

Executive Summary

If Homes Could Talk...

Connected Homes in Social Housing: From Pilot Paralysis to Predictive Practice

An examination of the
barriers to the large-scale
deployment of sensors
in UK social housing

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For The Disruptive
Innovators Network

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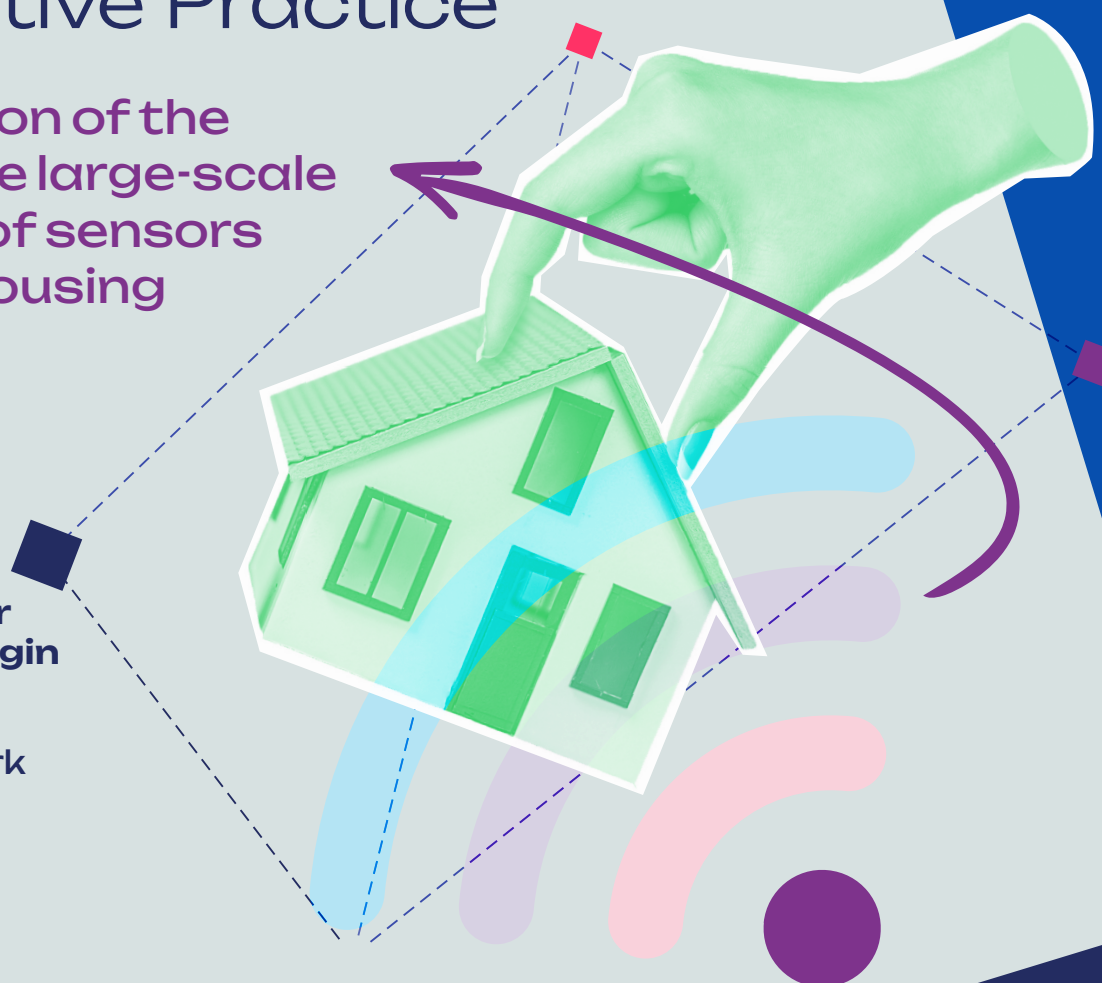
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Foreword

At Amazon Web Services (AWS), we believe technology can fundamentally improve how social housing services are delivered.

When we partnered with the Disruptive Innovators Network (DIN) on this research project, our shared goal was to understand how connected homes technology could best deliver impact and achieve widespread adoption in UK social housing.

This comprehensive study by Matthew Gardiner and Dr Philippe Demougin reveals that while the technical foundations for transformation exist, the real challenges lie deeper - in organisational readiness, procurement approaches, resident trust, and the cultural shift required to move from reactive to predictive service models.

Their findings show that scaling connected homes isn't simply a technology challenge, but a systems problem that requires careful consideration of people, processes, and technology working in harmony.

The vision presented here – of homes that can communicate their needs before problems escalate, of residents who are true partners in service delivery, and of housing providers equipped to act on real-time insights – aligns perfectly with AWS's commitment to improving lives through technology.

But as the research makes clear, realising this vision requires more than just installing sensors. It demands a fundamental rethinking of how housing services are delivered and managed.

As the sector faces mounting pressures around building safety, decarbonisation, and service improvement, the insights and recommendations in this report couldn't be more timely.

This research provides a practical roadmap for housing providers ready to embrace the transformative potential of connected homes technology, and we're proud to have supported its development.

Kris Burtwistle, Head of Local Government and NPO, AWS.



Overview

This research set out to understand how Internet of Things (IoT) technologies are being adopted across UK social housing, and why they haven't yet scaled.

Through our work, we found a sector alive with potential, but stretched, fragmented, and searching for a way through.

The core ingredients for transformation are increasingly present, thanks to the persistence and innovation of many landlords. But they remain misaligned, fragmented, or under leveraged. Residents are, for the most part, excluded or an after-thought, and the market created with and by suppliers is under-developed and as yet, immature.

Scaling connected homes is much bigger than just a technology issue. It is a systems problem and needs to be addressed on this basis.

The sector's ability to solve this system challenge will determine whether connected homes fulfil their early promise, or risk repeating the pattern of innovations that showed potential but stalled before reaching scale.



Key Insights

Drawing on a literature review, a sector maturity assessment, in-depth interviews, resident workshops, supplier input and practical design work, there are a number of clear common threads:

- Many organisations remain in extended pilot mode. Without clear exit strategies, triage models or integration plans, sensors produce data but do not follow through into action.
- Strategic aims vary. Some landlords see IoT as a compliance fix, others as a retrofit tool, a few as a complete service model rethink. This fragmentation undermines coordination and procurement.
- Data is disconnected. Alerts float in dashboards that no one owns. Workforces aren't equipped - or incentivised - to act early.
- Residents are not engaged. Tenants will accept tech, but only when benefits are tangible and control is respected. Poor messaging and unclear value can kill projects. Trust is fragile.
- The supplier market is fragmented. Closed systems and inconsistent standards limit interoperability. Procurement rarely rewards openness or service impact.
- Culture is the real blocker. Predictive models require new skills, mindsets and performance frameworks. Most housing services are still built around failure response, not failure prevention.



Our conclusions go way beyond a call for more devices to be deployed. We call as well for greater alignment; integrating technology into strategy, infrastructure, ethics and delivery.

The Barriers

Our research found ten important barriers to the deployment at scale of connected homes technologies.

- 1. A lack of organisational readiness.** Even the most well-intentioned and successful pilots fail to progress to scale when wider systems, governance and culture are unprepared. Without internal alignment, ownership and capacity to act, connected home technologies risk becoming expensive white elephants; useful in theory, but marginal in practice.
- 2. Fragmented procurement and short-term commissioning.** Innovation is blocked by rigid frameworks, low-trust relationships and transactional logic. Disconnected, transactional procurement models restrict the landlord's ability to build long-term partnerships, learn from pilots, or commission for whole-life outcomes, blocking the sector from realising the full benefits of connected homes.
- 3. Insufficient resident trust and conditional consent.** Without consent, participation drops and so do the benefits. Trust must be earned, not assumed. Where trust is low, residents are less likely to consent, less likely to participate and more likely to reject or disable the technology, eroding the viability of connected home services at scale.
- 4. Data infrastructure is fragmented and immature.** Disconnected systems mean that even good data goes unused or under-leveraged. Without integrated systems and automated processes, connected devices generate noise instead of insight and landlords miss the opportunity to act early, act fairly, or act at all.
- 5. Skills gaps across the organisation.** The workforce is under prepared for data-led services, limiting impact and increasing risk. Without confident, capable staff across the organisation, smart devices risk becoming isolated artefacts, generating data no one can act on, explain, or trust.



The Barriers

- 6. Unclear ownership and accountability.** No single team owns the outcomes, so devices become 'someone else's problem'. Without clear ownership, smart devices become inert; capable of seeing problems, but powerless to resolve them.
- 7. Limited strategic alignment.** IoT remains peripheral, rarely linked to core business objectives or performance metrics. Without integration into strategy, smart technologies remain peripheral experiments, lacking the sponsorship, resources and relevance needed to drive lasting change.
- 8. Digital exclusion and connectivity barriers.** Devices fail in practice when tenants lack internet access or digital literacy. When asked about trust, multiple respondents linked their concerns to digital unfamiliarity - wanting more support, simpler information - or the ability to opt out.
- 9. Weak post-installation pathways.** Sensors are installed, but action is slow, unclear or absent, eroding tenant confidence. Without robust post-installation processes, connected technologies become performative, seen but not felt, heard but not believed.
- 10. Cultural resistance and organisational inertia.** Established norms, workflows and mindsets resist the operational shift that IoT requires. Without cultural readiness, smart technologies may be installed, but they will not be embedded, trusted, or acted upon at the scale required to realise their value.



Roadmap: How to Get the Barriers Out of Your Way

Those are the barriers we found. But none of them is immovable. We found organisations that were addressing some of them, but there were none with a clear plan to address them all. Here's our list of things that will start to dismantle them. They act to reinforce each other - do them all and it will be powerful.

- **Get ready by doing**

You'll never be 100% aligned before you act. Start small but start properly. Pick one estate, assign real accountability and make it business-as-usual from day one.

- **Change the procurement playbook**

Forget frameworks designed for lightbulbs. Write your own rules. Commission for impact, not hardware. Demand integration, transparency and long-term collaboration - or don't buy.

- **Partner with residents**

Consent is not a formality. It's a relationship. Show residents the benefit, give them control and act on what they tell you. If they opt out, listen. If they opt in, deliver.

- **Stitch the data together or drown in it**

You don't need a perfect platform. You need a working one. Connect the systems you have. Automate one process. Prove it works. Then scale sideways.

- **Train for tomorrow, not yesterday**

Firefighting is over. Teach your people to prevent problems, not just respond to them. Start with your frontline. If they're baffled by the dashboard, it's not a smart home, because there is no action.

- **Make ownership unmistakable**

Every device needs a named owner. Every alert a first responder. If nobody's responsible for action, the tech is just decoration.

- **Embed IoT into your strategy or forget it**

No more bolt-ons. Make connected homes part of your risk register, your budget, your compliance plan. If it's not in the corporate plan, it's not happening.

- **Design for the real world, not the wi-fi ideal**

Digital exclusion is real. So is patchy broadband. Make your model work for the hardest-to-reach, or it's not a model.

- **Fix what follows the install**

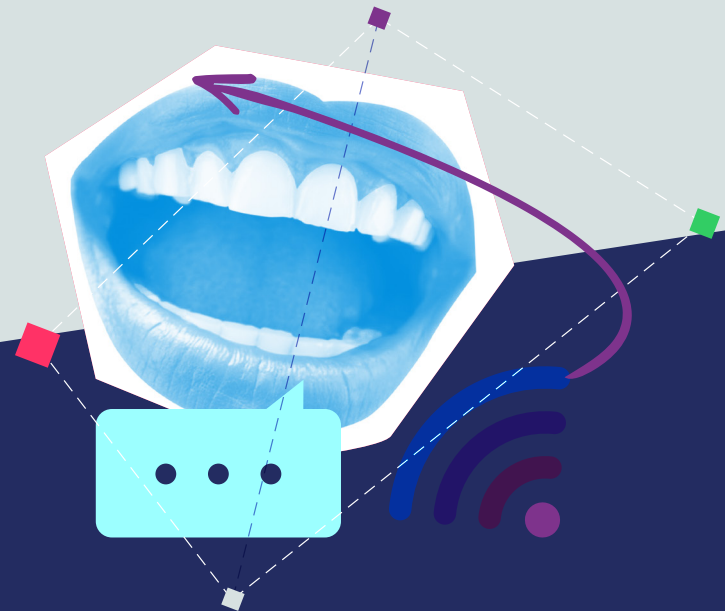
The sensor is only the start. If the data goes nowhere, the resident loses trust. Build fast, clear, responsive action pathways - or don't roll out.

- **Break the culture before it breaks the tech**

You can't install your way out of a 1990s mindset. Make prevention your north star. Align your incentives. Redesign your defaults. The culture shift isn't optional; it's the operating system upgrade.

Building on What's Working: The Call to Action

Our recommendations are directed variously at landlords, suppliers, sector bodies and regulators. They are deliberately clear. Some will challenge prevailing assumptions, but they are rooted in what we heard across the sector. All are drawn directly from the evidence.



They call on the sector to:

- Stop piloting without purpose. Demand scaling strategies, integration routes and business-as-usual pathways.
- Redesign services around prediction. If data doesn't trigger action, don't collect it.
- End supplier lock-in. Open APIs and modular stacks should be a procurement baseline.
- Position tenants as partners, not just recipients. Co-design isn't a courtesy; it's a condition of trust.
- Build sector-wide infrastructure. Without shared APIs and data models, every landlord reinvents the wheel.
- Change what is measured. Reward prevention. Fund collaboration. Regulate in real time.

The recommendations are not a blueprint. They are both a provocation and a path forward.

Connected homes can deliver healthier, safer and more responsive housing. But only if we stop treating them as pilots and start treating them as infrastructure.

The sector has tested, trialled and absorbed lessons. Now is the time to turn that insight into predictive practice – at scale, with confidence and with residents at the centre.

Summary Recommendations

This report recognises the quiet experiments, the hard-won learnings and the determined pilots already underway.

But across the country, even the best efforts are struggling to break through the structural and cultural barriers to scale.

The recommendations that follow are designed not as a critique of effort, but as a shared blueprint for doing more, faster and together.

Each part of the main report contains a longer list of our recommendations written in the language of applied research. Here, we summarise those recommendations down to 30 and present them in a punchy style across eight key domains.

1 Strategic leadership

- 1. Mandate a connected home strategy, or don't bother.** No strategy, no sensors. If IoT isn't in your core business plan, you're not serious. This isn't digital garnish: it's the future of compliance, service delivery and asset management.
- 2. Own it from the top.** Without leadership buy-in, cross-team alignment and a delivery roadmap, connected homes will fail. Give executive accountability for delivering outcomes and driving value.
- 3. Fund it like you mean it.** Stop scrabbling for pilot money every year. If you can't sustain capability over the long term, don't start.
- 4. Build the rules of the game.** Don't wait for someone else to solve interoperability, data standards or supplier chaos. Get in the room and shape them - or be shaped.

2 Skills training and workforce readiness

- 5. Train for data.** Few colleagues are digitally dextrous. Fewer still understand AI.
- 6. Retrain for prediction.** Most staff members are trained to react. Invest in skills that spot problems before they escalate.
- 7. Reward prevention, not firefighting.** Current KPIs value crisis response. Flip the model. Reward teams that stop problems before they start.
- 8. Shift staff from fear to fluency.** Your people aren't resisting because they're lazy; they're scared and unconvinced. Training must tackle culture, not just competence.
- 9. Bake skills into new ways of working.** If your workflows don't change, your training hasn't worked. Connect learning directly to job redesign.
- 10. Stop hoarding lessons learned.** Every pilot, success or failure, is gold dust. Capture it. Share it. Use it to fuel the next stage, not bury it in a post-project report.

Summary Recommendations

3 Resident engagement

- 11. Give residents a seat at the design table.** They're not just data sources; they're co-owners of the system. Involve them from day one or expect distrust on day 100.
- 12. No consent? No sensor.** Stop hiding behind implied consent. If tenants don't opt in, don't install. Build trust or don't deploy.
- 13. Speak human, not jargon.** No more 'digital engagement pathways.' Say what's happening, why, and how it will actually help. And then do it.
- 14. Let residents judge success.** Forget device counts. Measure what tenants care about - safety, savings, service quality - and let their voices shape the metrics.

4 Operating model and accountability

- 15. If it's not in the operating model, it's not real.** Sensors without action = noise. Embed data into daily workflows or don't roll out at all.
- 16. Collapse the silos, rewire the org.** IoT isn't an add-on. Redesign your operating model so that data, decisions and services flow together - not through five departments and a PDF.
- 17. No more digital dead ends.** Don't just push alerts to inboxes. Live dashboards are useless if nobody's watching them. Build workflows that trigger real-world action, not emails and monthly reports.
- 18. Assign accountability for impact.** Who owns the outcome? Who fixes what's broken? If you can't answer that for each system you install, you're not ready to scale.

5 Project management and governance

- 19. Run smart homes like a transformation, not a project.** Treat deployment like the system-wide change it is. That means structured planning, governance, resourcing and ruthless follow-through.
- 20. Govern for the long haul.** No more 'quick wins' with no support after go-live. Back your programme with board-level oversight, lifecycle planning and clear KPIs.
- 21. Track the whole system, not just the pilot.** One estate doing well proves nothing. Judge success at system scale and redesign what fails the test.
- 22. Build programme capability like you build IT.** Delivery can't be outsourced to enthusiasm. Train and structure a team that can plan, adapt and sustain the change.



Summary Recommendations

6 Data architecture and use

23. Make interoperability non-negotiable.

If a supplier can't work with others, they don't belong. Open APIs and modular design are the baseline, not the aspiration.

24. Architect for visibility, not just data.

Data must move across compliance, repairs, energy, and tenancy. If it only lives on a dashboard, it's not intelligence; it's wallpaper.

25. Let residents see and use their data.

This isn't surveillance. It's shared insight. Give people real access to what their home is saying - and what you're doing about it.

7 Procurement

26. Ban black box suppliers. No open API, no contract. Demand raw data access, standards compliance and full integration support

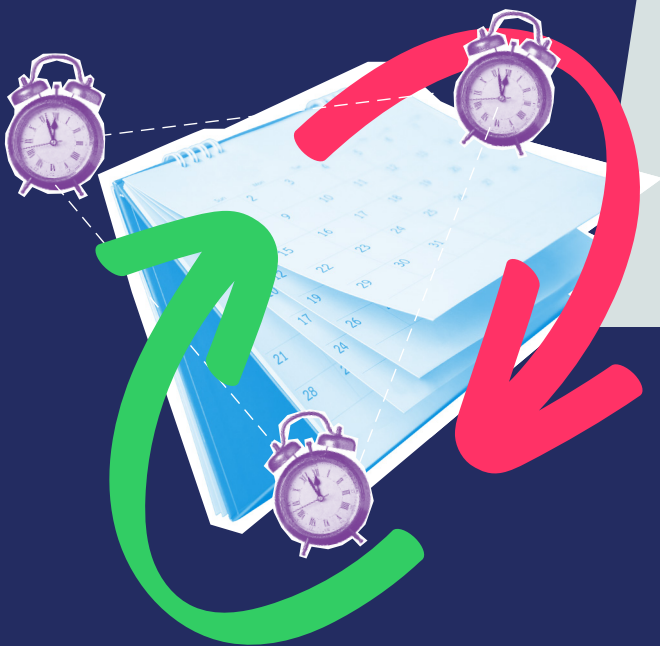
27. Break up the stack. Avoid lock-in. Only buy modular, interoperable systems. Demand substitutability at every layer. Align procurement with business outcomes, not just price and process.

28. Enforce standards. Make suppliers play by your rules. Insist on open systems, resident controls and delivery against outcomes; not empty installations.

29. Cut the lowest-price addiction. You're buying future infrastructure, not buying widgets. Evaluate total value, not just capital cost.

8 Policy and regulation

30. Require an IoT clause in Decent Homes 2. Once-a-year checks on property condition are not good enough. The next DHS must require digital capability and include continuous compliance, not episodic inspection, as baseline expectation.



Future Vision

This summary ends with a predictive piece, describing the scenario for property management in the future from the perspective of a notional resident and a notional asset director in a progressive landlord. It represents the type of shift in operational practice that is within the sector's grasp.



Future Vision (2035)

1 A day in the life of a resident

Amanda Wright, Tenant, Veridia Homes

It's 2035 and I wake up to the same walls I've lived in since 2012, but the experience of living here is completely different.

It's not just that the air feels warmer without blasting the heating, or that the window doesn't gather condensation the way it used to. It's the feeling that my home is looking after me now. That it knows when something's off, and someone will do something about it before I even notice.

I don't mean that in a creepy way. I was sceptical at first. We all were. When they talked about sensors back in the 2020s, it sounded like surveillance. Big Brother with a clip board. But that's not how it turned out. The tech got better. The people got smarter. And somewhere along the line, we stopped being tested on and started being listened to.

How It Used to Be (2025)

Back then, we had damp. Mould. Freezing bedrooms and boilers that cut out just when you needed them. You had to wait weeks for a repair and half the time the problem came back. You were expected to prove things: take photos, make calls, explain yourself again and again. You always felt like you were being judged, like the problem was you.

They installed some sensors during a pilot project. No one explained why. They didn't show us what the data meant or what it was for. When nothing happened, we unplugged them. Some of us threw them away.

I remember saying at a tenant meeting: "I'll trust the system when the system trusts me back."

Future Vision

How It Works Now

My home talks. Not out loud, thankfully, but through its data. It knows the air quality, humidity, temperature, energy flow, even movement inside the walls. Last winter, a spike in indoor CO2 triggered a gentle nudge on my phone: "We're noticing low airflow. Would you like us to check your vents or suggest a change?" I tapped yes. Two days later, the maintenance team upgraded the extractors. I didn't have to argue. I didn't have to beg.

If something shifts under the floor, they know before I do. If there's a leak or an electrical fault or a pattern that suggests something's wrong with the heating system, I get a call or a message asking if I'm okay with a visit. And I am. Because it feels like help, not inspection.

I can see my home's health dashboard. It's part of my resident app, next to the rent balance and community bulletin board. It doesn't bombard me with numbers, just shows me if everything's green, amber, or red. I don't check it every day, but knowing it's there gives me peace of mind.

What Really Changed

We got involved. Not just as case studies or panels, but as partners. Tenants helped design the messaging, the app, the system rules. We told them what felt intrusive and they listened. They removed the sensors that didn't feel right. They gave us data access. They made it optional and more people opted in because it felt like ours, not theirs.

They started rewarding prevention. My neighbour across the hall, who used to get blamed for condensation, now gets support to adjust his heating habits. Not lectures. Not letters. Real support.

Repairs teams don't turn up and shrug anymore. They turn up with insight. They know what's happening behind the walls. They fix the root problem.

How It Feels

**Safe. Respected.
Predictable. Like I matter.
Not just to my housing
officer, but to the whole
system.**

**I still have issues.
Everyone does. But they
don't fester. They don't
turn into battles. My
home doesn't surprise
me with failure. It
catches problems
early and helps us
prevent them together.**

**That's the real
change. It's not just
smarter housing.
It's more human.**

Future Vision

Future Vision (2035)

2 A day in the life of an asset director

Sarah Malik, Director of Homes and Assets, Veridia Housing

It's 2035 and I start my day with a coffee, but also with the estate's breath.

The digital twin of our 4,200-home community was once a planning model, but now it's a diagnostic tool and it loads onto my screen.

Overnight, everything has been quiet, but I notice that the sensor suite has identified an unusual spike in airborne ammonia across five flats in a 1970s terrace. It's not that it's urgent, just an early-stage indicator that would have gone unnoticed a decade ago. Now they're routine inputs into our morning dashboard.

This is what asset management has become; not just tracking decay but sensing the health of the environment our homes provide for tenants.

The Sensor Suite: A nervous system for housing

Every home on the estate carries some part of the sensing web. We rolled it out in phases, starting with high-risk buildings and vulnerable households, eventually reaching near-universal coverage. The suite is modular, tiered, and largely invisible. Residents barely know it's there. But for us, it's like the estate's nervous system.

We can detect a lot more things now than when we started – and we know that new sensors will keep adding to the knowledge we have about our buildings.

Air quality is where the change has been most dramatic. We can detect noxious gasses to a level more precise than anything we had before: we track levels of CO₂, nitrogen dioxide, formaldehyde, and mould precursors at parts-per-trillion resolution. Data is anonymised at the unit level but flagged when cumulative exposure threatens health or breaches policy thresholds.

Automatically, we trigger tiered responses: airflow adjustments via smart vents, suggestions to residents about what they can do to improve the situation, remote checks by building services, and, if needed, a housing officer visit to co-design improvements with the tenant.

There's no longer any guessing. We know when a home is healthy and when it isn't.

Automation, Trust and Human Hands

Much of our work now begins without us. The system automates what used to take weeks of triage.

- When sensors detect excessive movement in a slab or balcony, the structural engineer receives a 3D stress map pre-rendered by the twin. A repair sequence is proposed, costed and checked against budgets and compliance thresholds.
- When energy flow monitors identify unusually high thermal loss in a flat, a retrofit recommendation is queued automatically and prioritised by vulnerability, EPC rating and fuel poverty risk.
- When signs of infestation are picked up (yes, we can now automatically detect the minuscule movements of rats behind walls), our pest control partners are notified before a complaint ever arises.

As asset director, I no longer chase work orders or firefight breakdowns. The system does that.

My job is to curate the estate's future, using data not just to fix the past, but to imagine what's next.



Living with the Digital Twin

We call her Ayla, the digital twin of our estate. She's not sentient, of course, but she's responsive.

At any time, I can walk through her. Every flat, every roofline, every riser and meter cupboard. But more than a map, she holds time: snapshots of pressure, movement, temperature, gas levels, power flow.

She can simulate the impact of upgrades before we commit, test emergency plans across every floor, and visualise how heat moves through brick, glass, and air.



Today, Ayla shows me a worrying pattern. There's a strip of homes across three streets - different build years, but same orientation - where internal humidity stays above 70% for 11 hours a day.

This isn't just a ventilation problem. It's cultural, behavioural, possibly even policy-related. I make a note to bring it to our cross-team insight group. The sensors and their data shows the what. Understanding the why still needs people.

My Role:

From Controller to Curator

It's hard to explain how much this job has changed. Asset management used to be physical: inspections, inventories, replacements, repairs. Now, it's interpretive. The systems handle condition. I handle meaning.



I've had to become skilled at:

- Pattern recognition: seeing beyond the dashboard to spot strategic risk.
- Cross-disciplinary fluency: talking as easily with physicists as with housing officers.
- Ethical framing: ensuring data doesn't become surveillance. We've drawn hard lines. No biometric monitoring, no individual behaviour tracking without consent.
- Scenario planning: using Ayla to model not just interventions, but futures.

More than anything, I've become a systems thinker.

Not in the abstract.

In the bricks, the wires, the people.

What We've Gained

The payoff has been profound.

- Complaints down 45%. Because we fix before fault.
- Unplanned maintenance down 60%. Because we know when systems are tired.
- Resident wellbeing up. Because the air is cleaner, the warmth more stable, the silence more consistent.
- Staff morale up. Because our teams do meaningful work, not endless firefighting.

We've even shifted language. We don't talk about 'stock' anymore. We talk about homes with awareness. Homes that tell us when they're under strain. Homes that adapt.



Where We're Going Next

Later today I'm presenting to our board. I'll show them a new scenario Ayla has rendered: what happens if we add new ultra-precise moisture sensors to our timber-frame stock. Could we reduce long-term maintenance costs by 20%? Could we intervene in rot cycles before they start?

We'll debate it.

We'll cost it.

But I already know what we'll decide. Because when your homes can whisper to you in real time, when the walls, the air, the electricity are no longer silent, you stop managing assets.

You start listening to them and the people who live there.

