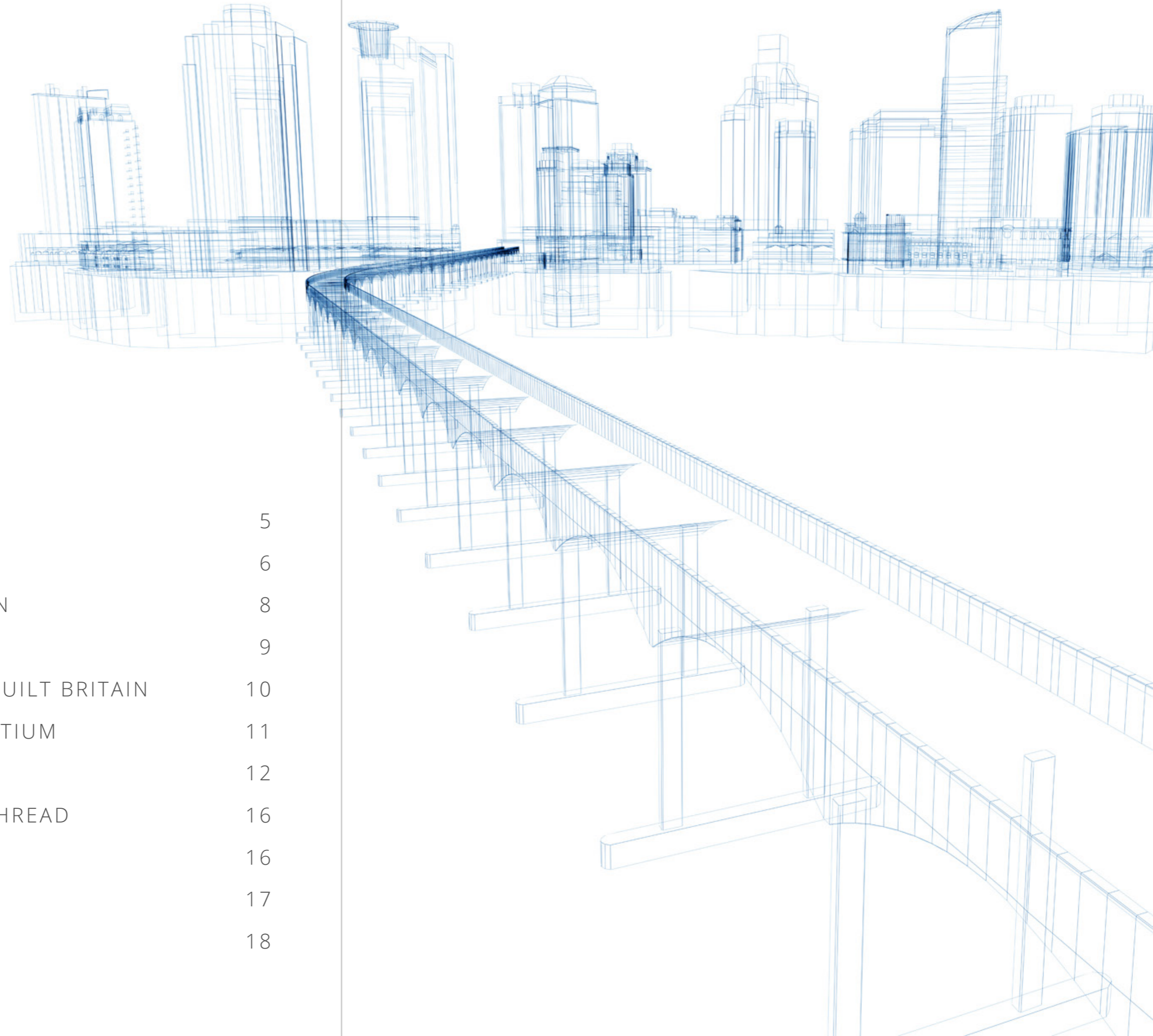


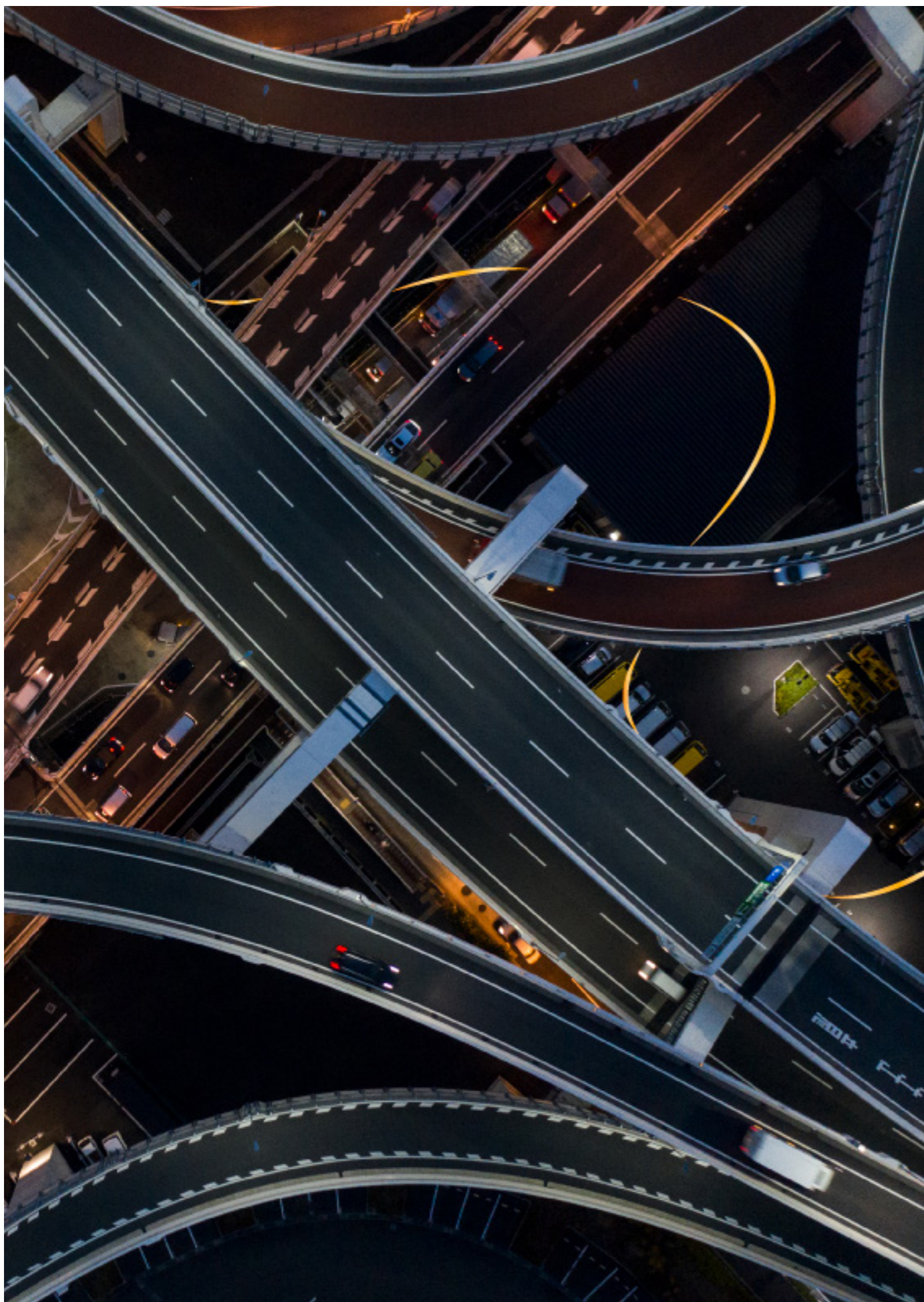
DIGITAL TWINS

WEAVING THE GOLDEN THREAD



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INTRODUCTION

Bridges create connections, providing access to disparate peoples, communities, resources, and ideas. This single innovation – as mundane as it may now seem – has allowed us to build diverse, extended networks and has transformed our interactions.

In this same way, digital twins are the bridge between the physical and the virtual world. The rise of Industry 4.0, which focuses on interconnectivity, automation, machine learning, and real-time data, is revolutionizing how we interact with technology, machines, and the world around us.

Using massive, cumulative, real-time, real-world data, digital twins provide an evolving digital profile of the historical and current behavior of a physical object or process.¹ In simple terms, they monitor and model how people and objects interact with their environments.¹

A combination of physical assets and digital technologies – including sensors, the Internet of Things (IoT),

and cloud computing – come together to “talk” to one another, allowing us to predict outcomes in the operation of a physical asset across its lifecycle and in varying simulated conditions.

This essential bi-directional flow of information provides businesses with an unprecedented view into how their products are performing, helping to identify potential faults, troubleshoot from afar, and ultimately improve customer satisfaction.²

This report examines the foundations required to build and implement a valuable digital twin, focusing on the idea of the golden thread of information and discussing the requirements necessary for its maintenance.

THE GOLDEN THREAD

Digital twins are set to usher in a new, exciting, and almost prescient digital era. However, the question stands: how do businesses position themselves to actually derive value from a digital twin?

The answer, here, lies in how we collect, manage, and deploy our data and digital information – without which, digital twins are useless. The “golden thread” is a concept that came out of the Hackitt Report, which was published in 2018 in the aftermath of the Grenfell disaster and has been a catalyst for discussions surrounding how we manage essential project information.

While the golden thread of information is used in construction to refer to an accurate and up-to-date record of the data needed to maintain and operate an asset, this definition is still useful when discussing digital twins in general.

A digital twin relies on sensor data from its physical counterpart and includes a combination of metadata (e.g. classification, composition, and structure), condition or state (e.g. location and temperature), event data (e.g. time series), and analytics (e.g. algorithms and rules).³

To enhance insights, improve performance, and optimize decision-making, a digital twin needs lots of rich, diverse, and reliable asset-

related data. Moreover, depending on the problem they are trying to solve, businesses must understand what data sets are required and decide how to make those data sets available to ensure that it actually delivers a new and valuable capability.⁴

The golden thread introduces formal processes to maintain digital information, assure accuracy, and ensure accessibility and security. In a nutshell, it should act as a live repository linking all asset data.

Figuring out how to achieve this golden thread of information is imperative for businesses looking to derive value from their data and is a foundational step in the deployment of a digital twin. This process involves gradually expanding the information at our disposal and using more and more data to understand how digital twins relate to the specific business needs and add value in those areas.⁵

FACILITATING THE GOLDEN THREAD

Simply put, organizations and wider industries alike need to adapt their current processes to make room for collaboration and interoperability. We need physical assets, solutions, and software to be able to “talk” to each other and have these conversations logged in order to create the necessary golden thread of information.



The “golden thread” is a concept that came out of the Hackitt Report – published in 2018 in the aftermath of Grenfell disaster – and has been a catalyst for discussions surrounding how we manage essential project information.



OVERCOMING DATA FRAGMENTATION

Digital twins work best when there is a seamless flow of data from the beginning of the project throughout its lifecycle and beyond. However, fragmentation and the lack of robust and secure methods of data exchange have resulted in poorly utilized data. This includes insufficient knowledge transfer from project-to-project, which means insights are routinely lost and deployed solutions are not optimized.

Speaking about the construction industry at Asite's panel at the Festival of BIM and Digital Construction, Jennifer Schooling, Director of the Centre for Smart Infrastructure and Construction at the Centre for Design Built Britain, emphasized this point, explaining that, "due to the nature of our segmented supply chains, we only consider data within our own organizational structure, rather than data of the lifecycle of an asset."

This fragmentation, seen across industries, results in siloed

engagement with data and prevents us from reaping the full benefits from the data we are collecting. For digital twins to excel, industries need to establish new forms of collaboration and introduce measures that encourage collaborative behaviors, including new procurement and contracting practices.

As discussed in a **previous Asite report**, a global digital framework could facilitate this.

The creation of a global digital framework that can establish how data is used, maintain, and shared would allow us to set global open interoperability standards and extract actionable insights from data that can then be used across organizations.

Ultimately, the ability to freely share and interpret data and insights will create an accurate record of a project, providing the optimal conditions for digital twins to thrive.

EMBRACING OPENNESS

To maximize the potential of this framework, which seeks to facilitate meaningful data exchange, industries also need an open environment where collaboration and sharing these data-driven insights is the norm. Creating a system to encourage data exchange is meaningless without an environment in which it can succeed.

As digital twin technology brings together a variety of stakeholders, industries would benefit from an interconnected ecosystem built around an open platform in which data flows freely.

This open platform, supported by open data schemes and ontologies that ensure standardization, would enable applications to interact and get data from each other securely, allowing the ecosystem to send, receive, capture, store, share, and collaborate.

Ultimately, all data related to a project would live here.

Embracing the openness required for a global digital framework would allow for a golden thread of information to be implemented and a digital twin to be successfully maintained.



CASE STUDY: CENTRE FOR DIGITAL BUILT BRITAIN

Leading in the field of Digital Twins is the United Kingdom's Centre for Digital Built Britain (CDBB).

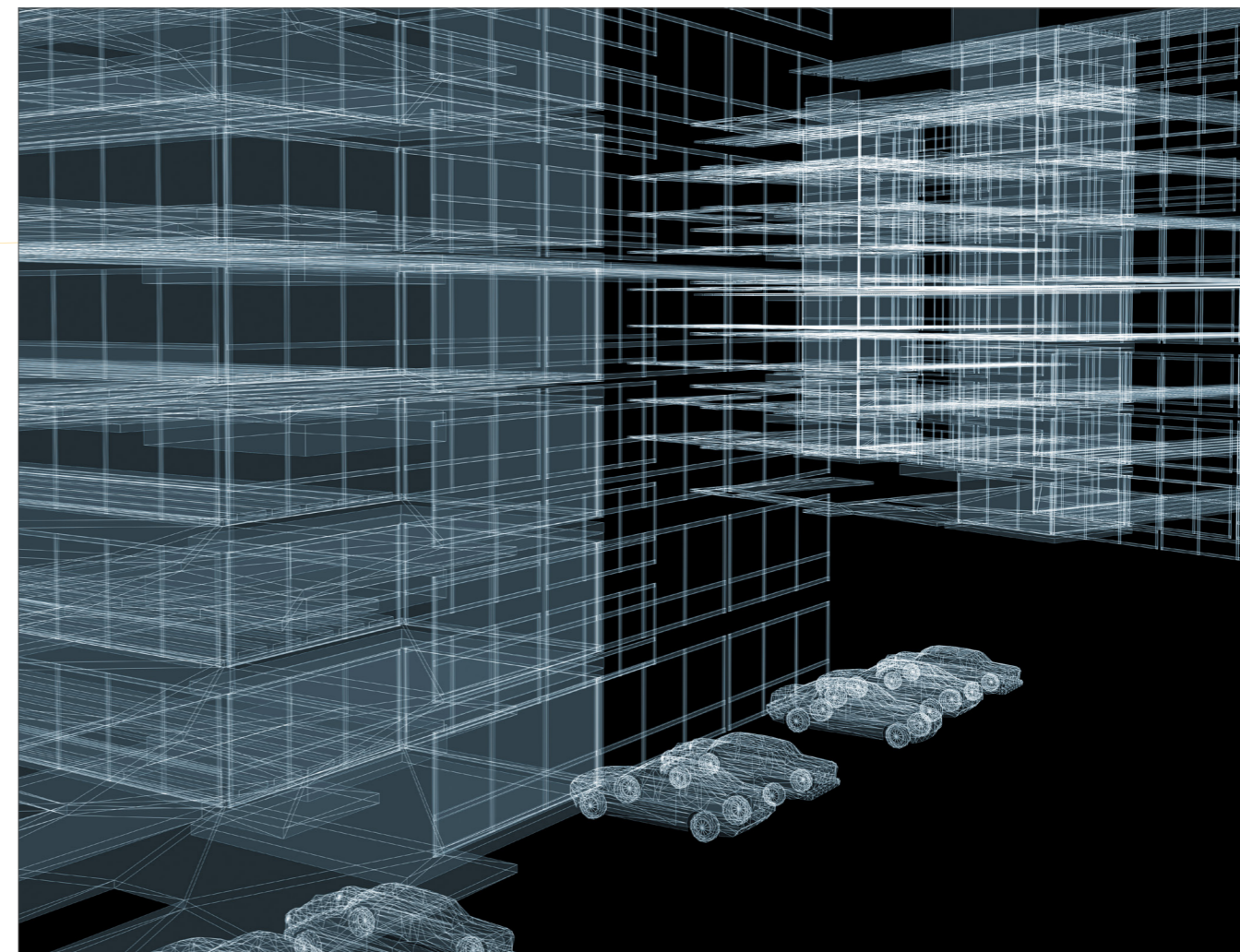
Focusing on the built environment, the Centre recognizes the benefits digital twins can have on society.

Through their National Digital Twin (NDT) program, they are "creating an ecosystem of connected digital twins — a national digital twin" which "opens the opportunity to release even greater value, using data for the public good."

This NDT will provide a digital model of a nation's infrastructure network

made up of a federation of connected digital twin models across sectors, including transport, energy, water, and telecommunications. Ultimately, it will offer better outcomes for society, the economy, business, and the environment.

By setting up a framework to establish a foundation to support effective information management and enable secure and resilient interoperability of data (i.e. data that can be readily exchanged and utilized by different systems), the insights generated by their digital twin will be used to make decisions in the real world.



CASE STUDY: DIGITAL TWIN CONSORTIUM

Digital Twin Consortium is another leading force in the world of digital twins.

Open to any business, organization, or entity with an interest in digital twins, Digital Twin Consortium is a collaborative global ecosystem of technologists who define the standards requirements, architectures, and open-source code and identify gaps in these areas.

The Consortium aims to be 'The Authority' in digital twin technology as it relates to policy, security, interoperability, and overall development of digital twins,

accelerating the market and guiding outcomes for users.

The expert-led community comprises of industry, academic, and government entities, who, through open knowledge sharing, are driving the adoption of digital twins and advancing research and development in the space.

Digital Twin Consortium is a program established by the Object Management Group® (OMG®) – an international industry standards association for a range of technologies.

DIGITAL TWINS IN THE REAL WORLD

Digital twins place us in an extraordinary position to anticipate problems, simulate scenarios, and make decisions with unprecedented foresight. For this reason, scientists are even looking to build a digital twin of the Earth to fight climate change.⁶

As demonstrated, the use cases for digital twin technology are extensive and the opportunity to enhance digital processes cut across sectors.

The increasing accessibility and affordability of cloud computing, IoT

technologies, and advanced analytics have opened up the possibility of predictive maintenance, virtual prototyping, process planning and optimization to more organizations.⁷

According to a Gartner survey of companies from various industries across six countries, 75% have already implemented or plan to implement a digital twin within a year.⁸

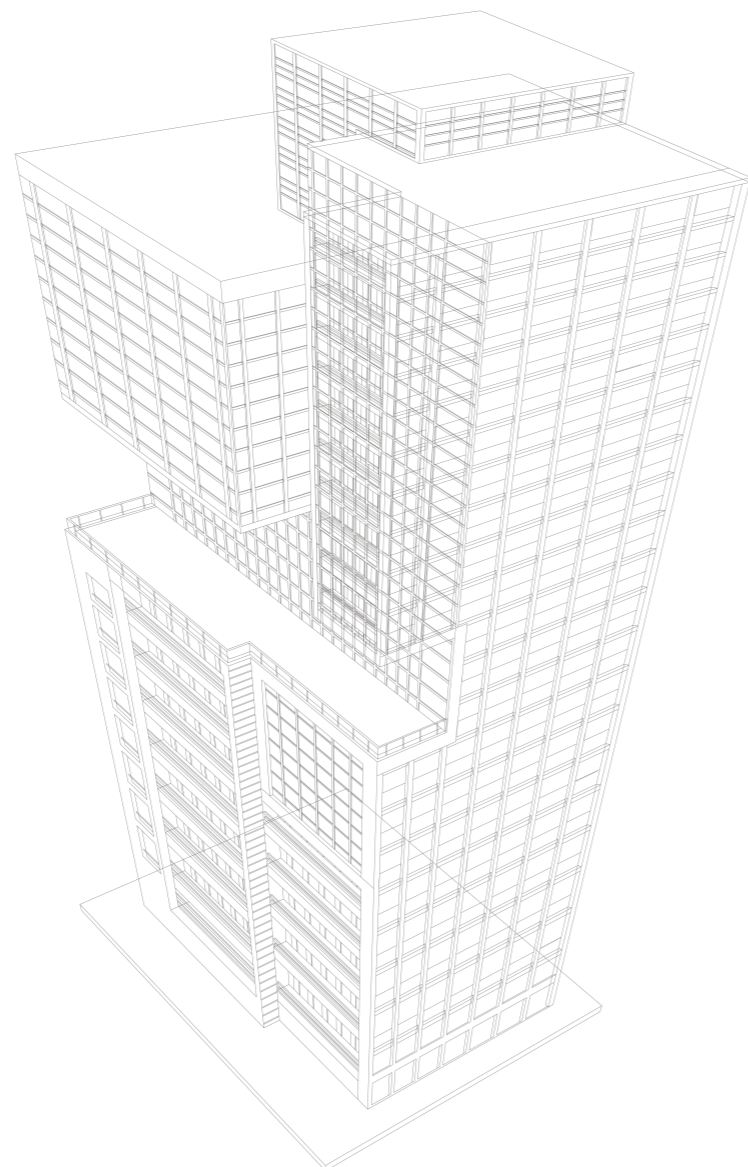


SCIENTISTS ARE LOOKING TO BUILD A DIGITAL TWIN OF THE EARTH TO FIGHT CLIMATE CHANGE



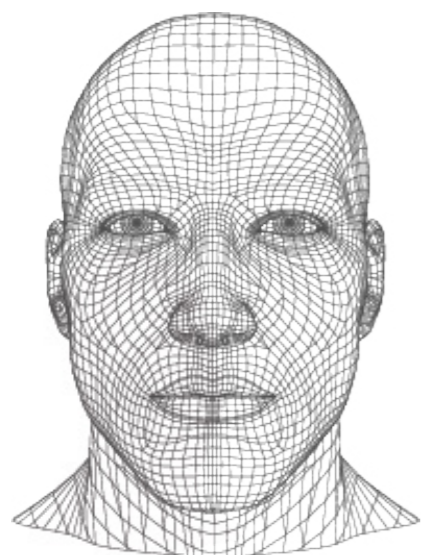
HOUSING

The quest for true transparency and accountability in the building sector and conversations around the implementation of the Golden Thread in the wake of the Grenfell tragedy has unsurprisingly reinvigorated the push for digital twins in the housing sector – in particular, social housing. Many argue that using rich data and visualization techniques would help us make smarter and more sustainable decisions for our communities to deliver better quality homes with improved whole lifecycles.⁹



CITIES

Cities have become early adopters of digital twin technology, with city planners using virtual models to gain a competitive edge. A federation of connected digital twin models across sectors – including transport, energy, water, and telecommunications – stand to improve construction progress, energy consumption, environmental conditions, public safety, waste management, security monitoring, mobility improvements, and infrastructure management.

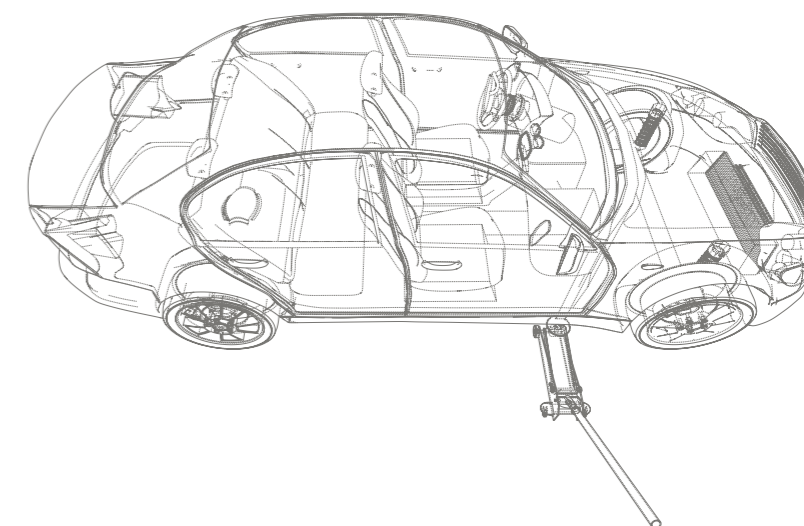


RETAIL

Digital twin implementation can even play a key role in augmenting the retail customer experience through customer modeling and simulations. Retailers can create digital twins of customer personas to enhance services and improve their product offering. Digital twins also optimize security implementation and support better in-store planning and energy management.¹⁰

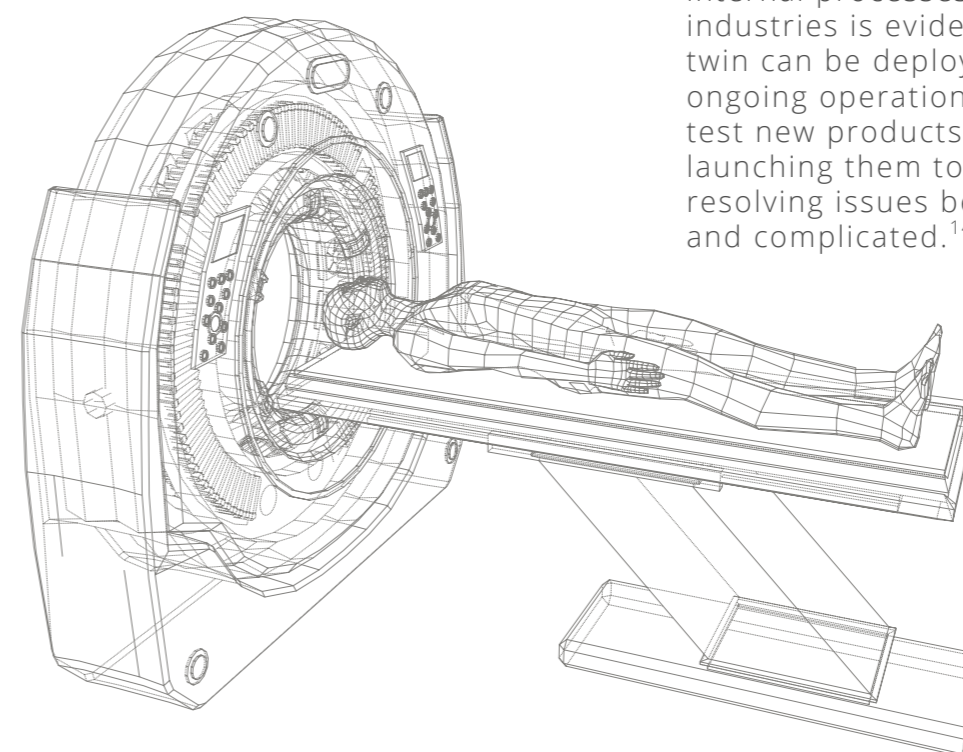
MANUFACTURING

Many contend that the manufacturing sector holds the most compelling promise in this space, with digital twins set to impact the way products are designed, manufactured, and maintained. Replicating what is taking place in real time, digital twins provide essential data on an item's design and use and the system that built it – all while reducing throughput times.¹¹



LOGISTICS

In the logistics space, a supply chain digital twin allows for real-time digital awareness, helping minimize disruptions of future operations while improving them. Users can predict the performance of packaging materials, enhance shipment protection, optimize warehouse design and performance, and create a dynamic delivery network using geographical data.¹²



HEALTHCARE

Digital twins can also impact us on a more intimate level. A digital twin of a patient allows surgeons and health professionals to practice procedures in a simulated environment rather than on a real patient. Additionally, sensors the size of bandages can monitor patients and produce digital models that can be monitored by AI and used to improve care.¹³

While digital twins are admittedly in the early stages of development and deployment, their capacity to change internal processes across traditional industries is evident. Ultimately, a digital twin can be deployed anywhere to improve ongoing operations, train employees, and test new products or procedures, before launching them to the real world where resolving issues becomes more expensive and complicated.¹⁴

ASITE: MAINTAINING THE GOLDEN THREAD

At Asite, we have been at the forefront of digital innovation for many years now, helping connect the physical, digital, and human. As we continue to evolve and innovate, we have recognized the need for a collaborative platform to help organizations transform.

Our cloud platform ensures that, as an industry, we can send and receive, capture, share, and collaborate on all the data we are collecting to derive actionable insights that help predict events and identify abnormalities to solve global issues.

Digital twins are the apex of this journey.

A DIGITAL ECOSYSTEM

In recent months, Asite has sought to strengthen its position as a facilitator and connector of solutions, focusing on connecting data across the supply chain.

The Asite public API, or Application Programming Interface, allows external software applications to interact with the Asite Platform, allowing multiple systems or applications to interact and share data.

To support this, we are using our API to build a number of integrations for the Asite Ecosystem. Launched in October 2020, the Asite Ecosystem is a partnership of consultants, industry partners, and technology providers working together to build knowledge hubs and enable seamless connections between organizations and regions.

Connectivity and the exchange of data is at the heart of the digital twin. Our “plug and play” approach allows Asite to act as a connector, bringing together partners who can also update and use this single source of information.

We understand that a digital twin is not a single technology or a solution that can be delivered unilaterally; our goal is to facilitate digital twins by enabling the flow of information between systems and creating a network of digital transformation partners.



ASITE AS THE CONNECTOR

While the potential of digital twin technology is undeniable, its value in business is largely dependent on our ability to uninterruptedly share large volumes of diverse data across systems. More importantly, we need to ensure that both our data and information is accurate, accessible, secure, and auditable.

In its capacity as a centralized repository, the Asite Platform supports connectivity and the implementation of a golden thread, providing a single source of truth in the form of the Asite Common Data Environment (CDE) – an Information Management Platform.

Following project completion, the Asite CDE not only serves as an invaluable auditable archive but exists as a dynamic “as-maintained” record that can be continually updated with asset information. The Asset Performance Management (APM) solution connects the physical and the digital, capturing dynamic data from the physical asset and representing it in a digital form, enabling object-orientated information management.

By facilitating the consolidation of associated objects, documents, and forms – a fundamental component in the creation of a digital twin – Asite becomes a hub or a central manager of information.

The clear next step to successful digital twins is to work together in an open and transparent way. The Asite open Ecosystem, supported by the Asite API and CDE, is our contribution to this cause and a truly open platform for everyone.





MESSAGE
from
THE CEO

It is often said that people drive digital transformation, and I wholeheartedly agree with this. The question at the center of all technological development should be – how can we live together better? And how does the technology we're building support that aim?

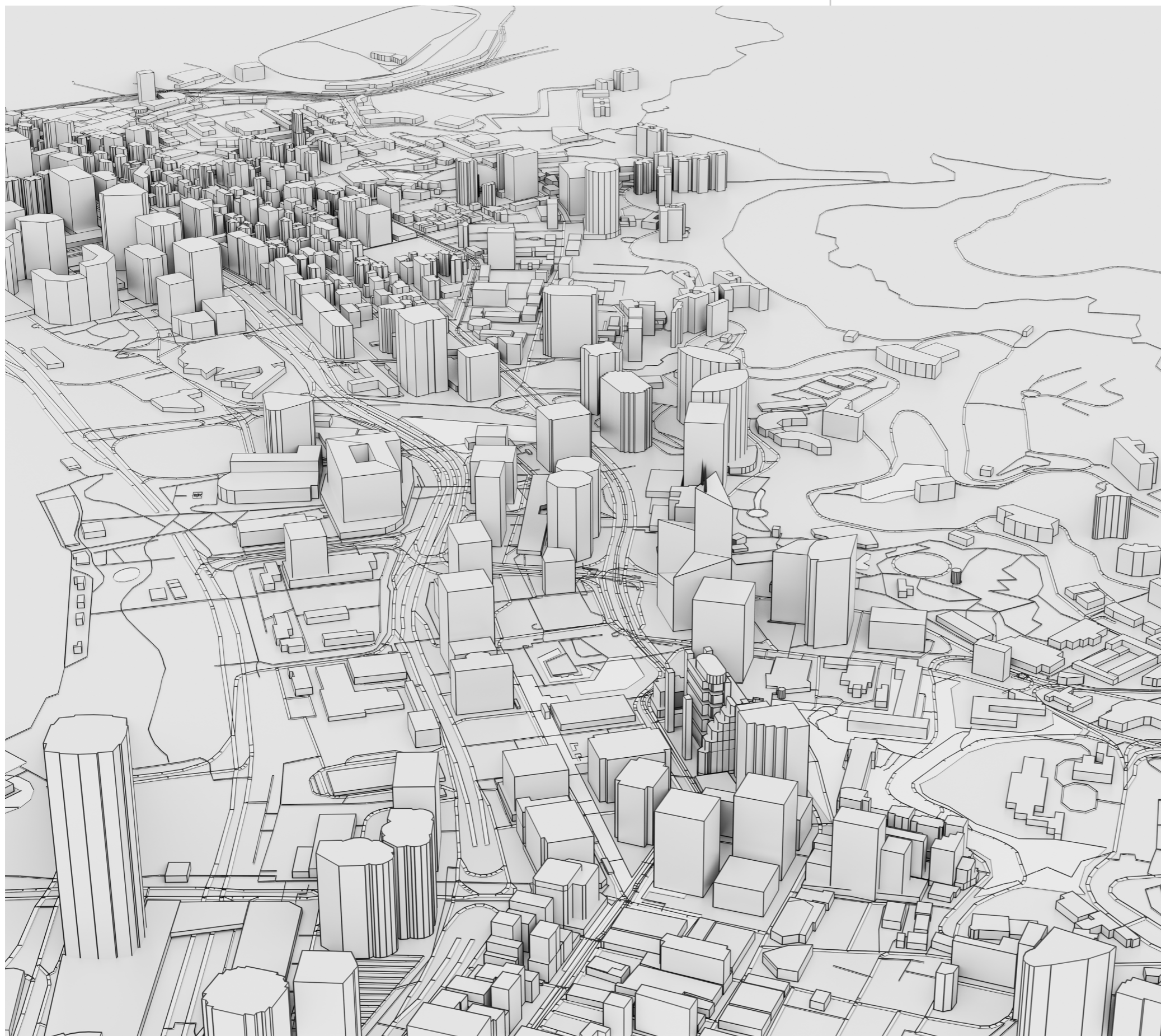
In fluctuating and increasingly uncertain times, digital twins can provide the built environment with a level of predictability and certainty that we need to remain resilient.

For digital twin technology to realize its potential, we need a common open platform that will allow us to send, receive, capture, store, and share structured and unstructured data. This will help us to collaborate without barriers – and specifically, without vendor lock-in or proprietary software. The Asite Platform connects our growing ecosystem of partners through standardized interfaces, consolidating our strengths to unlock everything digital twins have to offer.

I have always loved the imagery of this golden thread that grows and gathers more strands as it runs along the project lifecycle and onwards. I guess the platform in this metaphor would be the loom.

Asite is well on its way to becoming a hub for digital twins, delivering on our mission to connect not just the physical and digital but also the human.

At the end of the day, it's people striving for excellence that makes technology wonderful.



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The Asite Platform supports the collaborative nature of digital twins and provides stakeholders with the tools they need to collaborate and share information in a secure online environment.

To find out more, you can speak to a member of the team.

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