



Smartline 

Understanding how digital technology  
can support healthy homes and  
connected communities



*“Smartline research has shown what technology can do to help – and also that technology on its own is not enough”*

## FOREWORD

In the UK, including here in Cornwall, there are persistent and overlapping inequalities in health, housing and digital inclusion. Smartline set out to explore the role that digital technologies could play to support health and wellbeing through improved housing and social connections.

One of the unique features of the project is the collaboration which has seen colleagues from Coastline Housing, Cornwall Council, Volunteer Cornwall, the University of Exeter and residents themselves work together over a period of six years. It has been a real pleasure and hugely valuable to work in partnership like this.

In that time, we have seen a growing awareness of the importance of indoor environments for people's health and well being, particularly mental health, and the challenges of the pandemic on already disadvantaged communities. Smartline research has shown what technology can do to help – and also that technology on its own is not enough. Combined with human intervention it can prevent problems becoming crises, and help target help where it is needed most. We have also explored the barriers to digital inclusion often in households already dealing with considerable challenges.

Over the past six years, alongside our ground-breaking research Smartline has been supporting innovation among Cornwall's business community and local community groups. This report shares some of the highlights of our wide-ranging work.

### **Emma Bland**

Principal Investigator, Smartline, Associate Professor of Practice in Environment, Health and Wellbeing, University of Exeter

## THE SMARTLINE STORY

- ? **How do home environments and community connections affect people's health?**
- ? **Can technology help?**
- ? **How can we address health and housing inequalities, and make sure that everyone is able to benefit from digital technology?**

These were the questions posed by Smartline, a multi-faceted research project.

The project brought together a team of interdisciplinary researchers from the University of Exeter, customer support and maintenance teams at Coastline Housing Association, community development staff at Volunteer Cornwall, housing and health leads at Cornwall Council and innovation leads at South West Academic Health Science Network (SW AHSN).

Smartline's research focused on the Camborne, Pool, Illogan and Redruth area of Cornwall. More than half of the research participants live in some of the most deprived postcodes in the UK. They tended to be older, with more than half aged over 50 years old when the project began in 2017.



### **The people who made it possible**

More than 300 social housing residents agreed to have sensors installed in their homes and answer questions about their health, housing and community. Their participation was critical to the success of the project. Being able to gather real-time data from participants' homes, frequently and at scale was a ground-breaking undertaking and the Smartline team are grateful to everyone who participated.



More detail on Smartline's work including all our research is available on our website

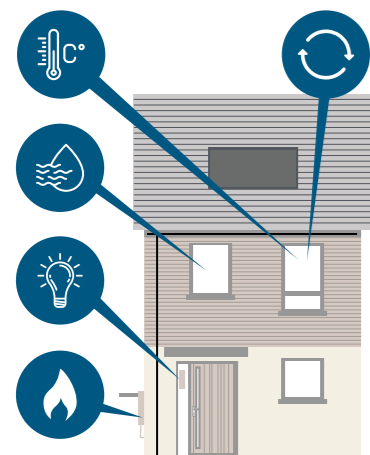
[www.smartline.org.uk](http://www.smartline.org.uk)





*“Evidence shows that exposure to poor housing conditions (including damp, cold, mould, noise) is strongly associated with poor health, both physical and mental. The longer the exposure to poor conditions, including cold, the greater the impact.”*

**The Marmot Review: 10 Years On**  
(Institute of Health Equity, 2020)



## RESEARCH IMPACT

### USING TECHNOLOGY FOR INDOOR MONITORING

#### Why it matters

There is lots of evidence that housing affects people's health. We spend the vast majority of our time indoors. Researchers are starting to understand that indoor air pollution is just as important a health issue as outdoor air pollution. This is increasingly important as homes become more energy efficient and therefore less well ventilated – in our effort to tackle climate change we risk undermining health.

#### What we asked

The Smartline project investigated how digital technology can support healthy homes.

**? Could digital technology help us to understand the indoor environment**

**? Could digital technology help social landlords to support healthy homes**

**? What do social housing residents think about technology in their home**

#### What we did

##### Sensor technology - a window into the home

Sensors installed in Coastline homes collect data on air temperature, relative humidity and air quality (measured by particulate matter, tiny particles in the air, and also total volatile organic compounds, potentially harmful gases in the air). The project also gathered information about electricity use, and in some homes gas and water use.

Over 1,000 sensors in over 300 homes



5 mins Sensors take readings approximately every 5 minutes

0.7 billion data points gathered over 5 years (2017-2022)



Smartline is working with the UK Data Service to make the anonymised data available to other researchers in future. The Smartline dataset is one of the biggest of its kind that we know of. It is real-time, real-life data gathered at frequent intervals over an extended period, in social housing in a low-income community. This makes it a rich and unique resource for future research.

#### What we found

Using data from the sensors, the Smartline research team have:



▶ **Shown that digital technology can provide a window into conditions inside the home.**

The sensors provide reliable data on a range of indicators over a long period of time. This helps organisations such as Housing Associations to understand issues affecting the building fabric and target support for residents.

▶ **Developed a new model to identify the growth of mould in the home.**

Mould spores in the air harm people's health, and this model will help householders and housing associations to predict and prevent it.

▶ **Discovered that common household cleaning products can increase the risk of asthma.**

Smartline is advocating better labelling of these products, advising people to ventilate their homes while using them.

▶ **Highlighted the overlapping issues of fuel poverty, mobility and mental health.**

The team is recommending a more flexible approach to definitions of fuel poverty that take into account people's health, as some people are more susceptible to cold and many fuel-poor households also have very limited mobility. Research exploring the impact of childhood poverty on wellbeing in adulthood is ongoing.

#### Co-designing a dashboard

Researchers at the University of Exeter wanted to explore how intermediaries such as housing associations could use data about the home to support health and wellbeing for residents. The research team worked with Coastline and Smartline participants to co-design a data dashboard. For Coastline, this could help them to manage their housing stock and support customers. For Smartline participants it could help them to manage their home environment.

With traffic light colour-coding, options to view detail of individual homes or a snapshot across every property, and the ability to view over different time periods, the Coastline dashboard allows their team to easily spot anything out of the ordinary – and take action. This might be a call to the customer or investigation at the property to understand what's going on and how to fix it.

While fewer customers have used the dashboard than expected, it has been welcomed by the Coastline team. By picking up issues early they can be much more proactive in the support they provide to customers, and address problems before they become more serious.

This example shows how data can help housing associations and others to support residents at home. The Smartline team are working to share their experience more widely.



*“Our staff really value the insight the dashboard gives. It's better having clear, accurate data that you can see for yourself rather than a simple verbal report or information passed on from colleagues.”*

**Mark England**, Coastline Housing



“People without digital skills are the group already most likely to experience health inequalities... 83% of GPs expressed concern about patients whose access to remote services may be impacted by digital literacy, disability, language, location or internet connection.”

Good Things Foundation, citing GPOnline 2020



## UNDERSTANDING WHY ‘DIGITAL INCLUSION’ IS NOT ALWAYS INCLUSIVE

### Why it matters

The digital revolution has transformed our lives: digital technologies help us to shop around for better deals, get convenient access to goods and services and connect with people at the touch of a button. More and more services are ‘digital by default’. But 10m people in the UK lack the most basic digital skills, and 1 in 3 people who are digitally excluded live in social housing. The covid-19 pandemic meant that online access was more important than ever, to keep in touch with friends and family and to access services.

### What we asked

The Smartline project investigated how digital technology can support connected communities.

- ? What are people’s attitudes towards digital technology, and what barriers prevent people from using it?
- ? How does people’s use of digital technology relate to their health and wellbeing?
- ? How can designers and service providers ensure that customers do not lose out as digital innovation races ahead?

### What we did

Smartline’s work on digital inclusion has drawn on a range of methods and data sources. At the beginning of the project, participating households completed a survey. Through this researchers discovered that 21% of participants did not have an internet connection at home, and 6% did not own a smartphone. Through surveys and focus groups, and evaluation of specific initiatives developed in response to the covid-19 pandemic, Smartline researchers have added to our understanding of how people living in social housing perceive digital technology.



**21%**  
of households don’t have an internet connection at home



**6%**  
Do not own a smartphone

### What we found

Using surveys, focus groups and interviews Smartline researchers have found:

- ▶ **People are broadly positive about new technology but worry about privacy and security.**
- ▶ **Technology on its own is not enough.**

They are particularly positive about using technology for health and wellbeing. They are clear that it should be easy to use and should not replace human contact. Social influence is an important factor, with people seeking help from family and friends.

- ▶ **Technology can support better services.**

As Smartline’s work with Coastline Housing and Cornwall Council has shown, technology can help organisations make better use of their limited resources by targeting support more effectively. Technological innovation needs to be considered throughout the ‘pipeline’ - not focused only on individual end users, but on organisations which can use it to work more effectively.

- ▶ **Technology on its own is not enough.**

Digital inclusion is about more than technical skills and devices – the motivation, confidence and willingness to give it a try and to keep going with it matter too. There is a need and demand for training and support, but it needs to be flexible and tailored to personal circumstances and needs. For example, people dealing with health issues or caring responsibilities may find it harder to take on new challenges and learn new skills.

- ▶ **Personas can be a useful way to design services around user needs.**

Smartline developed eight personas, characters created based on research among the real-life community of Smartline participants. The personas represent broad groups of people and their characteristics. The personas are a practical way of reflecting and representing the characteristics of a large group of people in a manageable way. They help service providers, researchers and project participants to talk about motivations and needs without identifying individuals.



## BUSINESS IMPACT

Smartline has worked with businesses and social organisations (small and medium-sized enterprises, SMEs) across Cornwall and the Isles of Scilly to help them innovate and grow.

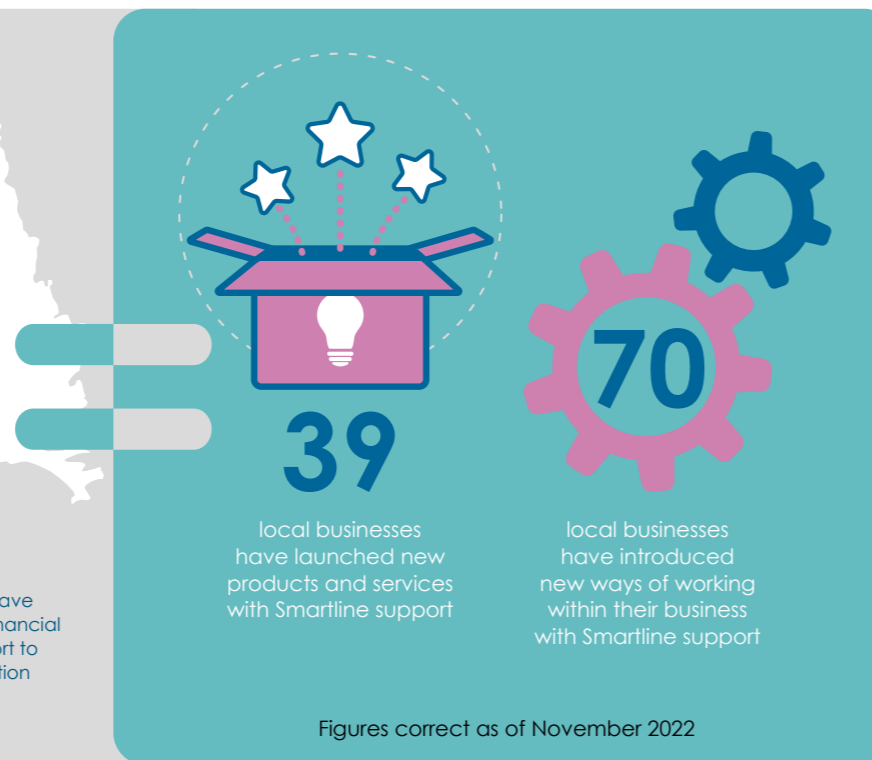
Innovation is risky: it takes time and money to develop new products, success is not guaranteed and failure can be expensive. For a small business this can be a real challenge.

Working with Smartline has given local SMEs the space to innovate, by offering expertise and giving them the confidence to invest in research and

development (R&D). Smartline has helped to de-risk innovation for small businesses by providing funding and research support. This has helped many of them to develop and launch new products, access further funding or reach new markets.

From using facial recognition technology in healthcare settings to testing out alternative heating systems, developing sleep consultancy to support for new fathers, they all share an interest in the power of digital technologies to improve health and wellbeing.

### Supporting Cornish business innovation to improve people's health & wellbeing



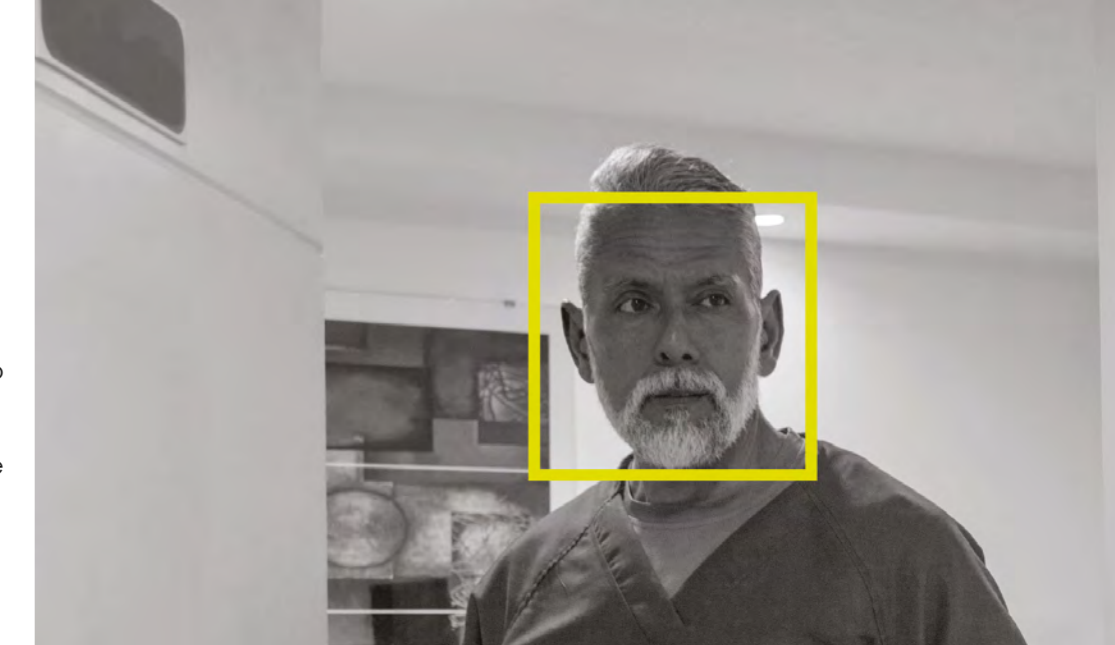
## Business case studies

### Hunrosa:

**The challenge:** Hunrosa provides sleep consultancy for people with health conditions. They needed help to develop their digital evaluation capabilities.

**The support:** Smartline provided Hunrosa with wearable devices (the sleep equivalent of a smartwatch) to track sleep patterns and gain accurate data. With Smartline support, they also partnered with We Are With You to develop a 'train the trainer' offer for people supporting individuals with mental health or addiction issues.

**The outcome:** Hunrosa successfully applied to the AHSN Health Equity and Innovation Challenge. The funding will help them to build on their training model and refine their evaluation methods.



### Touchbyte: developing new facial recognition applications

**The challenge:** Touchbyte is a Cornish IT business developing facial recognition (FR) applications. The team at Touchbyte were keen to explore the potential to adapt their FR applications for new markets. They wanted to see whether their new SecureCall product, which integrates facial recognition into virtual meeting software such as MS Teams, could help to make confidential GP appointments more secure.

**The support:** Smartline and the South West Academic Health Science Network (AHSN) worked with Touchbyte to identify key stakeholders and explore the acceptability and usability of SecureCall for patients.

**The outcome:** Touchbyte has adapted SecureCall for the care and construction sectors, and continues to develop the potential in the health, hospitality, education and prison sectors.

*“With no understanding of the health system, we would have spent days, years establishing what we achieved via the In Residence”*

**Jeremy Sneller,**  
Managing Director, TouchByte





### CN4C digital health pilot:

**The challenge:** Cornwall Neighbourhoods for Change (CN4C) is a local charity working with the NHS to provide digital hubs, physical spaces and greater access to digital health care for people without connectivity, devices or the confidence or skills.

**The support:** Smartline helped CN4C trial Tickertest, an online health app aimed at supporting people who are not accessing NHS Health Checks through their GP. Smartline researchers ran two online focus groups to explore the acceptability, feasibility and factors which would influence the use of CN4C's proposed Digital Health Hub and the Tickertest app.

**The outcome:** CN4C are now providing integrated hubs along with digital hubs, which have been shaped by the feedback from the focus groups. This move aligns CN4C with the NHS aim of improving population health, which will be a core focus of the new Integrated Care Systems.

*Smartline - Understanding how digital technology can support healthy homes and connected communities*

*“From the outset, we wanted to ensure that communities were supported to create projects that were important to them. A key part of Smartline for me has been ensuring that our communities lead on every initiative. This has helped to ensure that there was real ownership of the work that was undertaken, and has enabled us to create future-proof community groups that will continue as a legacy of Smartline”*

**Karen Spooner**, Volunteer Cornwall



## COMMUNITY IMPACT

Volunteer Cornwall used the 'guided conversation' tool to have detailed conversations with residents about their health and wellbeing and develop actions to help improve wellbeing. The guided conversation tool developed by Smartline offers a digital or paper-based toolkit to guide a supportive and inclusive conversation with someone about their wellbeing needs and interests.

Some common themes emerged from those conversations: residents said they wanted more activities that bring people together and help people feel they belong. Others wanted to improve their physical health.

In response, Volunteer Cornwall supported community members to set up and run various groups and projects including coffee mornings, improving green spaces in the community, exercise classes and community internet cafes.

## Community case studies

### St Euny Internet Café:

**The challenge:** In response to the covid-19 lockdown, St Euny church wanted to install internet connection and encourage parishioners to access church services online. They also wanted to set up an internet support café to help the local community with basic IT needs.

**The support:** Smartline worked with Switch Community Ltd to recruit and train volunteers. Volunteers were taught how to use various devices, internet safety, device management and teaching skills. The Church was supported to access funding to establish an internet connection and to purchase laptops and equipment for the internet café.

**The outcome:** Sessions at the community café deal with whatever people need help with. Volunteers feel confident to manage tasks such as setting up new devices, helping with internet safety and security, setting up and using email accounts, setting up online banking or shopping, and helping with file storage and general computer maintenance.

### Penlee Project:

**The challenge:** A group of community members were keen to showcase how the Penlee Project had made a positive impact on their lives. They wanted to do this through the medium of film.

**The support:** With support from Ruth Purdy of MITBER, young and older generations worked together to learn digital skills around film-making and interviewing and created films to show how the Penlee Project benefits their health and wellbeing.

**The outcome:** The Penlee Project now has several films to showcase the fantastic work they do to both funders and local community alike. Residents involved in the film-making now have transferable skills to take forward.



### Greenspace Project:

**The challenge:** A local community in Camborne reported that they were unhappy with a decaying green space close to where they lived. They had wanted to create a vibrant community garden for many years, but had come across many barriers and did not know where to start.

**The support:** Smartline helped volunteers to set up a formal committee and engaged community members in IT support sessions to become more confident in online bid writing. Bid for funding to support development of the space, advertise what they were doing and engage the local community in it, and project manage the work.

**The outcome:** The committee was successful in its funding bid. The space has been transformed, and is now completely run and coordinated by the local community.



## FUTURE DIRECTIONS

Smartline is shaping future research.

▶ **Exploring the role sensor technology can play in helping people with health conditions to stay independent at home:**

Many of the Smartline partners will be working together again, alongside a local GP, Age UK and the Health and Environment Public Engagement (HEPE) Group to explore the role sensor technology can play in helping people with health conditions to stay independent at home. This work is being funded by Engineering and Physical Sciences Research Council (EPSRC) and the National Institute for Health Research (NIHR).

▶ **Using sensors to understand the effectiveness of measures in the home:**

The University of Exeter and Coastline Housing are working together to research the effectiveness of radon mitigation measures. Radon is a natural source of radiation which can lead to cancer if present in high levels, and is a particular issue in Cornwall because of its unique geology.

▶ **Helping the fight against climate change:**

Sensors could also help the fight against climate change, by providing data on the effectiveness of energy efficiency measures and tailoring solutions to individual households.

▶ **Continuing to build our understanding of indoor air quality:**

Cornwall Council is currently testing remote sensor technology to understand their level of accuracy and see if outdoor air pollution affects indoor air quality. Data analysis conducted by University of Exeter researchers will help Cornwall Council's Air Quality Team further understand this relationship. The Council's air quality team are also assessing the impact of air purifiers on indoor air quality.

Project partners are taking the lessons of Smartline forward in their own work

**'It will feed into our work on climate and health'**

*"There is increasing recognition of the links between health, housing and climate. We are also thinking how to manage climate impacts on people's homes, particularly for those households who don't have the resources to make adaptations themselves or who are potentially more vulnerable. Smartline has shown we can do that research in a real-life environment."*

**Emma Bland,**  
Associate Professor of Practice in Environment, Health and Wellbeing, University of Exeter

**'It's given us insight into the connection between different issues'**

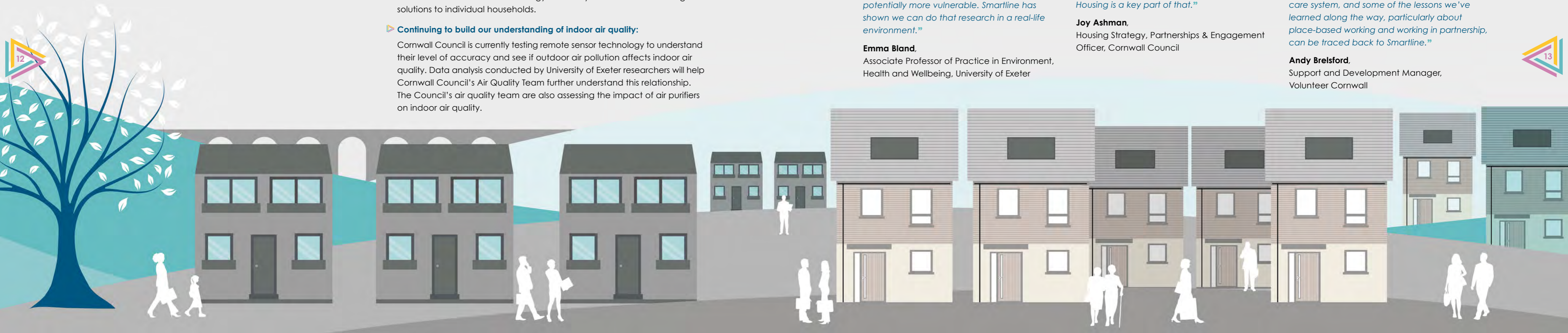
*"Smartline has highlighted our community issues and also how these overlap with those nationally. Having the Smartline data provides us with valuable information that we can use to explore what the Council can do to continue to promote health and wellbeing in Cornwall. Housing is a key part of that."*

**Joy Ashman,**  
Housing Strategy, Partnerships & Engagement Officer, Cornwall Council

**'It's given us confidence to show the public sector what we can do'**

*"Smartline has given us insights and wisdom, as well as confidence, to do things that we wouldn't have done – or would not have done the same way – if we hadn't been involved. Some of the conversations we are having now around the voluntary sector's engagement in the health and care system, and some of the lessons we've learned along the way, particularly about place-based working and working in partnership, can be traced back to Smartline."*

**Andy Brelsford,**  
Support and Development Manager, Volunteer Cornwall



Project partners are taking the lessons of Smartline forward in their own work



**'It's fostered partnerships and collaborations to further public health priorities'**

*"The project has furthered a range of public health areas including better understanding of fuel poverty, air pollution and how local communities use technology in the home.*

*Smartline has provided rich data and information across Cornwall, which has been used to inform our approaches to improve the health and wellbeing of local people, as well as support our training programme. It has been a privilege to work with the Smartline team and to jointly progress the health and housing agenda both locally and nationally."*

**Dr Richard Sharpe,**  
Consultant in Public Health, Cornwall Council



**'It's shaped our thinking about how we support customers'**

*"Technology reshapes thinking about homes, customers' choices, our approach to interventions and can also provide assurance where the indoor environment is being kept at suitable levels. It reinforces the need to intervene as quickly as possible when things are going wrong and helps target resources when they are most needed.*

*With the breadth and volume of new technology emerging and available it is becoming an essential rather than a nice to have. I would go as far as saying that if you are a landlord and have no technology in your homes, you probably know less than half of the real situation of your customers – and this is not a good position to be in."*

**Mark England,**  
Head of Innovation, Maintenance and Group Procurement, Coastline Housing



**'It's helped us develop our early stage innovator support'**

*"Early stage support from Smartline has helped businesses to get investment-ready. We really notice the difference in terms of their value proposition and product development, and that's prompted us to develop what we offer innovators at earlier stages of their journey."*

**Rosie Graham,**  
Programme Manager, South West Academic Health Science Network







[www.smartline.org.uk](http://www.smartline.org.uk)

The Smartline Project (05R16P00305) has received £3,740,920 and the Smartline Extension Project (05R18P02819) is receiving up to £3,307,703 of funding from the England European Regional Development Fund as part of the European Structural and Investment Funds Growth Programme 2014-2020, with additional funding of £25k from the Southwest Academic Health Science Network and £200k from Cornwall Council.

For more information on our funding please see the Smartline website - [www.smartline.org.uk/about](http://www.smartline.org.uk/about).

