

# Blog

## The Asset Management Network

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### The digitally built environment: Digital twins

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Digital twins for buildings using Building Information Modelling (BIM) are becoming standard across new construction projects.

Still in its infancy for social housing providers across both new construction and legacy homes, digital twins promise a greater overview of the lifecycle of homes and their parts, as well as the ability to stress test future scenarios at minimal cost.

The possibilities that this technology opens up could be sector changing. In the future, networks of digital twins across multiple sectors have the potential to shape better neighbourhoods through whole system thinking.

In its ongoing digital transformation, the UK has been readily adopting emerging technologies. Since 2011, most government departments that hold estates have utilised BIM and from 2016 it was [mandated](#) across all central government departments.

It has been predicted that using digital twins could result in a [10%](#) improvement in effectiveness for large industrial applications. The aim of digital twins is to harness data across the built environment to help assets perform better over their lifecycles, assisting on the path to carbon zero and linking departments within organisations, ultimately supporting leaders in their decision making with broader insights and the ability to test future scenarios.

### What is a digital twin?

A digital twin is a realistic and reactive digital representation of the physical environment. It differs from a 2D or 3D digital model due to its real time digital simulation of the physical asset. In order to unlock insights, the digital replica must be built with an appropriate level of detail. This is reliant on three factors:

- High-quality data, that
- has high fidelity to the physical asset, and
- whose visualisations encourage better decision making.

## Real-world application

In the housing sector, the Grenfell tragedy and the subsequent [Hackitt Report](#) has made the case for digital twins. The new [Building Safety Regulator](#) will soon require building owners to incorporate a digital product documentation that can prove a construction's safety. This not only applies to new builds but could also be applied to legacy assets to reduce risk, predict repairs and enhance future lifecycle planning.

The concept of digital twins is not new; digital twins of high value projects like aeroplanes and spacecraft have been around for some time. In 2018, one application introduced BIM and augmented reality (AR) for machinery repairs at [Boeing](#). During education and training, technicians conducting repairs wore headsets that exposed the wiring within the machinery and imposed live instructions during the exercise. The results were phenomenal – a 90% improvement in first time repairs when compared to those using 2D models and a 30% reduction in the time spent completing a job.

## Ensuring safety

For housing providers, a digital twin can be used to build predictive maintenance rather than reactive repairs, automatically flagging when the batteries on smoke alarms are due to expire, or a boiler has reached the end of its life. Before a repair is undertaken, a new option for replacement could be tested within the digital twin to analyse its suitability, whole lifecycle and potential cost. Once decided, the technician conducting the repairs could work faster assisted by AR, greatly reducing overall time and cost.

## Engaging residents

Beyond efficiencies, digital twin technology has the potential to transform community consultations. Imagine the possibilities of a walkthrough with residents of a proposed new structure from the viewpoint of the digital twin. The technology not only enables new designs to be interrogated from the perspective of other stakeholders but, crucially, means change can be implemented at minimal or no cost to explore the possibilities available to protect the existing residents.

These may seem like futuristic options for housing providers, but changes in this arena are coming now. [Assessing the whole lifecycle](#) of new constructions is now mandatory for projects in London.

## The National Digital Twin Project

At Cambridge University, the [Centre for Digital Built Britain](#) (CDBB) is proposing a far-reaching [National Digital Twin \(NDT\) Programme](#), which utilises data from across municipal and private services such as roads, housing, energy, water and public transport.

The ambitious long-term project will aim to securely harness an ecosystem of digital twins across the UK to unlock value by enabling more accessible and interdisciplinary collaboration within strategy related to the built environment.

Those who plan and manage the built environment, such as housing associations and [local authorities](#), need evidenced assurance that their decisions will not negatively impact residents now and in the future. The ability to assess current information and apply future scenarios to that data in order to assess the consequences of proposed changes could have a profound impact on how our neighbourhoods are developed.

Already in the UK, projects are well underway. [Northumbrian Water](#) have built a digital twin of their entire infrastructure; the aim is to improve their services and gain insight around how to best respond to the increased risks of flooding.

If local authorities and housing associations across the UK were NDT participants, shared data could reveal which of their stock was at potential risk and kickstart preventative works to save homes and reduce the massive costs associated with flood damage.

As such, housing providers are one of the many groups being suggested to embrace the National Digital Twin Programme vision. In order to build a level of interoperability amongst a wide variety of sectors and organisations, the CDBB have developed the '[Gemini Principles](#)' for organisations to integrate into the building and implementation of their own digital twins. These principles drive the notion that all digital twins must have clear purpose, be trustworthy and must function effectively.

For housing providers, the digital foundations being laid now will have wide-ranging and positive ramifications on easing pressures on service delivery, and improving customer experiences by constructing the right housing in the right places in a sustainable and affordable way. The responsibility will be gaining and retaining the trust of those whose data is being used, by sharing the visions of how it can be put to good use in the future.