

digital twin solutions
Twinnedit

**Digital Twins is not
the Destination**

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Many organisations responsible for places already possess a great deal of information. They have drawings, surveys, certificates, maintenance records, sensor feeds, compliance documents and the practical knowledge of people who keep buildings and networks working. The difficulty is not always the absence of data. It is that the evidence is often scattered, uneven in quality, hard to trust at speed, and separated from the real-world place it

is supposed to describe. A Digital Twin matters because it offers a different discipline for understanding: one that ties information back to the asset, the system or the place itself, and does so in a way that supports judgement rather than replacing it. The most useful conclusion is also the simplest. Digital Twin technology is not the destination. Trusted understanding is. [1]

Places are harder to understand than they look

Senior leaders responsible for estates, housing, campuses, hospitals, stations or civic assets rarely struggle because a place is physically invisible. They struggle because the place is only partially visible through its records. One file describes design intent, another captures construction changes, another sits in a facilities management platform, another is held by a contractor, and a great deal still lives in people's heads. The result is a familiar problem: when decisions matter, organisations spend too much time proving what is true before they can decide what to do. NIST described this as a long-standing industry weakness, noting substantial cost spent by operations and maintenance teams simply verifying whether documentation matched existing conditions and converting it into useful formats. [2]

That problem has become more serious, not less, as expectations of safety, resilience, operational performance and transparency have risen. In England's higher-risk buildings regime, the "golden thread" is now a legal expectation: a digital record of the information needed to understand the building, manage safety and comply with duties. The guidance is explicit that the information must be kept digitally, be available when needed, be understandable, and serve as a building's "single source of truth." A safety case report, in turn, must set out the building safety risks and how they are being managed. The implication is clear. For important places, fragmented records are no longer merely inconvenient. They are a governance problem. [3]

This is why the subject matters far beyond technology teams. A chief executive, estates director or accountable person is not really asking for more software. They are asking whether the organisation can explain, with confidence, what it is responsible for, what condition it is in, what risks are present, what has changed, and what should happen next. In practical terms, that is the beginning of assurance. [4]

The old model manages documents rather than reality

Traditional information management in the built environment is usually document-led and milestone-led. Information is issued at design stages, construction stages, handover stages and maintenance intervals. That can be perfectly adequate for some tasks, but it often produces a static picture of something that is constantly changing. ISO 19650, the international standard for information management using Building Information Modelling, treats the matter differently. It frames information management as a lifecycle process spanning delivery and operation, and it expects organisations to establish a Common Data Environment, or CDE, which is a managed environment for collecting, managing and disseminating information. It also distinguishes operational information that creates long-term value for the owner or operator through an Asset Information Model, or AIM. [5]

Many organisations discover that the gap between those two worlds is not caused by a shortage of systems, but by poor connection between them.

That distinction is important because many estates still behave as though handover is the finish line. Yet operational life is where most cost, risk and consequence sit. UK BIM Framework guidance is explicit that the appointing party may require asset information for maintenance purposes so it can feed facilities management systems, and Government Soft Landings guidance argues that a strategic approach to maintenance and operational information supports decision-making throughout design and construction while reducing time, cost and operational risk, including health and safety risk. In other words, the value of information lies less in its production than in its continued usefulness once people are living, working, studying, travelling or receiving care in the place concerned. [6]

NHSScotland's guidance on a "digital estate" makes the point neatly. It describes the digital estate as a portfolio-wide collection of asset information, including three-dimensional models, computer-aided design files and digitised paper records, linked across databases so that metadata, structure and common naming conventions make information searchable and understandable. The significance lies in those plain words: searchable, retrievable, understandable. That is organisational knowledge made durable. [7]

The opposite is just as revealing. British Land's experience at 100 Liverpool Street is a commercial property illustration of the same issue. With more than 9,000 smart assets in one building, it found that inconsistent naming across systems made it difficult even to identify and locate devices reliably enough to build the twin. The lesson is not that the building lacked technology. It is that technology without disciplined information management leaves organisations with digital clutter rather than better understanding. [8]



Trust turns data into assurance

NIST makes the same point in more technical language, noting that trust considerations for digital twins include environment, accuracy, functional equivalence, testability and the propagation of errors between connected twins. In a critical setting, a twin that looks persuasive but is wrong, stale or poorly governed is worse than no twin at all. [14]

This is why Digital Twins matter for trusted understanding rather than mere visualisation. The government's official definition requires a Digital Twin to mimic its real-world counterpart to a known and unbiased level of tolerance, within a specified validation envelope and assumption set. That language may sound formal, but the practical meaning is straightforward. Leaders need to know not only what the model says, but how far they can rely on it, for which kind of decision, and under what conditions. Without that discipline, the output is interesting. With it, the output becomes evidence. [15]

The link to Building Assurance follows naturally from there. "Building Assurance" is not a single statutory term in the way that "golden thread" or "safety case report" are, but in practice it means being able to demonstrate that the building is understood well enough for risks to be identified,

A place is not better understood just because more data has been collected about it. The decisive issue is trust. The Gemini Principles place trust alongside purpose and function, and define that trust in terms of security, openness and quality.

managed and explained. GOV.UK guidance states that the purpose of the golden thread is to have the right information to understand the building and the steps needed to keep people safe. Building Assessment Certificates then demonstrate that legal duties relating to fire spread and structural failure have been met at that point in time. A Digital Twin can support this by connecting the evidence needed for understanding, but it does not remove the duty to interpret, challenge and act on that evidence. [16]

This is where the idea of organisational knowledge becomes more important than data volume. When an organisation can see the relationship between design intent, actual condition, maintenance history, change logs, contractor records, occupancy patterns and sensor readings, it is no longer relying on disconnected fragments. It is building a memory of the place. That memory survives changes in staff, contracts and software platforms because it is structured, traceable and tied to the asset. In the context of higher-risk buildings, guidance for accountable persons is explicit that they must allocate roles to collect, store and manage relevant information and produce the safety case report. The organisation, not the tool, carries the duty. [17]

The evidence from real estates and networks

The strongest argument for Digital Twins is not theoretical. It is what organisations are already trying to achieve when they are serious about understanding places better. In healthcare, NHSScotland's BIM guidance describes a "digital estate" as a mirror of physical assets containing data and information, intended to support future investment and better decision-

making. Its Digital Twin Navigator then frames digital twinning as a lifecycle approach, encouraging boards to consider digital processes at every stage of a built asset's life. In a sector where buildings affect clinical risk, energy use, staff productivity and patient experience all at once, that lifecycle discipline is a practical necessity rather than a novelty. [18]

Education offers a similar lesson.

At the University of Cambridge's West Cambridge Digital Twin Facility, the twins of three buildings and the surrounding campus environment were designed to provide useful information to the Estates Division, which manages a large and varied portfolio. The project brought together data from asset management, building management and space management

systems, along with sensors measuring energy, occupancy, air quality, traffic and footfall. Its stated purpose was not spectacle. It was better asset management decision-making, improved safety and efficiency, and better value. Just as tellingly, the researchers treated transparency, security and timeliness as design challenges in their own right. [19]

In housing, the pressure is often more immediate because building safety duties and resident confidence are so closely intertwined.

Stevenage Borough Council's housing asset management strategy states that it is exploring BIM to provide a digital twin of high-risk assets so information can be tracked and managed through the whole asset lifecycle, from design to disposal. The strategy links this directly to the golden thread and to a move away from a narrower development handover process

toward a more comprehensive digital process designed to improve accuracy and efficiency. For senior housing leaders, that is the crux of the matter: a twin is useful not because it is impressive, but because it reduces uncertainty around the homes for which they are answerable. [20]

Local government is beginning to use the same thinking at city scale.

Bradford's "Virtual Bradford" case study is especially revealing because it emphasises openness and maintainability. The council's challenge was to create an open-source digital twin of the city that could be maintained by the council and others, without vendor lock-in. That is more than a

procurement preference. It reflects a deeper truth that understanding places is a long-term institutional responsibility. If the knowledge architecture cannot be maintained, the understanding will decay with it. [21]

Transport and infrastructure show what happens when understanding has to cross organisational boundaries.

The Department for Transport's economic benefits work on an integrated network management digital twin concluded that a connected ecosystem of transport twins could facilitate whole-system decision-making across organisational and sectoral boundaries. Even within the limited set of use cases it quantified, it estimated significant present-value benefits over a ten-year appraisal period, with the largest value associated with

planned works and maintenance management. National Highways says it integrates data feeds, digital design tools and digital twins to support safer, more efficient and greener outcomes. Network Rail's current buildings and architecture policy similarly describes digital twins, the Internet of Things and BIM as potentially giving rail more cost-effective and carbon-efficient ways to design, build, operate and maintain assets. [22]

HS2's published vision is valuable for another reason.

It states plainly that the HS2 Digital Twin will not replicate or replace the many systems already in use. Instead, it is intended to provide cross-business data integrity and integrate insights across the business, improving data quality while holding requirements, designs, as-built and as-operated

information together in one dynamic model. That is a concise description of the real strategic value: not replacing every existing system, but making them intelligible in relation to one another and to the physical railway they describe. [23]

Commercial property, finally, reminds us that the basics still matter.

The British Land example shows that even in highly instrumented buildings, inconsistent naming across systems can undermine the effort to create a useful twin. Digital maturity here begins with disciplined naming,

classification, metadata and governance. A Digital Twin is not an escape from information management. It is what happens when information management becomes operationally serious. [8]

The point is better judgement

The most important misunderstanding about Digital Twins is the idea that they are meant to replace experienced judgement. The evidence points the other way. Government guidance says a Digital Twin can inform the control system of its real-world counterpart, but the physical system must continue to function safely without a continuous connection to the twin.



HSE guidance for higher-risk buildings says those responsible are not expected to be expert in everything, but they must have sufficient working knowledge to make informed decisions, ask intelligent questions, know when to bring in expert help and coordinate action on the basis of that advice.

Those are profoundly human responsibilities. [24] That is why the phrase “Digital Twin” can sometimes mislead. It tempts people to think first about the digital artefact rather than the quality of understanding it enables.

The better question is simpler

Can it explain what is true, what is uncertain, what has changed, what the risks are and what options are available?

Does the organisation now understand its place more clearly than before?

Can it connect safety, performance, cost, carbon, service and user experience without reducing them to disconnected spreadsheets or incompatible systems?

If it can, then the technology is doing its job. If it cannot, the presence of a twin in name will make little difference. [25]

So the conclusion is not that every organisation needs a grand, all-encompassing Digital Twin programme. It is that every organisation responsible for places needs a stronger way of turning information into trusted understanding. For some, that will begin with better BIM discipline, clearer information requirements and a more reliable Common Data Environment. For others, it will begin with a golden thread for higher-risk buildings, an asset information model for operations, or a more coherent link between sensors, maintenance records and compliance evidence.

The mature end point is not more dashboards. It is better decisions, better assurance and better outcomes for the people who depend on those places every day. [26]

In that sense, Digital Twin technology should be judged by a modest but demanding standard. It should replace uncertainty with understanding. It should connect information that is currently isolated. It should preserve organisational knowledge that would otherwise leak away. It should help responsible people see more clearly and act more confidently. And it should always strengthen judgement rather than attempt to supersede it. That is why Digital Twins matter. And that is why they are not the destination. [27]

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