Cindy, Abbey Lodge).

Whilst the above example was extreme, it did demonstrate the level of commitment to provide support required by residents. Some members of staff with building maintenance, rather than personal support roles were also involved in facilitating tech usage, albeit in a more ad hoc manner. One member of staff explained how a programme of regular pull cord testing provided an opportunity to lend additional support:

I'm probably like the building side, but we have to do the pull cords every six months and that's a way as well of seeing how somebody's living, if they're struggling. It's like you say to something, yeah, I'm okay. You know, so that's another way of like checking on people as well (Stonewater staff member).

Another member of staff described how she was there as a 'safety net' to residents attending a digital inclusion course, to support them both in emotional and practical terms:

I don't really necessarily need to assist the residents that are training at the moment, but both have mental health issues ... so I give up my time...to sit with them, not that I can take over or do it for them, but just there as a security. If they go, 'oh, I really don't understand that', and don't get panicked about it. Because the one thing I don't want is them to start getting worried about using technology (Stonewater staff member).

Staff suggested that gradually introducing technology over time reduces the need to provide intensive support. Furthermore, using devices offering similar functionality (such as an iPad and iPhone) can help users to 'get their head around' the technology, without too much extra assistance. One respondent offered an example of how he introduced Apple products to a resident:

So this is what I'm saying to him, let's start off on the phone, give us the iPad back and then we'll review it within six weeks. Then if you feel ready, we'll give you the iPad back (Stonewater staff member).

Support staff contributed to the success of the project by promoting it to include and appeal to as many residents as possible, explaining the personalised approach taken to 'identify what they're struggling with':

I kind of feel like it's the individual's personality and how they bring this project across. I just feel like you have to know how to sell it. You can't just be like, 'this is the project, oh, come to this coffee morning, it's a tech savvy project'. You have to be like, 'no, they teach you about iPads and it's just simple things like chair raisers' (Stonewater staff member).

Making the effort to provide bespoke assistance at the earliest stage of intervention produced better outcomes for both residents and staff:

They're always looking for advice and guidance to make things easier and better, which I'm more than happy to help them, because it makes it easier for me in the long run, to be fair (Stonewater staff member).

There is therefore a key element and role for housing staff in providing effective information and advice. The above highlights the strong position of front-line staff as a facilitator of assistive technology. Interestingly, an effective pathway was to expand what technology means to people to widen the chance of them accepting or being interested in information and advice.

Trust has been shown as a key part of the relationship building that is essential for technological support. Section 2 also highlighted that one of the key barriers to taking up technology was lack of trust. Trust and distrust around the technology, and the person offering technology, is a clear element to be negotiated in the take up of (especially digital) technology. Trust of housing staff was particularly important.

It's the first time I've had an iPhone, you know, so...and that's better than what I had before, you know, and I'm getting quite good...used to that. I've got...I'm even...he's [staff member] even set me up, so I can get onto the bank now, you know. So, I'm finding it easier with this and, you know, so I decided I'm going to.....start embracing it, you know, yeah (Isaias, Cornmill House).

Trust was built on the relationships that were developed from ground-level. Time was a key element of this, and support for residents was enabled when staff had time and wider support to utilise in building up suitable facilitation support for individuals.

It's about building relationships with the residents, and getting that trust factor, you know, the fact that they're getting involved with a bit more of Christmas and things like that. That's the next steps for us, digital sessions ...I know we have some challenging views amongst some of the residents. I think the residents have views of each other. And I think the residents have a different view of us. I think since April, since they've got a new team in place, things have definitely improved. Again, I think it is, we have to build that trust and build that relationship back up... it's about us building up relationships, trust, and getting to know our customers (Stonewater staff member).

The time and resources into building trusting relationships have a positive impact on both staff and residents.

I've seen how these small things can change somebody's life dramatically, and you just wouldn't think it was down to a spoon and a plate. You know, and all of the little gadgets which, as you say, make just every day, simple everyday life, so much more... This had made me think, very much when I look at the project, how you've set it out, how you've planned it, and coming down at different stages, and it's built, and it's been on a solid foundation and then that sticks. Those, sort of things, stick (Stonewater staff member).

I've had no negative feedback at all, which is good. Which is great and I mean, people have just been very grateful and I think there's one or two now that have just cottoned on to what, what there's actually been happening and now, are quite keen (Stonewater staff member).

This section highlights that introducing technology as a process, with open and co-produced, person-led solutions that involve staff, family, friends and established networks can mitigate negative push back and reluctance in using technology. The key foundation to effective technology intervention is trust, time and establishing relationships that can connect and build social connectedness.

Conclusion

Many residents relied on peers, family, friends and staff in using technology and in resolving problems in its use. The most valuable form of technology was one which facilitated community interaction, motivating residents to become engaged (at an informal level) and helping to build community within and outside the home environment.

All these groups were involved in negotiations and interactions to build trust, improve confidence and support in problem-solving to enhance connectedness and familiarity with technology. The evidence suggests that this ground-level interaction and co-production of solutions is an effective way to establish the relationships needed to decide on technology solutions, and to introduce and maintain support with the technology process.

This section has clearly highlighted that the people within the process – staff, family, friends, wider social networks – are key to facilitating and overcoming the key barriers to taking up technology. For co-production to be successful in the housing sector, it needs to include strategic integration into organisational policy and development, alignment to the right motivations for those involved and plans for long-term maintenance (Brandsen and Helderma 2012a).

A focus beyond the immediate home environment to the external environment and connections to the neighbourhood and the surrounding community will also be essential to integrate inclusive design and prevention. Cyclical planning, repair, maintenance, void managements functions should be reviewed with respect to inclusive design to determine if integration of effective technology solutions can come sooner in the process. Such a review would mean integrating inclusive approaches to service delivery.



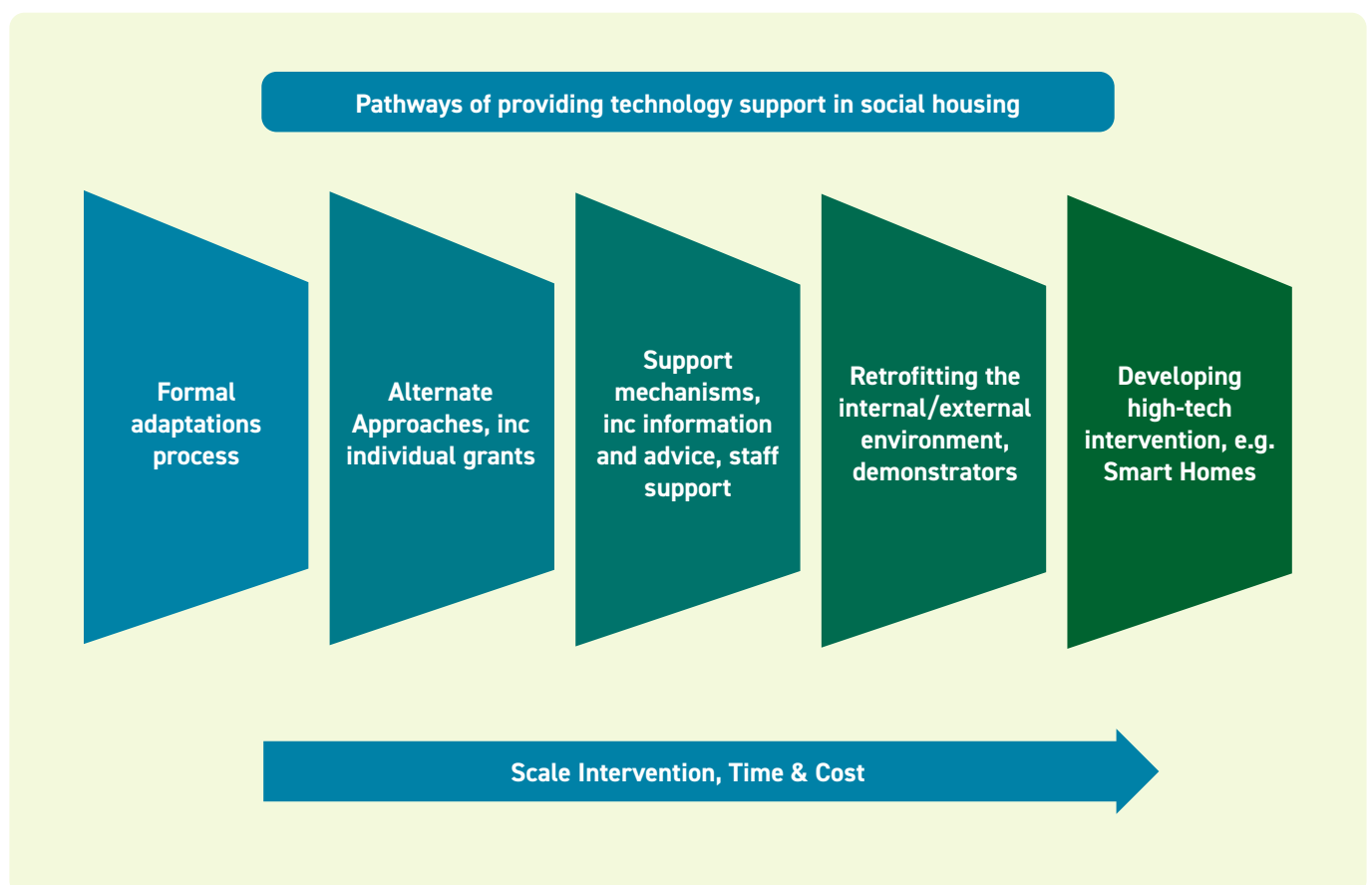
Section 4: How technology provision is supported within the social housing sector

The previous sections have outlined a diverse set of interactions that can facilitate or create barriers to the take up of technology. Co-production with staff, family and friends are a key part of this success, but can be challenging in the housing sector due to the negotiation between the public, private and non-profit elements that make up housing practice (Brandsen and Helderma 2012a). Co-production overlays three functions within housing: its capital function, consumer function and social investment function (Brandsen and Helderma 2012b). This categorisation can also be relevant when thinking through technological solutions and the role that the housing sector has in supporting technology.

This section aims to give the range of different support models that facilitate technology pathways within the housing sector. The INVITE Project has given insight into a range of interventions, from the role of housing providers in giving information and advice to larger system support.

This section looks at evidence surrounding the formal adaptations process, the possibilities that individual grants could offer and mechanisms that housing can provide such as information and advice alongside staff support. We offer some insight to other pathways, such as retrofitting and developing more high-tech solutions but ultimately argue that the 'small but huge' impacts are where we think housing can have an immediate impact on people's wellbeing and quality of life – at lower cost (see figure 6).

Figure 6: Pathways of providing technology support in housing



These types of interventions can apply to supported residential accommodation but also general needs and other types of models that support older and/or disabled people.

Insight into the adaptations process

The formal adaptations process is a complex landscape involving multiple partners within health, social care and housing working towards an assessment of individual, person-led solutions. Adaptations are often focused on physical changes to the home environment, but technological solutions and tech equipment are an increasing part of interventions that can be offered within the home. Adaptations are the main mechanism that housing services can draw on or refer people to wider support.

The formal process for adaptations and equipment provision can include a period of need awareness, information and advice, assessment, funding, design, delivery and evaluation (see appendix B). This system is a vital and tangible way for housing providers to support residents in their physical environment. The barriers that housing providers encounter within this process are varied, but include long waiting times for assessment and implementation, gatekeeping and 'institutional' looking solutions being provided (McCall 2022b).

Across case study sites, there were several examples where the formal route was an important pathway for individuals. A long-time resident of Abbey Lodge, for example, had recently noticed that he was becoming confused more frequently and was experiencing more falls than in the past. Additionally, he was becoming aware that getting in and out of the bath was starting to cause him pain:

I have to hold onto the side and pull myself up. I get a lot of pain in my arms, much more so now I couldn't get straight up onto my legs without pushing or pulling myself and I've hurt my arms doing that, and I didn't realise how much I'd hurt my arms until I'm in difficulty (Ian, Abbey Lodge).

This resident contacted a member of housing support staff to see what assistance was available so that he may – safely and confidently – remain in his home. Ian describes how this member of staff supported him through providing a formal OT referral. Although he was frustrated by the length of time it took for the appropriate person qualified to come to the home to conduct an assessment, ultimately he expressed satisfaction with the outcome:

She got an appointment for me to be seen by the GP, because that's when I was beginning to fall down. And I was very confused as well, and then from that, she took that further to getting in touch with the occupational therapy department...and they sent an excellent OT ... She watched me going up and downstairs, going to the bathroom, watched me trying to get in the bath, all of that, and she set the whole process in [train]...telling me that it might take a while (Ian, Abbey Lodge).

As a result of the referral, the OT recommended a walk-in shower. Ian reflected on the difference the adaption made to his day-to-day life: *'it helps me to get up independently... So I can do this [bathe] now better, I can almost do it up and down without holding onto anything'*. Ian also explained how this particular member of staff was especially qualified to have been able to make this referral: *'she's tuned into it all... because of her previous work with occupational therapists' (Ian, Abbey Lodge).*

Although he was pleased with the outcome of the referral, Ian was frustrated that some critical needs were unaddressed. At the time of the interview, a referral for a stairlift had been made as a result of the same assessment, but it was unclear when it would be installed:

A chairlift, yeah, and that's been assessed for and it's been measured up for, and then I think we have to wait for so far about two months'. In the interim, this resident explained being 'nervous' and 'frightened' to use the stairs in his home: 'when I'm in the house on my own, there are some things that for me are very dangerous, like going up and down those stairs (Ian, Abbey Lodge).

As this case study demonstrates, the more formal route to adaptations via social work can be an appropriate option for residents needing significant assistance – especially in cases where need is immediate or complicated and may require multiple and costly adaptations to the home.

The formal adaptations process was not seen as the best process for less complex adaptations in supporting independence. One resident who was living with multiple assisted living needs, health problems and pain was unable to use her settee for several years, because it was too low for her to sit down and stand up, without exacerbating her pain. As part of the project, she was given chair raiser blocks, a device that can be placed onto the feet of a chair or settee in order to raise the height of the furniture by around 15cms (6 inches). While the resident had many other health issues, this was one problem that a very simple solution had managed to adjust and had made a significant impact on the resident's wellbeing:

I could not sit on my settee, because I couldn't get out of it because of my legs. I keep falling ... and them blocks, as soon as he put them in, I went and sat on the settee while he was here, just in case I couldn't get up, so he could help me up, and my husband, and they worked perfect (Olivia, Abbey Lodge).

The process from identification of need to installation was easily included within work activity. The staff member was able to make a request for the chair raisers to the INVITE project (supplied for £28.98), thus removing undue delays related to the Occupational Therapy governance ordering and approval processes. The Stonewater staff member was able to easily attach the furniture raisers to the residents existing furniture and this enabled the resident to

immediately use her settee again. The chair raisers removed the expense of purchasing new furniture or the need for an assessment for a specialised chair. We also learned that in the past Occupational Therapy had supplied chair raisers; however, this has been removed from their list because they were considered too expensive to continue supplying. Yet, Furniture raisers are a simple device that can help make standing up and sitting down into a chair less painful and are an affordable alternative to buying new furniture.

Therefore, the formal adaptations processes remain a vital form of support, but the evidence suggests that this pathway is not always the most appropriate in determining what can be supplied; the process needs to be quicker for less complex adaptations that can help individuals sooner and more effectively.

Alternate pathways for support

McCall et al's (2022a) work on adaptations has highlighted a significant informal process that works around and across formal pathways, that includes individual assessment and management (see appendix B). This means that there is a large role for people themselves in controlling and identifying technological interventions that work for them. The INVITE project gathered interesting insight into 'side-stepping' the formal process to providing direct support. We saw that not all residents require multiple, expensive adaptations to enable them to live independently in the home. In contrast to the case of Ian described above, others required small (sometimes incremental) changes to the home that involve a less formal intervention. In such cases, individual grant support can play an important role in safeguarding the health and wellbeing of residents in supported housing.

Examples of individual grant mechanisms include many third sector organisations – [Disability Grants](#) and [Comic Relief](#) have offered computer and technology grants for example. Housing Associations in particular have set up schemes for digital tech provision, often accessing UK or devolved government budgets (e.g. the supporting communities funds) to facilitate grants for tenants to access technology (see [Wellhouse HA](#) for an example). The Longleigh Foundation, funder of this research, also offer grant mechanisms for a wide range of resident needs. Other support that was evidenced for Stonewater tenants included We are Digital and other support mechanisms for site and staff.

One staff member was interviewed about her experience in supporting residents through the formal Occupational Therapy pathway for adaptations. She described a specific example of a resident who struggled to get in and out of bed, as well as to use furniture in her home, due to limited mobility. After a member of staff had successfully made a referral, she conducted a visit with the resident to assess if she needed any other assistance. She noticed that instead of

opting for a simple solution, such as chair raisers to support use of existing furniture in her home, the OT procured a medical chair for her home. This staff member expressed her dismay that the formal route resulted in a more expensive, less optimal outcome for the resident:

I went in their house and I've seen a lovely brown chair what the OT had given them. And I was like, 'oh, that looks uncomfortable'. Then I was like, 'oh, I've got some settee raisers what I can put under your settee to make it higher, so you haven't got that back problem, you know, to put all your weight on your back and your arms. It's just so you can literally just stand up straightaway'. She ended up sending it back to the OT. (Stonewater staff member).

She explained how, in this instance, individual grant support would have been a more appropriate option for this resident, which ultimately would have generated cost savings for both the housing provider in terms of saving staff time required to make a successful OT referral, as well as saving the council/local authority money in procuring unnecessarily expensive medical equipment and adaptations:

So in a way, it's kind of...this project is kind of saving Stonewater money and it's saving the council money. Because every customer has £1000 within Stonewater's budget for any disability adaptations. And if they're over £1000, then we had to go to the local council and have an OT assessment. Like the NHS, they basically have to do an OT assessment for them to get the stuff for free. It comes out of the government pot, do you get what I mean? (Stonewater staff member).

I feel like the only time you need to make an OT referral is when they have multiple things going on, because that's when an OT needs to step in. You need multiple adaptations. So when it's on one or two things...say, if they need a chair and it comes under the £1000, then Stonewater will get them that chair because they need it and it's part of their adaptations. But why spend just under £1000 on a chair when you can spend twenty quid on some settee raisers? So it's saving the organisation money in the long run over the years. Then it's saving the council, because if I need an OT assessment because this chair, special chair or special bed was going to be over £1000. But then realistically, you only need to get chair raisers, because them chair raisers potentially you can put them on a bed, if it's a four-poster bed. You can put them on anything...you know, that's got poles. You can put them on anything. It's not just the chairs and settees. You can use it for beds, you can use it for benches. There's so many different uses for it (Stonewater staff member).

As this case study demonstrates, formal routes available to housing support staff to pursue necessary adaptations to enable residents to live longer in their homes – in comfort and dignity – are not always the best option for all stakeholders.

For certain situations, individual grant support produces better outcomes in terms of the care and wellbeing of residents, whilst simultaneously providing cost efficiencies.

Facilitation and training staff and individuals

The above sections point to the crucial role staff play in supporting residents in using assistive technology. Although staff are key facilitators of tech usage, housing staff do encounter barriers in providing (at times, intensive) support for users. This section considers these constraints, namely with respect to time available to staff to devote to these duties (typically falling outside their normal role), as well as the need of staff themselves for training on using specific assistive technology.

Following Wave 2, staff provided feedback on their experience of the project and identified a number of recommendations for developing a model of effective assistive technology support in residential care settings. Many of these recommendations emphasised the amount of staff time required to replicate effective assistive technology projects. As the previous section suggested, not all interventions required intensive support, but those which involved complicated set up, a steep learning curve and ongoing support were identified as particularly time consuming. In one case study, two members of staff noted the amount of staff time involved in setting up the project to approach residents individually, introducing them to specific types of tech which might assist their own particular needs:

It took some persuading [them] to join in. To start with, they weren't interested at all, 'no, I don't need anything', 'I don't want anything'. So, we did take them down to the room where the stuff was and actually walk them through every item and how it might be useful. ...It had to be a visual thing for our residents here... And a lot of explanation about what it could benefit or help them with, in regards to their needs. So that was quite time consuming, on an individual basis (Stonewater staff member).

Another staff member at the same site explained that after needs were identified, there was also a significant time lag between ordering the equipment and delivery to residents – requiring further conversations to explain how technology can be useful:

It took a while for the stuff to come too. We were missing lots of stuff, took a while to come. And then when it did it, [staff member] was very busy delivering it all out to them, which was another little time consuming... I'd go round with a trolley, little food trolley, delivering it. Mother

Christmas, she was! (Stonewater staff member).

In addition to the time staff devoted to setting up the project, participants suggested that individual capability and confidence of staff in supporting tech usage was a barrier. Nevertheless, overwhelmingly staff expressed a desire to overcome such constraints, as expressed by one participant: *'I'm more than happy to accommodate where I can, I'm not the worlds' greatest but I know enough to be able to help' (Stonewater staff member).* Another participant explained how whilst she lacked experience of digital technology, she devoted time to train herself in basic skills to become more comfortable in supporting residents:

The digital side... is not my strongest point at all. I mean I can work a computer...you know, iPad but I think more, you know, showing people, that's not one of my high strengths. You know, that's probably one of my weaknesses. But anything like that, anything that helps you, you know, gain knowledge, especially when it comes to, you know, things like that I'd definitely be happy to do (Stonewater staff member).

At the same time, those staff who admitted their own ignorance in using digital mechanisms, could be of great benefit to residents (through demonstrating how using technology required a low level of skills).

You know, and I think, as well, it's given people...because it's a sense of achievement, really. Especially, having fear around technology, and I don't want to get involved with that because we've had that a lot. You know, as soon as it gets difficult...mind you, I can be a bit like that now. Oh, do you know what, do I really need that, you know, if it's that difficult, I could do without, you know, making my brain hurt. But I think it's changed people's perception, as well, about assistive technology, and it's just something that, as I said, really keen to build on, as well, throughout the rest of the schemes that weren't involved in a project (Stonewater staff member).

There was clear evidence of a need for resources to support staff, to effectively undertake this type of facilitation role and promote assistive technology in residential care, as well as an acknowledgment of the value of such initiatives: *'In regards to our roles and helping our residents, customers live longer in their homes and meet their needs, I guess that's what we're here for. But from the more technical side we could have done with a little bit of training or support' (Stonewater staff member).*

Wider support pathways – infrastructure, demonstration, and design

The housing sector is facing a retrofitting challenge to upscale existing environments to facilitate the use of tech in existing homes. This can often be implemented through cyclical repair and maintenance plans, which offer clear ways of integrating technology on a wider scale, within supported social housing communities. The evidence suggests that the wider impacts are supported better when the infrastructure enables the smooth introduction of technology.

Battling with the WiFi has been quite time consuming. And I think that's been a block for us. Normally you just plug and play with a lot of devices nowadays but because of the way I think our WiFi is set up...Just didn't work (Stonewater staff member).

The report has also shown that tangible changes – items that people can hold and play with, are good ways of introducing technology and overcoming barriers and negative perceptions.

That engagement element, and stuff, has been really better than I expected to be honest because I think the first...you know, the couple of sessions we did right...I don't know when it was, a little while back when...right at the very beginning it kind of sent...felt a bit abstract and people weren't really sure and they were going like, oh no, okay. But then when you turn up with a table full of goodies, and things, and people can concretely see what it is that's when it's...that's when we got quite an uptake, I think, in more people being interested and engaged with the project (Stonewater staff member).

There is also a role for staff to improve the environment in which technology is introduced via ongoing mechanisms and conversations.

You know, you need to be having regular meetings, where, you know, like, yeah, let's get together, let's have a techy afternoon and talk about how you use this. Try and get people in, as well, that haven't and are not using it, and especially those that feel, it isn't for me. You know, just to try and tease them in a little bit. It's about understanding, as well, what's important to the person, what's important to them because everyone's different. You know, no-one feels that's...well that's not that important to me. I feel like that now, even with my colleagues, you know, work that's not important to me, this is what's important to me (Stonewater staff member).

Providing tangible support within people's home environments, alongside building trust and social connectedness (see section 3) highlight how technology is integrated into key elements of housing delivery. A supportive living approach acknowledges the integration

of different elements that support inclusion. This approach embraces the perspective that by integrating inclusive design you effectively future-proof housing stock for an ageing population (McCall 2022a). Figure 3 (see introduction) highlighted the dynamics of the Inclusive Living concept, where technology links to accessibility, sustainability and universal design principles. There was evidence throughout the case study sites that technology is part of a wider set of solutions in supporting residents.

My role is going to be, moving forward, engaging with the residents more. Helping them to age well, looking at their welfare, but still promoting and signposting to external agencies, doing referrals where necessary. And having probably more hands-on to do with their health and wellbeing. So that's what we're going to do, and hopefully networking with the wider community (Stonewater staff member).

The role of individuals in taking control and feeling empowered to lead on their own solutions was also particularly important.

People have their own individual answers, they will find solutions for themselves. Put a range of things out in front of them and you'll find an answer and because they're intelligent men and women. You know what I mean, they've lived their lives and we mustn't lose sight of that, that people know what they need, even if they say they don't need anything. And you think like, oh, have you tried this? You know, little things (Stonewater staff member).

A key principle of Inclusive Living is to combat design that can link to stigma, and this was a central element in making technology work well. Barriers to technology can sometimes be linked to perceived ageism, and residents were very resistant to any technology that was labelled 'for older people' or that looked institutional.

Well, I'm just glad I've got it because it looks good as well. I feel quite posh with it (Claudette, Cornmill House).

it's just it's a nice-looking thing and it's easy to keep clean. You just have to, sort of, wipe down on the back where the hot water comes out. It gets steamy and I just wipe that down every other day (Ophelia, Highland Lodge).

Participants welcomed simple 'good design' that was flexible, attractive and versatile. This highlights the need to introduce technology from a wide range of inclusive design options. Much of the technology that was introduced (see appendix A) was not especially marketed with older and/or disabled adults in mind, but rather was versatile, well-designed and helpful for a wide range of ages.

Conclusion

Interestingly, an effective pathway to utilising technology was to provide a broad definition of what technology means to people, to widen the chance of them being interested in and accepting advice and support. This section outlines that co-production, low-tech gadgets and building supportive networks can act as a catalyst to building trust in technology.

Residents and staff were receptive to inclusive design, and items that could be integrated to support day-to-day activities. The objective should be to overcome the reluctance of those who do not see themselves as 'techy'. Defining Inclusive Living within an understanding of the integrated nature of technology, and how it links with other elements of housing support can assist in providing a person-led solutions approach. We saw examples of how inclusive design can help technology take up, by addressing barriers of 'stigmatising' design. This needs flexible systems to offer quick person-led solutions. Moreover, the formal routes available to housing support staff to pursue necessary adaptations were not always the best option for all stakeholders. In certain situations, being able to support individuals informally, by integrating technology quickly, produced better outcomes than a time-consuming formal process, in terms of the care and wellbeing of residents, whilst simultaneously providing cost efficiencies.



Section 5:

Conclusions

This report offers in-depth evidence that supports the role of the housing sector as a provider and facilitator of technology. By exploring the lived realities of residents, staff, carers and family members, we outline positive outcomes that can be achieved in people's everyday lives when linked to effective, person-led solutions. These solutions may be wide-ranging, and as part of this project we suggest a reconceptualization of technology, to widen out the umbrella of interventions that we consider in supporting people in everyday activities. This reconceptualization should include the following principles:

Creating impact: Introducing, providing and maintaining different levels of technology has shown clear and positive outcomes for individuals - including increasing social connectedness, wellbeing, quality of life, independence, confidence, learning, skills development, feelings of safety and control.

Facilitating 'small but huge' outcomes: The evidence suggests that ground-level interaction and co-production of solutions are effective ways to establish the relationships needed to decide on technology solutions, and to introduce and support the technology process. The technology in this project outlined a variety of 'high-tech' (iPad, Alexa) and 'low-tech' (kettle tippers, jar openers) solutions. There was success with high-tech solutions such as Fitbits, which had impacts including providing entertainment, knowledge, information, social interaction and connectedness. However, what this project found was that the low-tech solutions have the most potential in making small but huge impacts on residents. Routine devices were often the most highly valued forms of technology: *'I feel like they've been the smallest but the most massive impact out of everything' (Stonewater staff member)*. The simplest technologies often had disproportionately large impacts on resident wellbeing and activities – from being able to independently make a cup of tea, to improved wellbeing via gardening or being able to eat a meal more easily for enhanced dignity.

The barriers to technology take-up: A minority of residents resisted the adoption of technologies despite support and availability. This report outlines examples of reluctance and resistance to technology. Technological complexity impacted on levels of confidence and trust in devices. Perceptions of safety were a key barrier to building trust in technology. However, there was evidence that starting with 'small' technologies can act as a catalyst to assist in wider supportive interventions.

Seeing technology as a process: There is a fundamental role for residents, family, friends, and staff in the facilitation of technology. Giving staff opportunity to identify solutions collaboratively with residents, and to respond as a person's needs change was clearly an effective way of finding the right solution for the right person. We found that often the first solution may not work, but the second or third device may be the most effective. What makes the take up of technology effective was not the 'gadget', but the building of confidence and trust before and after technology introduction.

People know what they need. They just don't know what they don't know: Residents, family and staff were generally interested and motivated to seek technology solutions but often 'did not know what they did not know'. There is a key role for housing providers here in terms of information and advice; signposting and making clear what is available and where to find support. The residents in this study were eloquent and clear on their needs – but needed help visualizing the support that is out there. The project found that co-production, demonstrating low-tech gadgets and building supportive networks around technology can act as a catalyst to building wider trust and confidence in using technology. This also includes investing in barriers related to resources and infrastructure, such as staffing, WiFi and mobile connections, which had significant impacts.

With these conclusions in mind, we offer a visualization of a model for effective housing support for promoting inclusive living via technology-enabled support:

A model for housing delivery

This model notes the wide variety of support that would enable positive outcomes for individuals and can help organisations promote inclusive living via technology-enabled support. These key support mechanisms play important roles in the facilitation of technology as a process and enabling person-led solutions. We offer more detail below, linking the model to strategic and operational recommendations.



Recommendations

Strategic Recommendations	Responsible Partners
Increase investment at UK government level for housing providers to be effective facilitators of tech support including an ongoing 'tech fund' to be made available to housing providers and/or third sector organisations to systematically enable them to facilitate technology across the housing sector.	UK, Scottish and Welsh Government, Northern Ireland Executive, Housing Associations, Local Authorities, NHS, Health Boards, Third Sector organisations
Create nationwide housing sector support posts that focus on technology support, sharing best practice and information and advice that can focus on 'what works' with tech alongside promoting and publicising information and advice. This post could also support innovation with business and industry for generating and feeding real world tech solutions that improve peoples' lives.	UK, Scottish and Welsh Government, Northern Ireland Executive, National Federation of Housing Associations (NatFed), Scottish Federation of Housing Associations (SFHA)
Increase investment into the connectivity infrastructure to encourage the uptake of digital technologies to support independent living, improve health and wellbeing and reduce social isolation.	UK, Scottish and Welsh Government, Northern Ireland Executive, Housing Associations, Local Authorities
Review and revise procurement processes relating to technology to support purchasing low-tech, low-cost items quickly.	UK, Scottish and Welsh Government, Northern Ireland Executive, Local Authorities
Widen the Disabled Facilities Grants (DFG), social work and NHS adaptations processes to include a wider variety of lower-level technology, based on wider consideration of support needs within the home.	UK Government, Local Authorities, Health Boards, Social Work, NHS
Provide individual grant mechanisms – something such as a 'bits and bobs fund' for accessing lower-level technology support via simple application processes, accessible to residents, staff, family and friends.	Housing Associations, Third Sector organisations
Improve evaluation processes and existing outcome measures to generate robust evidence linking technology to positive outcomes, to build business cases for investment in adaptations.	UK, Scottish and Welsh Government, Northern Ireland Executive, Local Authorities, UK Universities, UKRI, NatFed, SFHA
Increase support for effective partnership working between housing, health and social care to encourage person-led solutions, data sharing and reduced waiting times for support.	NHS, Local Authority Housing and Social Work departments, Health Boards, Housing Associations, RCOT
Create consistent language in information and advice around technology to circumvent the wide variety of understanding around assistive technology, from high-tech devices to low-tech gadgets.	UK, Scottish and Welsh Government, Northern Ireland Executive, Local Authorities
Operational Recommendations	Responsible Partners
Offer staff training on producing person-led solutions & matching technology to facilitate the recognition of tech-based solutions and support the maintenance of tech.	Housing Associations, Local Authorities, Health Boards
Establish an information and 'advice hub' for staff & residents to facilitate knowledge exchange around technology within organisations.	Housing Associations, Local Authorities
Demonstrate flexible 'tech kits' to show people gadgets to support information and advice about what is available, updating them as technology changes and more is known about what works.	Housing Associations
Set up a technology/gadget recycling system so residents can donate their tech for use by other residents.	Housing Associations
Hire and/or set up secondments for in-house Occupational Therapists within housing organisations to support the wider staff base in identifying possible tech solutions.	Housing Associations
Require technology skills as part of job descriptions into hiring processes for housing-related posts.	Housing Associations, Local Authorities
Set up workshops for residents, family, friends to learn technology skills to engage residents at different levels.	Housing Associations
Develop a volunteering policy to encourage 'digital champions' for those keen to support friends and neighbours for ongoing successful technology introduction, facilitation and support.	Housing Associations
Take a proactive Inclusive Living Approach to planning for housing and adaptations to integrate inclusive design and prevention into cyclical planning, repair, maintenance, void management and other housing provision.	Housing Associations

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Appendix A:

List of Technology

Category	Item
Time and place orientation	Day and night clock
	Signs for within the home
	Sticky labels
Lighting	LED lights
Kitchen utensils	Pan pickles
	Easy pour kettle and tipper
	Hot cup dispenser
	Easy grip general purpose knife
	Easi grip knife
	3-in-1 Hands Free Can Tin
	Jar opener type 1
	Jar opener type 2
	Jar opener type 3
	Jar opener type 4
	Childproof bottle opener
Magi plug	
Eating and drinking	Two handled tea pot
	Two handled mug
	Spillnot cup carrier
	Scoop plate
	Easy grip cutlery set of knife, fork, spoon
	Mug for wheelchair
Dealing with doors	Doorknob grip
	Key turner
Staying connected	Accessible smart phone
	Ipad
	Ipad cover
	Galaxy Tab A7 Lite 32GB Grey WIFI
	Tablet cover
	Kindle (no ads)
	Kindle cover
	Alexa Echo Dot
Phone mount for wheelchair	

Category	Item
Entertainment and leisure	Big button TV remote
	One button music player
	One button radio
	Nintendo Switch (with no ring fit but that's fine)
	Brain training game
	Game collection
	Just Dance game
	Full-page magnifier
	Fitbit
	Pen grip 1
Noise cancelling headphones	
Medication management	Pill dispenser
	Tablet organiser
Physical aids and adaptations	2 in 1 sock aid
	Suction grab bar
	Grabber
	Long handled shoe horn
	Fall detector
Furniture	Furniture raisers
	Booster cushion
Gardening	Garden kneeler
	Easy grip trowel
	Easy grip long handled garden fork
	Garden gloves for arthritis
	Kikka digga
Memory aids	Whiteboard for fridge
	Memory box for dementia

Appendix B: The Adaptations Process

This figure highlights the adaptations process as visualised from key stakeholder perspectives (McCall 2022b).



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