The Future of Social Housing:

How connected technologies are delivering digital inclusivity and value to the future of social housing.

HACT
ideas and innovation in housing

hyperoptic

Prepared by Hyperoptic with HACT (Housing Associations' Charitable Trust)

We have a long journey ahead, but through shared insights and learnings, we secure a positive future for the whole social housing sector, which will be to the benefit of the whole country.

HACT (Housing Associations' Charitable Trust)

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Introduction

Dana Tobak, CEO and Founder, Hyperoptic

The value of social housing is beautifully explained by Shelter, the UK's biggest housing and homelessness charity – "social housing is an investment in people, strong communities and the future of our country." Enabling the future success of social housing is a fundamental priority for the UK.

Here at Hyperoptic, we have been working alongside councils and social housing providers since our inception ten years ago. We believe that everybody in the UK should be able to enjoy the benefits of access to fast, reliable and affordable broadband.

That's why we pioneered a partnership approach with social housing providers, spotting synergies and agreeing portfolio wide agreements to roll out full fibre across their whole housing stock, whilst working together to enhance digital inclusion.

> *we understand that affordability and access are only parts of a complex equation in alleviating digital poverty*

We believe we should give back to the communities we serve. To date, we have provided free connectivity to over 400 community centres across the UK, enabling people to access a gigabit-enabled broadband service in a location local to them. During the lockdown, we were the first broadband provider to offer free fixed-line broadband services to families without a reliable broadband connection, so that their children could access virtual education resources and learn from home. We also recently launched our social tariff - 'Hyperoptic's Fair Fibre Plan' – which gives people on means-tested benefits long-term support with the cost of their broadband.

However, we understand that affordability and access are only parts of a complex equation in alleviating digital poverty. In 2020, we broke new ground in understanding, communicating and delivering social value in relation to high-speed broadband and digital skills, launching the 'Hyperoptic Digital Connectivity Social Value Calculator.'

This revolutionary new tool was developed in partnership with the Housing Association Charitable Trust (HACT) and social value specialist, Simetrica-Jacobs. It was based on independent data from organisations such as the Official of National Statistics (ONS) and Ofcom. It was supported with an industry whitepaper that outlined how the social value of broadband can be calculated via its economic impact on businesses, consumers, and their finances; and the social impacts on communities and on society as a whole, including individuals' wellbeing.

With the huge change society has experienced in the last eighteen months, we wanted to take our analysis one step further and examine how digital transformation and smart technologies can form the foundation of future smart communities. We also wanted to examine the link between connected technologies and social value in the social housing sector, which can be used to inform decision-making about investment in infrastructure and technology.

Our new whitepaper aims to be a thought-provoking view of the future of social housing. It draws on a literature review and interviews with fifteen social housing organisations, thought leaders and technology providers, all conducted by HACT, as well as research of a representative sample of 250+ decision-makers at social housing providers, conducted by Censuswide.

The whitepaper identifies three ways in which connected technology in homes and communities can create value and address challenges in the social housing sector.

The UK social housing sector is under unprecedented levels of pressure – with reduced resource and funding making 'business as usual' challenging. Read on to find out more about how connected technologies are poised to address these issues today and in the years ahead.

Foreword by HACT

We are delighted to once again to be partnering with Hyperoptic, and our goal is that the research we have co-created will help social housing providers identify where connected technology can create value, and for whom. Having a high-level view of the potential to deliver impact now and in the future is the first step to establishing an informed procurement approach that will invest in the right technology that will solve real issues for residents and communities.

As social housing organisations look to demonstrate performance against net-zero goals and impact through Environmental, Social and Governance (ESG) funds, the use of connected technology will play a fundamental role in supporting the sector to evidence impact and deliver these wider agendas. To support this journey, our insights include examples of existing good practice, key considerations and potential future use cases, with the aim to support social housing organisations and other stakeholders as they roll out smart connected technology.

The implementation of connected technology involves a number of different stakeholders, from those installing the necessary infrastructure such as Hyperoptic and local government, through to individual housing providers procuring technology, and residents engaging with smart home functions. Many cross-cutting sectors see value in connected technology, such as health and local government, and may be pursuing individual pilots and deployment.

When it comes to smart communities, many people including social housing residents benefit from shared infrastructure. The same is true for the data and insights generated by connected technology, which can be aggregated to inform better decision making. Therefore, we have also offered examples of where to explore opportunities to collaborate with other key stakeholders in local communities when implementing technology and associated infrastructure.

There are three sections to this paper:

1. Firstly, a review of the broader policy landscape and context, with a focus on the role of smart technology and connected infrastructure in meeting key challenges, including the green transition to ageing communities.
2. Secondly, an assessment of the extent to which connected technology can deliver social value in three areas: directly improving quality of life and access to services; better equipping social housing organisations to deliver good homes and services and make better decisions; and supporting communities and society to address major challenges.
3. Finally, the paper reviews how social housing organisations and other key stakeholders approach the challenge of implementing this technology. It considers the role of collaboration and investing in infrastructure and identifies barriers, risks and opportunities for the future.

We hope you find this whitepaper both informative and useful. The sector faces many challenges moving forward, and connected technology can be a part of the solution for both residents but also for the benefit of the whole country.

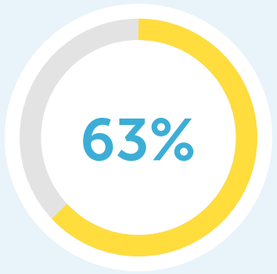
Contributing organisations include:

- Appello
- Foundations: The National Body for Home Improvement Agencies in England
- Halton Housing
- L&Q
- London Office of Technology and Innovation
- LSE
- Maryhill Housing
- Qlinker
- Smartline
- SMS Solopower
- South London Partnership InnOvaTe Programme
- Switchee
- Vattenfall
- West London Alliance

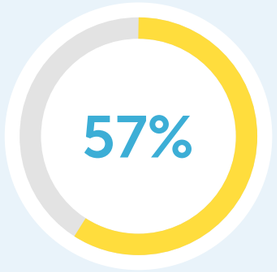
Background and landscape of smart technology and connected infrastructure

This first section examines the types of smart technologies that are being piloted both on a community and citywide level, as well as in the home. Of course, all these technologies rely on having a robust underlying digital infrastructure, whether that be hyperfast broadband or cellular connectivity.

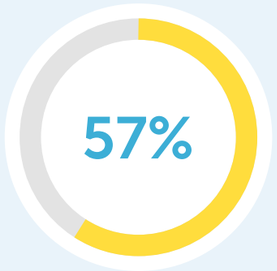
Like many industries, social housing providers have been hugely impacted by the pandemic. According to our research of 250+ decision-makers of social housing providers:



Nearly two thirds have faced diminished resources

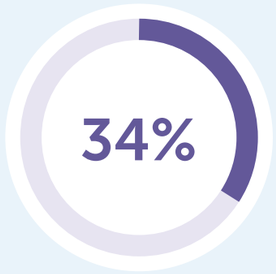


over half have experienced an increased demand on services

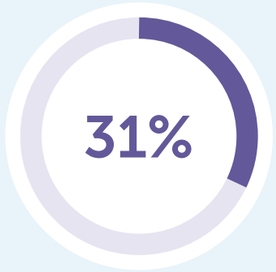


over half have had a reduction in funding.

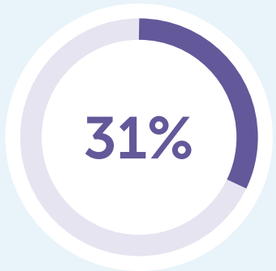
Smart technologies are key to enable social housing providers to work efficiently post-pandemic, with the key benefits being enhancing decision-making and resident quality of life – which can help alleviate the post-pandemic pressures they are facing. In fact, according to our survey:



The pandemic is the biggest driver for the deployment of smart technologies



followed by enhancing engagement with residents



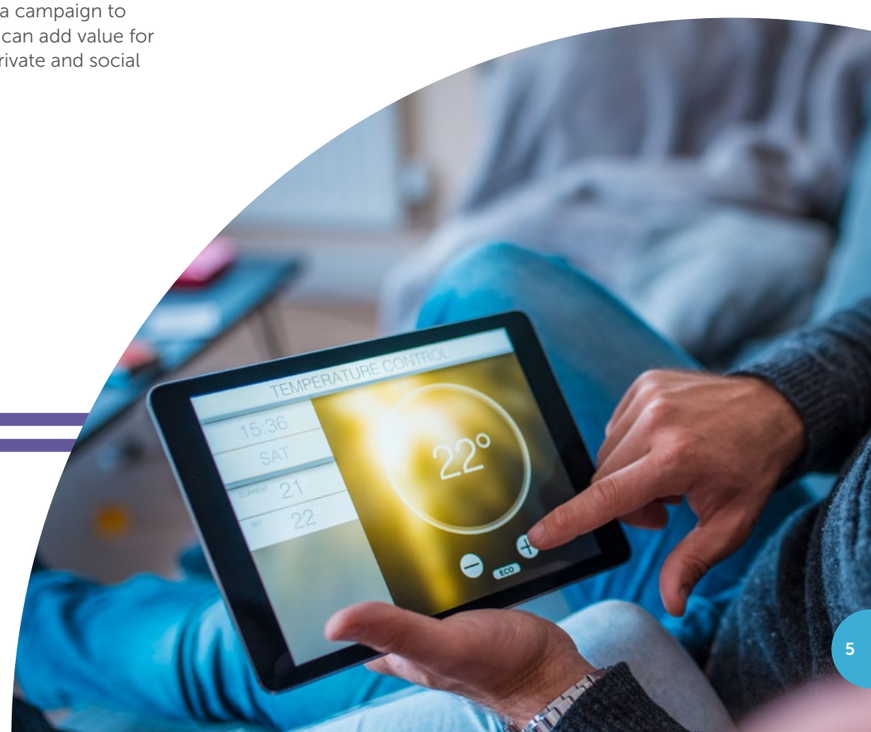
and tenancy sustainment.

The Future of Transport Programme is one example of how the UK government is investing in connectivity infrastructure. Smart, connected technologies are viewed as central to better service management, decarbonisation and an improved user experience of transport systems. £90 million funding has been set aside for trials of transport innovation in three 'future transport zones', including Portsmouth and Southampton, the West of England Combined Authority, and Derby and Nottingham. Types of technology to be tested as part of these trials range from smart sensors to manage traffic flow, to networks of e-chargers to enable higher use of electric vehicles.

The use of smart meters within individual homes is also widely supported within the UK government as a means to address and meet energy efficiency targets. Lord Callanan, the Minister for Climate Change, highlights the value of investing in this technology: "smart meters are playing an important role in helping the UK deliver a cleaner and more efficient energy system, with the added benefit of also saving tens of billions of pounds in the process." There is recognition that the successful roll out of smart technology in homes requires clear and consistent messaging to the end user, demonstrating the benefits in real terms including health, wellbeing and costs. Smart Energy GB, a not-for profit organisation backed by the UK government, is driving a campaign to communicate how smart meters can add value for customers, including residents, private and social landlords, and local authorities.

Infrastructure and connectivity also play a key role in smart cities. The British Standards Institute defines a smart city as "the effective integration of physical, digital and human systems in the built environment to deliver sustainable, prosperous and inclusive future for its citizens". Broadly speaking, the Centre for Cities highlights two types of definition for a smart city; those which focus on integrated technology and data in controlling the operations and functions of a city, and those which describe a different sort of citizen experience where people can benefit from a connected infrastructure.

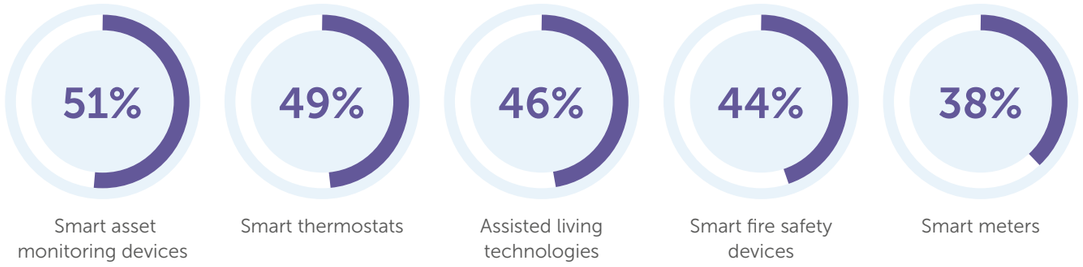
Across the country, some regional and local authorities have made smart cities a priority. Greater Manchester's Infrastructure Framework 2040 outlines a vision for the city region which utilises smart technology across the built environment. As a part of this framework, there is a commitment to new technologies that "will facilitate the creation of smart environments. Homes, networks and environments will become smarter, thanks to smarter devices connected by the Internet of Things and the fitting of smart meters and appliances within every house within GM".



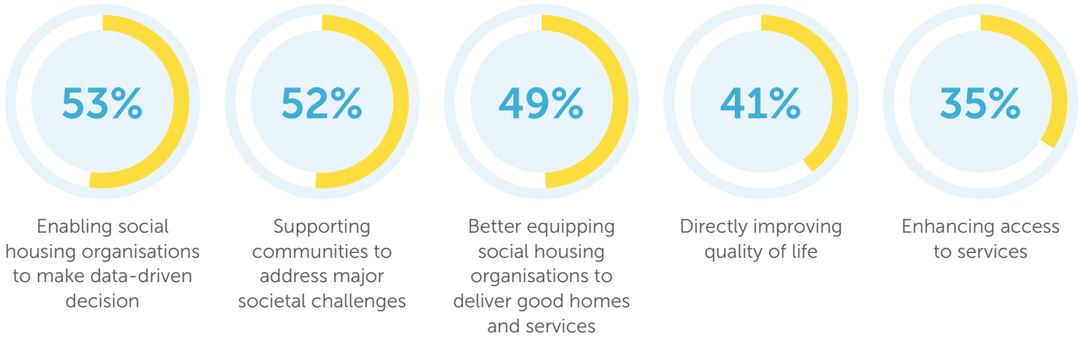
Smart social homes

Social housing organisations are involved in the building and management of both homes and communities. Therefore, many providers have piloted and installed smart technology at scale. Several use cases for this technology in social housing are featured in this report.

All of the social housing leaders we surveyed are committed to the deployment of smart technologies in the next year. The top smart technologies that social housing leaders plan to deploy in the next 12 months, include:



When we asked how the deployment of smart technologies could positively impact their organisation, the top benefits included:



Smart technology may factor in decision-making at every point in a building lifecycle - from the design of a new community, through construction, and in the eventual management. Deciding how and where to implement connected technology is dependent on the objectives of the organisation, and the specific needs of the residents and community.

At an organisational level, the sector is increasingly perceiving smart technology as a core part of new homes, and the retrofitting and adaptation of existing homes, for changing resident needs and net-zero targets. The delivery of connected technologies is moving from an early period, characterised by smaller scale pilots, towards widespread roll out.

This demonstrates that the business case for the use of connected technologies is now clearer, with cost of implementation reduced, whilst the necessary infrastructure and potential applications increase. It is also a case of organisations becoming more literate in the technology and use cases, through both the experience of pilots and in-house expertise.

The role of smart technology and connected infrastructure

In looking at the value of connected technology, and interviewing key stakeholders, three themes emerged which can help organisations to measure and communicate the types of benefit technology is providing.

1

Connected technology can directly change the residents experience in social housing, by improving the home environment, health and safety, and experience of core services.

2

Connected technology can enable housing associations to deliver better homes and services through the collation of data and remote asset management.

3

Connected technology can support new flexible energy systems, provide aggregated data, and be integrated into the wider community. This can enable action on societal issues, such as the green transition, and improve quality of life for the wider population.

Figure 1: Connected Technology Summary of Social Impact.

1.1 Improving quality of life and access to services

From a social value perspective, wellbeing can be created by connected technology in a number of ways. This relates to the home itself (is it affordable to heat? Are there damp and mould problems?), the ability to engage with your social landlord, and the feeling that your home and neighbourhood is safe.

Some of the ways in which connected technologies are delivering these benefits already, and what the future opportunities might look like, emerged in the research interviews. This section will look at evidence and case studies relating to the application of connected technology where residents engage directly.

Independent Living

Technology is playing an increasing role in how we access health and social care services in our homes as we age. In supported housing, a variety of assisted living technologies can enable residents to maintain independence, whilst also providing peace of mind and support.

Assisted living technology includes smart living interfaces, which enable residents to conduct both emergency and routine calls to housing staff in supported living. This can enable residents to live independently and comfortably, utilising the ease-of-use capability of smart devices. A range of in-situ and wearable smart alarms allow residents in supported living to access emergency support, including through voice-activated capabilities.

Whether it's specialist assisted living technology, or off-the-shelf technology, social value can be created by enabling residents to continue to live independently. For individuals, feeling like they are in control of their life, can rely on friends and family, and are connected to a community, has a demonstrable social impact through the UK Social Value Bank. There is an opportunity to further explore the relationship between assisted living technology and these improvements in wellbeing, through pilots and evaluation.

Everyday IoT (Internet of Things)

HACT spoke to Foundations, the national body for home improvement agencies in England about the role of smart technology in improving quality of life.

It was highlighted that smart technology is becoming more affordable, easy to install and simple to use. Off the shelf technology, such as voice or app-controlled lighting can give residents with limited mobility greater a control to improve comfort in the home.

During the pandemic, there has been a greater reliance on video calls to remain in contact with friends and family. Relatively low-cost devices like the Facebook portal have been used to reduce social isolation. Some social housing providers provided grants for these sorts of devices to support isolated residents to stay connected, and it's been a period in which less digitally experienced residents quickly adapted to using new devices.

Accessing Services

Connected technology has the potential to change the way we access and engage with services. Because these devices are connected to a network, people can make use of controls on everyday devices, like a smart phone, to consume services in a more flexible way.

Greater connection can mean entirely new ways of managing services, down to the energy we use to heat and power our homes. Not only is the end-user connected to the technology in their home, they are also linked into bigger networks of technology and people.

Connected technology can be deployed in a way that builds trust and empowers residents. Providers should target automation in certain areas, while simultaneously developing accessible ways to engage, retaining personal engagement where needed.

There is potential to use connected technology to automate routine processes like manual testing, which may decrease direct contact between residents and their housing providers. However, there is also an opportunity to improve resident engagement by making it easier to make contact and provide feedback. Targeted automation can free up capacity for staff to engage with residents where it really matters.

Qlinker: Digitally enabled

Qlinker is a Dutch housing association based in Utrecht. Qlinker now has 136 homes and is growing. An initial pilot involved 18 homes, residents use an app to pay rent, book repairs and manage their tenancy documents through a digital rent passport. This led to much faster service delivery with the initial sign-up process reduced from six days to six hours. The app utilised a chatbot which managed just over a third of all transactions without direct staff involvement. Chat bot engagement was only transferred to an officer when issues couldn't be resolved. Qlinker residents could also make use of smart speakers in the home to book repairs, creating multiple channels to resolve routine transactions.

Part of the reasons for Qlinkers success relates to it being founded in 2017, therefore the entire operating model could be built from scratch in a digital age. Building on a much longer, proud history of social housing provision in the Netherlands, the team at Qlinker could look at how residents accessed services in the twenty-first century and create a system architecture to match.

For housing associations with more legacy systems, one learning can be to be led by user-centered service design, rather than the path of least resistance. Whilst creating a digitally enabled tenancy will require investment in connectivity, technology, processes and engagement now, it can improve satisfaction and increase efficiency in the future.

That doesn't necessarily mean digital by default, or entirely automated transactions. Rather, it is about understanding the contemporary resident experience and access to technology, and crafting routine services that utilise digital technology at points that leverage impact across the organisation. For example, automating some routine transactions through a chat bot or self-service app, can unlock staff capacity to focus on more complex issues, or where personal engagement is needed. This way, a tenancy is digitally enabled.

Digital exclusion remains a reality, however preconceptions about who values online access and would benefit from fast broadband can be outdated. Our research also identified that the biggest challenges with closing the digital divide are:

- **45%** a lack of coordination
- **40%** grant funding limitations
- **36%** identifying digitally excluded residents
- **36%** a lack of access to hardware
- **30%** partnering with the right ISP

A combined approach to resident engagement

Virtual concierge services provided by Alcove have been deployed in social housing, such as in an L&Q extracare scheme in Essex. By combining video carephones and a range of smart devices in the home, some routine processes can be handled manually, meaning the real concierge and staff are able to spend more time directly engaging where it matters.

Platform Housing Group ran a trial of remote video calls for repairs with 8x8. Repairs operatives were able to solve many smaller problems on the spot. 39% of calls led to a remote repair and 26% of contacts meant there was no need for an initial inspection visit.

Another example is the housing association Ongo, using AI-enabled chat bots to deal with some routine enquiries. Whilst it's not the answer to all inbound contact, it can free up capacity by supporting residents with common issues – thus allowing the housing team to triage those enquiries needing a direct contact with a member of staff.

Connected technology can't be successful on its own. It leads to real impact as part of a hybrid and integrated digitally-enabled operating system. With residents able to access fast broadband to stay engaged with their social landlord through these multiple channels, it increases the likelihood that issues in the home will be addressed either before they arise, or quickly when they do.

39%

of video calls in a trial by Platform Housing Group resulted in remote repairs of smaller problems

Equal access, equal opportunities

Fundamentally, social housing residents should have access to the same opportunities to benefit from connected technology, regardless of tenure. Globally, there is a socio-economic divide which results in lower uptake in new technology in poorer communities.

There are concerns about this leading to exacerbated inequality, not only in terms of internet access but the quality-of-life improvements that can be achieved through connected technology. Social housing in the UK has the opportunity to use targeted, connected technology to do the opposite, bringing quality of life standards up for residents in their homes. As deployment of connected technologies by owner occupiers and in wealthier communities accelerates, the sector can ensure residents are not left behind.

From an infrastructure point of view, social housing providers can work with broadband providers to ensure the foundation of a connected home is put in place- fast connectivity. Whether this enables the use of connected technology installed by the housing provider, or off-the shelf products purchased by residents, there is the potential for wellbeing benefits.

The more barriers to use of connected technology can be removed, the more choice residents are effectively given to engage with connected technology in a way that can benefit them. Social housing providers can tackle these structural inequalities – including infrastructure, but also price and digital inclusion.

> *We need to be careful about their public and private deployment, because low-income neighbourhoods might not get the same support [as high-income neighbourhoods]. For example, a luxury high rise might have air-quality sensors, leak detectors and security sensors, whereas none of these features would be found in a low-income housing project.*[1]
>
> Swarun Kumar, Assistant Professor of Electrical and Computer Engineering at Carnegie Mellon University.

1. http://www3.weforum.org/docs/WEF_The_State_of_the_Connected_World_2020.pdf

1.2 Components Connected Technology: Better Data, Better Insights

Connected technology means the ongoing collection of data, whether that be humidity temperature on a smart sensor, or the behavioural data from a smart meter showing energy use day to day. This isn't just taking place inside the home. Out in streets and communities, connected devices monitor air pollution, traffic and even footfall.

Data is valuable – from an individual level, all the way to aggregated data from many people across the country. In an individual home, it might mean noticing signs of damp and mould, allowing for early intervention. At scale, combining data from traffic sensors across a local authority could lead to better traffic management or targeted improvements.

Increasing an ability as a data-driven organisation will enable the sector to better meet these challenges. Using standards can also increase transparency and reduce costs for organisations to clean and order data for analysis. Particularly regarding asset maintenance data, the sector needs to trust the data that decisions are based on, and by adhering to sector-wide standards and agreed specifications.

Trusting the data and providing one single version of the truth is a key component to ensuring better decision-making. As we move from a traditional, customer satisfaction-based perspective to one that uses connectivity and every data interaction, we must ensure residents, and their data, are shaping the service that they receive.

Brainport Smart DISTRICT: Benefit from your data

Data is valuable, and people should benefit from sharing their data, for better services and other incentives. In an innovative Dutch project called the Brainport Smart District, by agreeing to share data through smart technology in homes and the community, residents can have their rent reduced.

The district is currently being developed and will be a space to engage residents in the co-creation of solutions for a more sustainable and healthy future. Residents will live in a mix of social and private sector housing but will all be similarly engaged in a community of users.

It's a reflection that individuals own their behavioural data, and to share it means they should get something in return. Across eight program lines from one looking at mobility to sustainability and healthy living, smart technology is being integrated to improve quality of life, and quality of data insights.

BSD is a collaboration across multiple partners, including both Tilburg University and Eindhoven University of Technology, the Province of Noord-Brabant and the Municipality of Helmond.

Halton: Building better homes

Halton Housing have been working with Loughborough University, Leeds Beckett University, and University College London on a BEIS funded trial, using smart meters and other connected technologies to develop more accurate EPC ratings.

The goal of making homes low-carbon, and meeting net-zero targets is requiring more complete, real time and comparable data. Whilst abstract plans might meet technical requirements, it's not always clear how a home will perform when occupied.

With the target of getting all social housing EPC rating C by 2030, it's hard to rely on sometimes inaccurate SAP surveying. The aim of the project was to use connected technology to actually monitor the energy efficiency of a building over time.

Installing a range of sensors, smart meters and thermostats in the home to provide an accurate picture for each home, down to individual rooms. Whilst projections of average energy performance provide an overview, the reality is that individual homes perform differently.

Reliable, granular data is also a way to compare a home before and after a retrofit has taken place, or after new technology has been installed. In the long run, this data means the sectors can improve efforts to meet net-zero.

For Halton, it's all about making better decisions. "The final solution will better inform housing providers like Halton Housing when making choices on how its homes are improved and upgraded to meet the minimum energy efficiency rating of C by 2030, showing which ones are poor performers and need addressing first."

Open data

The West London Alliance has made data ownership a key priority when it comes to connected technology. The goal is to make sure London Boroughs can collect data from a number of connected technologies into a central data lake, opening the door for robust analysis and data led decision making.

In the procurement cycle, this means choosing to work with suppliers who will provide data ownership to the borough and residents. The outcome is open-source data, which both residents can view and benefit from, and the borough can utilise through partnerships with universities and local companies to build better services and products.

One example might be traffic flow data from sensors. By making that data accessible, local people can avoid traffic. At the same time, aggregated data can be used to inform how the borough mitigates traffic build up and reduces air pollution.

Safe and healthy homes: Improving asset management

Social housing organisations are responsible for most repairs in residents' homes, as well as ensuring building safety. This will cover heating and hot water appliances and many fittings such as toilets and baths, as well as gas appliances. Ensuring safety in the building structure and emergency exits is also imperative.

The quality of the home environment is another area in which social housing organisations are responsible, such as ensuring damp, condensation and mould is tackled and root causes addressed. The Housing Health and Safety Rating System (HHSRS) identifies 29 "housing hazards", from damp and mould to structural collapse and falling elements, including associated health effects. Hazards are identified as category one or two, depending on severity of the risk.[2]

Legislation and regulation around building safety has changed since the Grenfell Tower fire of 2017. A new building safety regulator is to be established, alongside increased accountability, stronger enforcement, and improved building data across the asset lifecycle.[3]

Despite legislative changes and emphasis put on addressing structural failures, recent high-profile cases of damp and mould have demonstrated the need to develop an approach to asset management that starts with prevention of structural issues before they arise.

Making smarter decisions for residents

Smart technology can make it far easier and cost-effective to address problems in the home before they arise. That means preventing defects that lead to everyday stress and health concerns, but also ensuring residents are safe in their own home.

There is a central role for accurate and common data on buildings from the design, through construction, and the handover to residents and housing managers for the building's full life cycle. When it comes to the maintenance of homes, and key components like boilers, the real-time data from smart systems can be invaluable.

From a social value perspective, it's clear to see how connected technology can translate back into benefits for the resident. Better data, if consistently gathered, can lead to more informed decision making that impacts the resident experience day to day. For example, the UK Social Value Bank puts the average value of rectifying serious condensation/ mould growth at £770 per year to the individual.[4]

2. https://www.gov.uk/government/collections/housing-health-and-safety-rating-system-hhsrs-guidance
3. https://commonslibrary.parliament.uk/research-briefings/cbp-8782/
4. Jim Vine, Mary-Kathryn Rallings Adams, Christina Knudsen, Ricky Lawton and Daniel Fujiwara. (January 2016) Valuing Housing and Local Environment Improvements using the Wellbeing Valuation method and the English Housing Survey: Results and Guidance Manual.
HACT. London.
http://www.hact.org.uk/sites/default/files/uploads/Archives/2017/01/Valuing%20Housing%2 0and%20Local%20Environment%20 Improvements%20-%20Jan%202017.pdf

1.3 Supporting communities and society to address major challenges

The social housing sector is central in efforts to meet net-zero targets, and in building a more equal and sustainable future. The built environment is accountable for about 40% of the UK's carbon footprint.[5] Investment into social housing is also being increasingly linked to ESG criteria, providing funding for decarbonisation costs. For more background on how investors are increasingly linking their investments to ESG criteria please see Sustainability Reporting standard for Social Housing

The social housing sector is both faced with the retrofit of existing stock and building low and zero carbon homes. Estimates put the cost of decarbonising UK social housing at £104bn, with only a small proportion expected to come from government grants.[6]

This means the sector will have to be smart, targeted and efficient in the decisions it makes. With a number of pathways and technologies available, good data, technology and automation will play a central role in ensuring interventions deliver against targets.

In Housing the Green Revolution Pioneering the way forward, Altair highlighted three key approaches for the housing sector to meet net-zero targets:[7]

1. **Behavioural change:** to help drive down or alter patterns in the consumption of energy
2. **Energy efficiency measures:** to save energy
3. **Reduced reliance on fossil fuels**: increasing the use of low-carbon alternatives.

Our research identified ways in which smart technology is playing a role in each of these areas. Residents are able to use smart devices to raise everyday awareness of energy use, and more easily cut usage. Housing providers are using smart sensors and other devices to gather more data on the performance of homes and increase efficiency. Finally, smart green technology in the home is enabling the transformation of the energy grid, moving towards a more optimised and balanced system powered by renewables.

At the same time, social housing organisations are tasked with ensuring the green transition works for residents and communities, tackling fuel poverty and improving wellbeing.

Behavioural Change: Smart Meters

Smart meters have been promoted by the UK government as a way to make us more aware of our energy use, and as a way to build a smarter energy grid at scale. Smart meters don't automatically save residents money, however in combination with an in-home display, they can help shift energy consumption, cutting down on wasted use, and shifting to cheaper times in dual or flexible rate tariffs.

The National Housing Federation and Smart Energy GB published guide for housing associations, listing a number of potential benefits to the resident. This includes an end to estimated bills, allowing residents to only pay for what they use. There is also evidence that in-home displays can support people to cut down on usage, by giving a more granular understanding of what appliances cost to run. Smart Energy GB conducted a survey in which 85% of smart meter users had made changes to their usage, leading to energy savings.[8]

The guide also notes the potential of better energy behaviour and property performance data, opening the door for more targeted interventions to improve the energy performance of homes.

A Smarter Grid

Connected technology has the potential to change the way we produce, use and manage energy use across the country. In an effort to meet net zero goals, a smarter, connected energy grid has the potential to reduce our reliance on fossil fuels, at the same time as reducing wasted energy.

Solopower is a solution from SMS that is being trialled in Orkney and offered to social housing providers and local authorities across the UK. It involves smart home storage batteries and solar PV being installed in existing and new social housing without the upfront costs of installation.

Typically, this involves connecting a smart battery to the customer's home broadband. A good, high speed connection can improve the performance and reliability of smart battery solutions. In broadband not-spots, cellular connection fill in the gaps.

Residents energy use can then be optimised via the Flexigrid software, to charge at low-cost times, saving the resident energy costs and reducing demand on the grid at peak times. This can mean a 25% saving on energy costs compared to a standard tariff (up to £200p.a.).

In an equitable green transition, it's important that residents in social housing have the same access to innovative technology, and opportunities to be active participants in the journey to net-zero.

With considerable opportunities to improve quality of life, and cut ongoing energy costs, solutions like Solopower open the door for social housing residents to achieve some of these benefits. For residents in social housing, benefits can include low and zero carbon heat at a reduced cost, which can help tackle fuel poverty and improve conditions in the home.

Collaboration in large towns and cities to build and manage district heat networks is an example of how connected technology can facilitate a more symbiotic, localised energy systems, by providing the necessary data to manage and distribute waste heat and energy between different stakeholders.

Vattenfall: A circular system

Vattenfall are Europe's leading large-scale district heat network provider, with around two million homes connected to heat networks across Sweden, Netherlands, Germany and now the UK.

Low/zero carbon heat is provided in built-up urban areas via networks of pipes in the ground and energy centres. The heat sources include energy from waste plants, renewable heat and waste energy from industry and retail that is otherwise is not put to use.

A largescale District Heat Network is a connected system which needs balancing and technology to communicate, for it to work as a system. Newer systems are making use of internet connections to link remotely to the mechanical systems which can then be monitored and controlled to ensure performance and efficiency for both the operator and the energy consumer.

Social housing providers have been adopting communal heat, district heat and heat networks via their development programs for some time, and Vattenfall help to decarbonise these networks, which leads to progress toward Net Zero targets.

For residents in social housing, benefits can include low and zero carbon heat at a reduced cost, which can help tackle fuel poverty and improve conditions in the home.

Collaboration in large towns and cities to build and manage district heat networks is an example of how connected technology can facilitate a more symbiotic, localised energy systems, by providing the necessary data to manage and distribute waste heat and energy between different stakeholders.

5. https://www.ukgbc.org/climate-change/
6. https://www.insidehousing.co.uk/insight/insight/the-cost-of-net-zero-social-landlords-decarbonisation-plans-revealed-68497
7. https://thinkhouse.org.uk/site/assets/files/2305/altair0121.pdf
8. https://www.smartenergygb.org/en/resources/press-centre/press-releases-folder/usage-tracker-may-2019

Reduced reliance on fossil fuels: Energy Systems of Tomorrow

In London, examples of new and innovative smart systems include heat transfer systems, allowing for excess heat from the London Underground to be displaced to heat buildings, reducing wasted energy. This is an example of how connected infrastructure may develop in the future.

As social housing organisations build new homes and retrofit existing homes, there will be new opportunities to change the way residents' homes are powered and heated. Smart technology is likely to play a key role and investing in an infrastructure capable to supporting new use cases is a way to prepare for the future.

Connected technology is changing the relationship between residents as energy consumers, social housing organisations, and energy providers. It's opening up new energy systems with renewable generation at a local level and building new collective relationships between energy consumers. This includes individual homes generating their own power through solar panels and distributing excess energy back into the grid. This is changing people's everyday experience as energy consumers, with the potential to reduce cost an increase comfort at the same time.

Shared data and decision making

Environmental targets don't only relate to high level reductions in carbon, it's also about improving local environmental quality, in ways that are more immediately experienced by social housing residents.

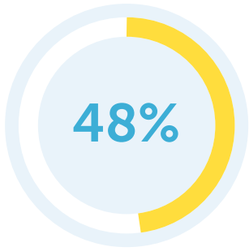
One example is local air quality. Granular data is needed to see where pollution levels are high, to make the right interventions to improve health and wellbeing. Not only does poor air quality worsen health conditions and even lead to mortality, it's also been linked with anxiety and other social issues.[9]

Sutton Council is part of the Breathe London trial, in which air quality sensors are being used to monitor air pollution in the city.[10] Made available on an online map, this data is helping individual boroughs and the GLA to develop a targeted strategy and also communicate with local people on the need for, and success of efforts to improve air quality for all.

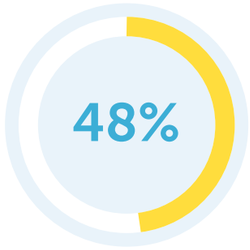
When asked about the top cross-sector pilots that social housing providers are working on, the top programmes included:

waste management

e-health applications



air quality



online education programmes

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10. https://www.breathelondon.org/
11. Jim Vine, Mary-Kathryn Rallings Adams, Christina Knudsen, Ricky Lawton and Daniel Fujiwara. (January 2016) Valuing Housing and Local Environment Improvements using the Wellbeing Valuation method and the English Housing Survey: Results and Guidance Manual.
HACT. London.
http://www.hact.org.uk/sites/default/files/uploads/Archives/2017/01/Valuing%20Housing%2 0and%20Local%20Environment%20Improvements%20-%20Jan%202017.pdf

The Future of Social Housing

Unlocking shared benefits with connected technology

When asked what the biggest challenges were with enabling shared infrastructure to deliver cross-cutting sector pilots, the top issue was not having project management skillsets (63%), budget restrictions (58%), and a lack of resources (47%).

When it comes to addressing community and societal level problems such as climate change, large scale action is needed to translate benefits back to the individual. At the same time, connected technologies can lead to tangible benefits for residents, such as through energy savings.

Making homes more energy efficient means greater resident comfort, whilst also allowing for a reduction in energy bills and a reduced carbon footprint. The UK Social Value Bank puts the benefit to the resident of moving up one EPC band at Energy efficiency improved by one EPC band at £217, with movement from the EPC G to APC A coming to £1,302.[11]

EPC rating are partially determined by heating systems and controls, and smart, flexible connected technologies allow for greater degrees of targeted and automated heating. This means using energy when you need it, and it being easy to control the system at the press of a button.

The Future of Social Housing

Building the connected communities of tomorrow

Our research identified some common barriers which are preventing the necessary investment in the connectivity infrastructure and the connected technologies. It also recognised the varying role that social housing providers have in their deployment.

For example, whilst an organisation has a larger degree of autonomy over which IoT systems are installed in a development, when it comes to consumer IoT their role might switch to education and advocacy to support residents to adopt and use new technology effectively. For public space IoT, social housing providers will be one of many stakeholders with overlapping priorities and will need to collaborate on broader agendas, including through data sharing and joint funded pilots.

Each of the various activities identified below is likely to engage different team members, from those responsible for IT systems and asset management, to the resident engagement team which is required to communicate with residents around the installation and use of technology.

Developing a high-level roadmap and strategy for connected technologies is a logical first step, allowing the organisation to identify clear objectives, and a staged process to scope, implement and learn from the technology over time.

	Examples of technology	Role of the social housing provider
Consumer IoT	Smart home hubs Smart thermostats Smart meters Smart assisted living technology	Providing broadband and connectivity infrastructure Resident engagement and technical support Grants and support for off the shelf technology Some installation, including smart thermostats and smart meters
Enterprise IoT	Smart asset sensors (humidity/ temperature/water etc) Communal and emergency lighting Smart fire safety technology	Installing and managing technology Data collection
Public Space IoT	Air quality sensors Traffic and footfall sensors Flood sensors	Collaboration in local use cases, through placemaking Collaboration in trials and data sharing Joint funding

Identifying the need, then the technology

Through its research, HACT identified an emerging understanding of the social value connected technology can provide social housing, despite limited examples of full deployment and evaluation. Organisations we spoke to were able to predict where social value would be created, but most were in the middle of pilots and evaluations so did not have evidence.

In fact, our research identified the top barriers with the deployment of connected technologies, were 'other pressing priorities that need addressing' (50%), not being sure on how to measure impact of the deployments and not knowing how connected technologies will solve real issues for residents and communities (38%).

Procuring connectivity infrastructure and connected technology is also one of the challenges we heard about from social housing organisations and local authorities. One learning was the need to identify problems to address, and positive goals to achieve first, then find the technological solutions that can be delivered.

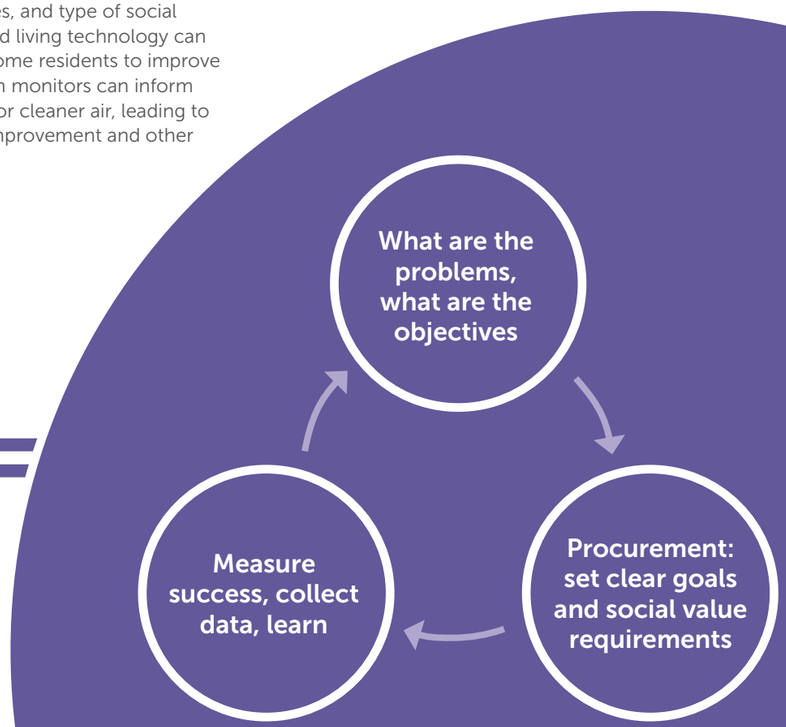
From a social value perspective, it's important to understand the different use cases, and type of social value that can be created. Assisted living technology can have a considerable impact for some residents to improve independence, whilst air pollution monitors can inform local and national interventions for cleaner air, leading to a general health and wellbeing improvement and other societal benefits.

No one size fits all

Being clear about expectations for social impact and scalability will help organisations to set the right objectives through procurement.

Technology providers can take a proactive approach to understanding their own value, by understanding the needs of different demographics, and building solutions that meet those needs.

To help show social housing providers what social value is being created though digital connectivity in their communities, Hyperoptic has created a Social Value Calculator. The calculator identifies key areas where improved access to high-speed broadband can make a difference, using the most up-to-date research available to measure the impact on personal wellbeing and financial savings.



Collaboration

We spoke to social housing organisations, technology providers, local authorities and academics, and thought leaders. Common across the board was a call for more collaboration, especially in local places, between stakeholders with shared objectives.

One common theme in conversation with social housing organisations, local authorities and thought leaders, was challenge and opportunity for collaboration around connectivity infrastructure.

Whilst national and city region level plans can set the agenda at a policy level, the reality is that decisions about what infrastructure and technology is needed will differ between localities. A one-size-fits-all approach is unlikely to deliver the greatest social and business benefits.

Collaboration between stakeholders can help target resources to invest in vital connectivity infrastructure, such as high-speed broadband. At the same time, it can move beyond siloed projects to build truly smart and integrated communities in which data serves a common purpose.

Because we are in a phase of adoption and testing of connected technology, it's important to share learnings from pilots across the globe, rather than work in siloes.

Collaboration in South London

One example of a collaborative approach is the IoT project South London Partnership is running across the five South London Councils of Croydon, Kingston upon Thames, Merton, Richmond upon Thames and Sutton. It's a highly collaborative initiative, working alongside the Sutton Housing Partnership, and engaging suppliers in pilots across the four boroughs.

The project is using funding from the Strategic Investment Pot (SIP) as part of the London Councils Business Rates Retention scheme which is administered by the City of London Corporation.

The project team spoke about how they had developed a problem driven approach, first identifying the issues and services which needed better data, then procuring the technology needed to improve the service.

From traffic monitoring and air quality sensors to temperature monitors in supported accommodation, the partnership was able to think holistically about the problems the community faces both in the day to day, but also through the Covid-19 recovery and the long-term goal of meeting net-zero targets.

One focus of the project team was ensuring data from IoT solutions could aggregated across multiple boroughs, to provide value both at a local, regional and city-wide level. With many of the trials, there are multiple and unpredictable use cases which can arise from the data, and it's an important opportunity to tackle collective issues.

Investing in tomorrow, today

For organisations working to tackle digital exclusion during the Covid-19 pandemic, it quickly became clear that limitations on bandwidth in homes was a major issue. It prevented people from being able to access online schooling and work from home effectively, as well as stay connected with friends and family.

A learning from this period is that there is a need to future proof communities and connectivity. It's unclear what sort of demands will be placed on connections, both through direct access to the internet, and through connected technologies.

The use of smart technology is one area in which social housing can both widely deploy tried and tested solutions at scale, but also lead on innovative use cases that change the status quo. Many examples of widescale deployment, notably smart sensors, are becoming a common feature in new builds and retrofitted stock. Other examples in this paper offer the potential to lead the way, such as the Brainport Smart Districts model for data sharing, or new models for energy distribution such as smart batteries or district heating networks.

Ian Wright of the Disruptive Innovators Network (DIN) notes that whilst there are many small-scale examples of smart technology deployment, the sector should develop a more strategic approach which takes a lead on more ambitious use cases, "wouldn't it be powerful if social housing was in a position to export some genuinely disruptive innovations for other sectors to learn from?"

One area of growth is likely to be systems using Artificial Intelligence (AI) to analyse large sets of data, automate certain processes, and equip social housing organisations with better analytic capabilities. Social housing organisations like Ongo and Housing Solutions are already using AI-enabled chat bots for routine enquiries.[12]

In the future, the capability of AI will only be as good as the data it uses to learn and analyse, and connected technology has the potential to gather large amounts of behavioural and asset data. If reliable, and gathered with transparency about its use, this data could allow organisations to diagnose service failures with a greater degree of accuracy.

> *"wouldn't it be powerful if social housing was in a position to export some genuinely disruptive innovations for other sectors to learn from?*
>
> Ian Wright, Disruptive Innovation Network, Housing Digital.

12. https://www.insidehousing.co.uk/comment/why-ongo-is-using-artificial-intelligence-71207

The question of connectivity

For emerging technologies, lack of bandwidth can be a constraint that the supplier must work around to deliver solutions that can be deployed across the country. Some use cases don't need access to high bandwidth, such as smart temperature monitors using low bandwidth connectivity options, such as Low Power Wide Area (LPWA).

Fostering the creation of new, innovative connected technologies could solve existing and new problems the sector faces. Whilst it's hard to predict what these technologies might be, it's important to build a future-proofed infrastructure, and support innovation through pilots and active engagement by the sector. Waiting for off-the shelf solutions built for other markets could leave the sector playing catch up. If high-speed infrastructure is invested in, this will mean more advanced capabilities can be built into smart technology to be deployed across the country, which may require a high bandwidth.

As more devices and systems go online in the future, and communities look to optimise and balance national and local energy systems, there is value in having a fast and secure connection. The long-term trend has been towards a greater demand on bandwidth, and it's likely to continue in that direction.

Speaking to many social housing organisations from across the UK, it became clear that good, fast broadband access was increasingly becoming an essential service offer as a fourth utility. Even without the additional benefits of connected technologies to enable better asset management, this was a strong enough business case.

Additional benefits are leveraged when connected technology is combined with digitally-engaged residents. Modern technology can now provide the mechanisms for the resident and data journey to go hand in hand. Customer touchpoints - either face-to-face, over the phone or via digital media - can be standardised and measured, to support better collection and data analysis. In tandem with the real-time data from sensors in homes and buildings, social housing associations have access to a rich and varied range of insights upon which to make operational and strategic decisions. The example of Qlinker in the Netherlands is testament to what a digitally enabled housing association can look like, where residents are empowered to engage with their social landlord through digital channels alongside IoT systems collecting data.

One learning is the value of removing inter-organisational siloes between IT, asset management, and other customer-facing parts of social housing organisations. Different parts of the business, with different strategic objectives, need to be able to make a unified case for investment in infrastructure and technology. With fast broadband becoming increasingly essential for internet access, there are opportunities to leverage additional residents and business benefits, through the targeted deployment of connected technology.

A social value case for connected technology

Social housing organisations have a social purpose, above and beyond their role in providing purely bricks and mortar for their residents. Simply providing housing is not enough to ensure tenancy sustainment and provide successful communities. Unless residents are supported when they need it and the communities, they live in are both socially and economically sustainable, housing associations are not fulfilling their charitable objectives or protecting longer term income streams and capital assets, of which they have a responsibility to do so.

From a social value perspective, different types of technologies have varying impact. A network of smart smoke alarms can help residents feel safer in their homes, whilst smart thermostats can improve comfort in the home and tackle fuel poverty. Out in the community, air pollution and traffic monitors can make the journey from point A to B more pleasant, healthier and less stressful.

Taking a holistic, place-based approach to wellbeing recognises the varying ways in which people's lives can be made better. For housing providers, local authorities and other local stakeholders, it's important to be able to have a different social value ask for each type of technology provider. Its then easier to make smart procurement decisions, and measure performance against key measures of success.

Securing the future of social housing is a strategic priority for the whole of Britain. We hope this whitepaper has given some food for thought as to just how crucial technology will be in enabling its success.

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