Do the smart thing

The future of the social smart home

May 2020
Over the last five years there have been numerous articles, conference presentations and ideations dedicated to the use of the Internet of Things (IoT) technology in social housing. Yet, despite pilots demonstrating the value of the technology, the social smart home remains on the drawing board.

In this White Paper, we examine some of these pilots to see how far the sector has engaged with IoT technology. We then look at some of the barriers to its wider implementation. We finish by highlighting the potential benefits of the social smart home for residents and communities.

The Paper has three key messages for social housing organisations who want to move beyond the drawing board:

- the social smart home will save you money and reduce your carbon footprint;
- implementing IoT technology into your homes should be part of your business transformation and not, as is often the case currently, siloed on its own;
- the social smart home will enable and empower residents as well as the communities they live in, improving resident engagement and breaking down the current stigmatisation of social housing residents as untrustworthy.

Smart homes should be for everybody. For social housing organisations especially, the introduction of IoT technology should be seen as a win-win. It will help them to manage and maintain their assets more effectively. And it will help their residents to take an active and leading role in that management and maintenance process.

Smart locks will let a resident who is at work open their front door so that a repairs person can fix a faulty boiler, reducing costs associated with missed appointments.

Smart temperature sensors will enable social housing organisations to measure and resolve damp and mould issues before they become a costly problem to fix.

Smart leak sensors can detect water escape and activate smart stop-cocks before major damage is caused, saving costs of repairs, protecting residents’ home contents and the inconvenience of remedial work.

With the sector committed to a data-driven future, one in which residents are engaged and empowered, investment in smart homes should be seen as a critical step towards achieving this. Put simply, it is the smart thing to do.
The social housing sector has been talking about the introduction of smart technology for a number of years. A cursory look at the sector’s trade press provides numerous comment pieces from social housing executives about the importance of moving with the smart tech tide and imploring colleagues to not be afraid of investing in smart technology.\(^1\)

Yet in a survey conducted at the beginning of 2019, the smart energy company Secure found that only 56% of the social housing organisations surveyed had either implemented or trialled IoT solutions.\(^2\) And, critically, only 20% had installed IoT solutions in more than 100 homes.

There was, however, a strong appetite to expand the scope of IoT, with 80% stating they were considering new home sensor solutions. Yet the scope of ambition tended to be focused on smart meters and heating systems, rather than on the full range of smart tech solutions that are now available.

While the sector has been excited about the prospect of smart home technology for years, its focus has been on piloting various initiatives to build the business case for further implementation. In this section we focus on a number of these trials, outlining some of the key benefits identified.

**Maryhill Housing, Glasgow**

This trial saw 360 homes in the 20-storey towers blocks on Glenavon Road in Glasgow being fitted with IoT technology, alongside high speed fibre optic cable. The project was funded by the Scottish Government and was a partnership with CENSIS, Hyperoptic and iOpt Assets.\(^3\)

The project aimed to improve the welfare and safety of residents in the tower blocks, with sensors fitted that monitored temperature, humidity and CO\(_2\) levels. The project also included free digital inclusion classes for residents.

The project benefits included:

- increased quality of living for the residents;
- improved operational efficiency;
- fuel poverty and fire safety addressed.

\(^{1}\) See, for example, “Smart homes: Our social homes are going to become more high-tech – we need to move with them”, Inside Housing, 29-07-2015, and “Don’t be afraid of investment in smart technology – it can improve services and make homes safer”, Inside Housing 29-01-2019

\(^{2}\) “The Internet of Things and Smart Heat Controls in Social Housing: Market intelligence report 2020”, Secure, 2019

Flagship Group, Ipswich

In 2016, Flagship fitted twelve flats with wifi, smart locks for communal doors, Switchee thermostats and CCTV cameras in communal areas. This initial pilot aimed to improve the management of homes and the quality of everyday life of the residents.

The pilot was a success, with Flagship taking preventative action on damp and mould when detected by the devices. Another benefit of greater resident connectivity was the expedited process of communications between residents and Flagship.

Phase two of the pilot began in 2017, with the initiative rolled out to 493 properties in Norfolk and Suffolk. Switchee estimate that the devices installed during this second phase will save £600,000 in energy bills over the next ten years, along with 1.82 tonnes of CO₂ per annum.4

Cross Key Homes, Peterborough

In 2019, Cross Key Homes partnered with the digital infrastructure firm CityFibre to trial the use a network of smart sensors in three residential locations across Peterborough. The sensors were used to monitor humidity and condensation, transmitting real-time data back to a network of antennas, which in turn were connected to CityFibre’s full fibre network in the city, in order to track wasted heating in shared spaces.5 Other sensors were fitted to monitor noise, fire risks and parking.

The aim of the project was to improve the quality of life for residents by allowing Cross Key Homes to be more proactive, to reduce energy bills and CO₂ emissions. Full results of the trial have not, at time of going to press, been published.

Renfrewshire Council, Renfrewshire

In July 2016, Renfrewshire Council began working with iOpt Assets, installing sensors to monitor temperature, humidity and CO₂ levels in 50 homes.

The scheme enabled councils to identify issues relating to damp and heating, as well as the number of residents dealing with fuel poverty. The council’s head of policy and commissioning also noted the value of using this technology in improving the health and wellbeing of residents.6

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Peabody, London

In 2014, Peabody became the main landowner in Thamesmead, an area in southeast London. Thamesmead contains over 4,500 properties, spread over a wide area. After taking over management for the properties, Peabody had to spend well over a million pounds on repairs and compensation for residents for issues arising from damp and mould.

They piloted the use of IoT technology to try and address some of the issues. They installed over 140 Switchee smart thermostats to identify damp and condensation. They were also used to evaluate third party interventions, so that Peabody could identify the best solution to the issue. A reporting dashboard enabled ongoing testing of interventions, such as the installation of 40 smart ventilation systems.

The pilot resulted in fuel poverty being reduced, with households saving 15% on average on their heating bills, as well as resulting in significant CO$_2$ reductions. By monitoring the ventilation systems, Peabody was able to understand that these systems were effective and could be further deployed with confidence.

Vivid Homes, Hampshire

In 2019, Vivid installed water sensors and safety lightning into a 65-home sheltered housing development at Chandlers Ford, in partnership with Barter for Things, an IoT predictive maintenance company. Vivid wanted to drive cost efficiencies, meet regulatory requirements, and improve safety and security for residents.

The installation of the IoT meant that water quality could be tested without manned testing, with sensors providing a scald alert in case of any boiler problems.

The Safecility emergency lighting enabled automatic testing and reporting, alerting Vivid to any defects in real time, which is vital for Vivid for fire safety. The system also created a digital record that could be analysed and used for service improvements.

All of these early trials have demonstrated the value of IoT technology in social housing. The majority of them, however, have focused on the use of sensors to facilitate more proactive management by social housing organisations. The use of IoT to enable and empower residents to control their homes has received less attention.

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7 See: https://www.switchee.co/wp-content/uploads/2019/03/Peabody-Case-Study.pdf
What is it?
An internet connected lock that allows temporary access to be granted to contractors, visitors or housing officers. Smart locks are available from manufacturers including Yale, Salto, TLJ (UK), August and Klevio.

How does it work?
Locks can be installed in blocks with door entry systems and in properties with doors to the street. The type of technology deployed will depend on the unit, the door and existing lock type. Most smart locks allow for existing keys to still function.

Smart functionality will require power. A new maintenance regime will need to be created to manage battery replacements, with the technology reporting battery status.

For the resident
Allows repairs operatives and deliveries in without being present at home.

Temporary access can be granted to family and friends without a key. If keys are lost, smart access can be granted instantly.

For the social housing organisation
Reduces the number of missed appointments, gain access for gas safety inspections, reduce the cost of issuing new keys.

Deploying smart locks could significantly bring down void time by reducing key management issues. For example, contractors have to collect and return keys. Smart locks enable contractors to understand access patterns during voids, ensuring contractors are working during required hours and not outside of permitted hours.
Smoke alarms
Smart smoke alarms work in a similar way to traditional smoke alarms, using an alarm to notify residents if smoke or fire are detected. By being connected into an IoT network, smart smoke alarms notify the resident and property manager of defaults, or low batteries. In the event of a fire, smart smoke alarms can notify both resident and property manager regardless of whether there is anyone in the property to hear the alarm, vital for the safety of nearby residents in multifamily buildings.

For the social housing organisation
Remote testing capabilities allow the property managers to perform routine testing without needing to send an individual into the property, ensuring sustained fire safety regardless of circumstances.

In light of the Grenfell Tower fire of 2017, fire safety compliance is a key concern for landlords, seeking to prevent a similar tragedy from occurring. Smart smoke alarms are a way of ensuring resident safety is protected - even during challenging circumstances like the coronavirus pandemic which is creating complicating the ability for property managers to perform routine checks and maintenance.

Smart smoke alarms available in the UK include Google’s Nest Protect which can distinguish between heads-up (low level smoke detection such as burnt toast) and an emergency.

Also available is Minut’s Point Sensor. This is a device that detects temperature, humidity motion and noise, whilst also recognising the audio profile of other alarms in the home. This effectively turns existing CO, radon, smoke or other alarms into smart alarms notifying resident and property manager if they are triggered.
Smart lighting

In-home smart lighting has improved over recent years, however there are still key issues to address around the user experience. However, smart lighting is another tool which can improve fire safety.

As with smart smoke alarms, smart lighting has been used in communal spaces, access routes and fire escapes. Insufficient emergency lighting was identified as a serious point of concern in the Grenfell Tower enquiries, with two thirds of emergency lighting failing a routine inspection.

For the social housing organisation

Remote testing and the ability to flag faults immediately ensures fire safety standards are maintained. Alongside smart smoke alarms, this technology can equip property managers to protect the safety of residents, and meet compliance standards. Safecility is one provider of smart emergency lighting, complete with remote testing and an automated reporting system. Safecility smart lighting has been used by Vivid in a sheltered housing scheme in Chandlers Ford, reducing the need for costly and time-consuming manual testing.

For the resident

Smart lighting can improve visual comfort in the home, allowing the resident to exercise greater control over the luminal levels beyond just on/off.

Smart technology allows the resident to control the ambience of their home can be particularly helpful in empowering those with physical disabilities.
2 The integration challenge

As we’ve seen in the previous chapter, numerous pilots run by social housing organisations have evidenced the benefits of introducing IoT technology into homes. Despite expressions of interest and some pioneering trials, however, social housing organisations have not integrated proptech into the development and management of stock to the same degree that has been seen within the commercial real estate sector.

Proptech relates to the digital transformation of real estate, including the use of IoT technology to change the way property is managed, maintained and occupied. In commercial real estate, smart technology is used to add value for residents and to improve the management of properties. By using data generated by sensors and other smart home devices, building management systems are leveraging the potential of data to improve efficiency, liveability and profitability of properties.

In 2018, Deloitte published a report looking at the role of IoT for real estate companies. The report outlined three models of building management systems:

1. **Individual BMS**: Deloitte notes this is the typical model, in which CRE owners “install BMS on a piecemeal basis to automate individual tasks such as elevator or lighting control”. The process of collecting and aggregating data then becomes time and resource consuming.

2. **Partially integrated BMS**: This is often a response to CRE companies to the limitations of model one. It involves integrating the automation of some features, normally with a similar focus, i.e energy management systems. The report highlights that this leads to “less manual intervention” and “faster decision-making”.

3. **Fully integrated, IoT-enabled BMS**: A fully integrated IoT-enabled BMS allows for “higher-order cost, productivity, and revenue benefits with a deep customer and data focus” and “requires minimal to no manual involvement”.

In social housing, the implementation of IoT and proptech has been limited. The trials and early adoption of IoT has tended to fall within models one or two of individual or partially integrated building management systems.

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8 Smart buildings: How IoT technology aims to add value for real estate companies, Deloitte, 2018
These trials have revealed the significant benefits of individual IoT technology on residents’ lives as well as the business bottom line. And there is an understanding that a more strategic and less piecemeal approach should be applied to smart technology in social housing: 60% of respondents to the Secure survey said they were looking to take a “wider strategic” approach to the implementation of IoT. By contrast, just 12% said they were taking an individual, problem-solving approach.

So what are the challenges facing social housing organisations in moving beyond the pilot stage? How can they move from installing IoT in a small number of homes to deploying it across thousands of units?

**Design and deployment**

Pilots tend to be designed around proving a single use case. To translate this into full scale deployment, a system must work for multiple current and future uses. A robust technology and data strategy can help organisations select a system that aligns with their expected future requirements. Unfortunately, relatively few organisations have the clarity of vision to understand how the technology market or event their residents’ demands might change in the next five years.

There is a role for technology providers to build open platforms that provide social housing organisations the ability to scale and pivot based on future needs. Technology that doesn’t offer this now is not fit for purpose. Modern technology should be flexible by default, using industry standards for data and communication where available.  

**Managing multiple devices**

Once one IoT system has been successfully deployed, the temptation is then to look for the next system and deploy it alongside the first one. This, however, creates challenges for systems management, as well as how data is delivered and analysed. As with any IT and communications systems, variation adds complexity. Variation is not always bad, but it does need to be managed practically, and strategically. Most social housing organisations are not mature enough to manage this complexity without significantly increasing costs and impacting the short-run viability of predicted ROI on the technology.

Integrating a range of devices into a single functioning smart home is difficult, from

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9 See the UK Housing Data Standards for social housing: https://www.hact.org.uk/DataStandard
design to implementation and management. One company looking to support the social housing sector to achieve this is SmartRent. This home automation company has developed software and hardware that has been widely deployed in the United States by property managers of multifamily apartment buildings.

SmartRent’s response to the challenge of managing multiple devices is to work with landlords to design a smart home set-up that meets the organisation’s business objectives and includes a system with a single dashboard for the multiple devices in the home. The approach also offers a single application for residents to control devices.

Moving management of multiple devices in the field to a single dashboard reduces the cost of smart home management and increases the benefits by bringing data and insights together. For property managers, this helps them better monitor and protect their assets and create operational efficiencies. For example having leak alerts that automatically trigger a repair call out and flags the issue to the planned team for analysis and possible pre-emptive work in similar properties. For social housing residents, this can mean access to the same wide range of smart home technologies as home-owners and private renters, controlled through a single application that doesn’t need to be configured by the end user.

Another application offering home aggregation connectivity options is Homelync. As with SmartRent, it can also bring together data from multiple sources to provide a seamless single login interface for multiple IoT technologies, and requires only a single integration point with a legacy system. Both systems provide an opening space for the type of advanced analytics that gives IoT technology its true value.

**Return on investment**

Aiming for a short run return on investment will make most smart home technology projects unviable. The evidence from other sectors is clear: return on investment is always linked to service transformation. In commercial real estate, for example, using sensors to understand building occupancy allows building managers to change their cleaning and maintenance provision to meet live demand. This has resulted in significant cost reductions for these services.

The same is true for the social housing sector. Currently, IoT projects tend to
operate in silos, partly because of their limited scope, data and insights that they generate. If they are to deliver a data-driven future, social housing organisations need to link investment in initiatives like smart homes to their wider transformation strategies.

Take the example of asset management. Smart homes will enable advanced analytics that can be used for strategic and operational decisions, transforming asset management. This move towards a pre-emptive asset maintenance strategy will require a new approach to managing inventory, contractors and DLOs.

SmartRent has worked with landlords of multi family apartment buildings in the US to install smart home systems with smart locks. These have provided landlords with a return on investment on the technology through a combination of reducing the number of missed appointments for maintenance contractors, a shift towards more proactive maintenance and an increase in service charge.

According to calculations based on SmartRent’s existing live installations in the U.S., implementing this technology in 100 homes could provide a return on investment within 36 months. Delivering this ROI requires systems integration and data sharing across teams, departments and with contractors.

We know in social housing that keyless entry can reduce void times but we will only truly see cashable savings if our systems can automatically provide access codes to contractors and provide use with automated auditing and flags for suspicious activity.

This shift will also mean asset and maintenance teams needing training to use new data sources so they can redesign work flows and change their approach to asset management. It’s possible, for example, that some surveying and inspection processes might become redundant with live data providing an enhanced view of the condition of assets.

Successful implementation will also require a shift in culture, away from what can this technology do for us to how can this technology can work best for residents.
What is it?
An important part of the infrastructure of a smart home, smart sensors can be used to monitor a range of environmental conditions, and can be used in conjunction with other smart home devices like smart thermostats and smart lighting. Commercial smart sensors include Minut Point and Alloy Home.

How does it work?
Smart sensors collect data on environmental conditions like humidity, temperature and also contact, motion and noise. Changes in the environment can be used to prompt responses from other smart devices, such as turning on lighting when motion is detected in a room, or moderating temperature through a smart thermostat.

For the resident
Smart sensors, in conjunction with other devices, automates control over the environment of the home, improving living conditions with reduced input.

For the social housing organisation
As with most sensor data, it is most useful when combined with other legacy data sets such as repairs history, repairs cost, weather, profile of residents in the home. Analytics across these data sets can help housing providers move toward proactive maintenance regimes and understand the effectiveness of any repairs or improvements made to the property.

For example, if lower humidity is recorded after a new ventilation system is installed, this can be used as evidence of the effectiveness of the intervention and the product installed. This allows landlords to confidently identify which other properties could benefit from a similar intervention.
Leak sensors
Leaks cause considerable property damage, at a cost to housing providers and a threat to the health, wellbeing and safety of residents. Smart sensors monitor the presence of excess water in the home, and can be placed in risk areas like bathrooms and kitchens, notifying residents and property managers to enable fast action, limiting the potential damage and costs of repair.

Smart water sensors such as those provided by leakSMART can be linked to a smart valve which shuts off water valves to prevent further damage to the home if a leak is detected. With insurance policies for leaks often having high excess, considerable savings can be made if leaks are prevented from causing damage.

Legionella testing
Social housing organisations must comply with HSE’s Approved Code of Practice L8, which demands that property being rented out must be safe for use. Ensuring the water supply is not at risk of transmitting legionella to residents is a vital part of this compliance, and there are smart technology solutions designed to monitor water safety.

Legionella is a water borne bacteria that can multiply when water is between 20-45 degrees centigrade. It can be a serious health risk especially for those with weakened immune systems. In the commercial rented sector, smart water devices are used to monitor water temperature at key areas in the water system within a building.

Real-time data provided by tools such as Spica’s Devicepoint for Healthy Water system monitors water temperature to reduce the need for regular manual testing for legionella. Remote monitoring saves the cost of sending contractors to site and provides live alerts rather than the annual test.
Smart thermostats

What is it?
An internet connected thermostat that allows the user to control the system remotely and report sensor data such as temperature and humidity. Smart Thermostats designed specifically for the social housing sector include Switchee and Co-Control. Other smart thermostats aimed primarily at consumers include Nest, Hive, Honeywell, Alloy Home and Tado.

How does it work?
Smart thermostats can replace existing thermostats for gas and electric heating.

Most smart thermostats require a wifi connection, but some systems use cellular to connect to the internet. The current consumer models do not offer functionality for landlords to manage multiple properties. Enterprise level smart home automation companies bring the wider connected portfolio together in one view for landlords.

For the resident
Smart thermostats can potentially offer residents around 20% savings on their energy bills by ensuring their homes are only heated when needed.

For the social housing organisation
For full efficiencies, smart thermostats should be introduced alongside other smart sensors (see page 13).

The temperature, humidity and other sensor readings that are reported to the landlord can be used to help understand properties at risk of damage due to damp and mould growth. Data collected can be used to profile a portfolio of properties, to determine where it is most effective to deliver planned maintenance.

Consistent underheating can also alert landlords to identify residents who might be in fuel poverty, so they can target community investment initiatives more effectively.
3 The social smart home

Over the last few years, the UK smart home market has experienced rapid growth: in the 2016 PWC Connected Home Survey, 14% of respondents said they were planning to buy a smart device for their home in the next two years. In 2019, this figure was 30%. By 2022, 6.3 million households in the UK were expected to have some smart home technology, representing one of the highest rates of growth in Europe.

The reality, however, is that people’s access to smart home technology is not equitable. A YouGov survey in 2018 found that just over half of smart home tech users were in the higher income bracket (>£30,000 per annum). Smart home users were also 33% more likely to own their home.

Clearly home ownership provides people with greater flexibility to install a range of smart home technology options. Those in rented accommodation are more limited in the changes they can make to their homes.

Yet, as we have seen, investing in and installing smart home technology helps social housing organisations to maintain their assets more effectively and efficiently. While pilots have tended to focus on the use of data from smart home technology for management purposes, there has been less focus on the empowering effect that smart home technology represents for social housing residents and their communities.

In 2018, the Government published its social housing green paper, A New Deal for Social Housing. In launching the paper, the Prime Minister, Theresa May, stated it would “empower them by giving them greater control over their lives and homes”.

One of the aims of this empowerment was to address deep-rooted stereotyping and stigmatisation of social housing residents. The Green Paper noted how residents felt they were treated like “second class citizens”, “an underclass” and “benefits scroungers”.

Social housing organisations don’t just provide homes to residents. Most perceive their role to stretch beyond this, providing services through community investment and resident engagement to empower residents to build flourishing, independent lives.


11 ibid, chapter 4.
As part of this role, though, shouldn’t residents have the same access to the same technological innovation as those in other forms of housing tenure?

Giving residents access to smart home technology can create a more collaborative relationship between social housing organisations and their residents, empowering both with the tools and data so they can share the responsibility of efficiently managing and maintaining their homes.

Smart home technology can improve the quality of life and give residents more control over their home, from making sure the heating is on when they come home to enabling remote access when they are at work. When homeowners buy smart home technology, they do so in order to improve the quality of their lives and better manage their home environment. This should also be an option for social housing residents.

This principle should be central to the design of the social smart home. Providing data and insights locally should be the first priority. Just as the expected regulation around fire and building safety will require this information to be provided on request to residents, so the smart home is an opportunity to redefine the relationship between social housing organisations and their residents.

The smart home should be an opportunity to enhance a new era of transparency, delivering regulated and unregulated information to residents. Combined with greater clarity around rights and responsibilities residents have for their home, the smart home should play a central role in giving residents greater control over their lives and homes.

Moreover, the use of smart home technology need not just be limited to homes. It can go beyond the individual home, helping to build communities and enhance mutual support networks.

An IoT pilot run by Accenture in partnership with Ymere, a Dutch housing association, installed the Homies alarm and smart home system into social homes in Amsterdam.

Instead of reporting alarms to the landlord, in the first instance notifications were provided directly to a group chat that residents had on WhatsApp. This empowered communities to respond to local incidents while the landlord was kept informed about alarm triggers through aggregated data.
Other platforms like Nextdoor are already building digital networks linked to specific spatial locations. At the time of writing this report, NextDoor has proved to be invaluable as a first point of contact for neighbours to support each other - especially those more vulnerable neighbours - during the Covid-19 crisis.

Smart homes can strengthen already existing networks in many communities, provide new entry points for those who have just moved to the area and facilitate the shift towards a world where offline and online duality doesn’t exist.

They represent a triple win for social housing organisations: for their own business, for their residents and for their communities. They are the smart thing to do.
To discuss the contents of this White Paper, or for other queries about our work in shaping the future of social housing, please contact:

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