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Digital twins in real estate - Humanizing buildings in the age of Industry 4.0

In a time when technology-laden smart buildings have become an industry standard, "digital twins" are poised to deliver the next stage of real estate innovation. A digital twin is the digital representation of a physical asset, process, or system that allows for predictive modelling in order to deliver proactive adjustments for assets. This technologically-enabled process can deliver greater strategic value for the real estate industry as a whole. But while digital twins are similar to smart buildings in that they optimize operations and improve the customer experience, a twin can also deliver benefits across the full lifecycle of a building by simulating complex scenarios.

Buildings are more than assets
As complex, high-value assets with an equally complex lifecycle, buildings present an ideal opportunity for realizing the benefits of a digital twin. But buildings are so much more than just a physical asset. They are the environment in which people live and work, they facilitate social interactions, foster communities, and have the opportunity to improve individual outcomes, drive loyalty, build brand, and create healthier, happier, and more productive people.

When creating a digital twin, approaching it from a perspective that encompasses the entirety of a building ecosystem allows you to optimize far more than such straightforward activities as energy usage. It allows you to completely reimagine such key aspects as air quality, temperature control, furnishings, and facilities in a way that responds to human sensitivities and personas.

Breaking down the digital twin
Creating a complete digital twin that can do this is a complex journey. Rather, it is better to break down a project into smaller, modular "digital twins" that can eventually be integrated together over time. This allows the development of the twin to progress faster, prioritizing use cases in a way that builds momentum, realizes short-term value, and creates the roadmap to create a complete digital twin of a building across its entire lifecycle. Eventually, the process can even create a digital twin of the entire property portfolio

For example, choosing to optimize the HVAC and lighting may not be the use case that redefines the industry, but strategically it makes sense. In the average commercial office building, about 10 to 15 percent of operating costs are due to electricity, of which almost 70 percent is associated with HVAC and lighting.

These are substantial costs largely driven by tenant use of a building. Digital twins will enable better visibility of how tenants use a building, and, in time, the ability to simulate and forecast how tenants will move and interact. This will allow for more efficient HVAC and lighting management as well as a more optimal cleaning roster while still maintaining tenant expectations. In this way, it is a use case that will drive immediate and sustained cost savings—building confidence in the digital twin—and pave the way for more complex use cases.

A digital twin-enabled future
A digital twin expands as it incorporates each new simulation and use case. The twin can slowly build to a complete view of the entire structure across its lifecycle and integrate any disparate systems to create a centralized repository for all data and decision-making, often referred to as the digital thread. With a digital thread and digital twin in place, the real industry shift can begin.

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The full construction process can be planned, visualized, and optimized before ground is even broken. Construction sites can be managed more effectively, with the ability to predict exactly how delays and decisions will impact the overall construction. And the ability to monitor safety and compliance in real time can save lives by predicting emergency situations before they occur

Self-maintaining buildings will become more commonplace as the digital twin can predict when something will fail, book a contractor, guide them to the asset to be fixed, provide specifications and historical information, and then generate an invoice once the job is done. Workplaces will take advantage of simulations to redefine the way spaces are structured and dynamically reorganized, with a shift to bespoke spaces and multimodal workstations that can respond in near-real time to the unique needs of different teams. Retail will take advantage of simulations to test new store layouts and design spaces that engage consumers in a more meaningful way. The health sector will use simulations of staff and patients to minimize friction and bottlenecks, allocate medical supplies more efficiently throughout the space, and optimize the rostering of staff to meet the current and predicted needs of patients.

The next industry-wide disruption
Though real estate assets have been getting progressively "smarter" across industries, the digital twin represents the next major driver of change due to its powerful predictive capabilities. Given the complexities involved with creating a complete digital twin, the industry is currently focused on delivering value for smaller, more specific digital twin use cases. And while these aren't big enough to completely disrupt the industry, as use cases slowly combine into a complete digital twin, companies will be able to optimize entire buildings, precincts, and portfolios in every stage of the lifecycle.

As the way spaces are designed and built is redefined, new business models and market offerings will emerge. Buildings will become more human, with an understanding of human sensitivities and the capability to nurture rich ecosystems. It will no longer be sufficient to just design, build, and lease a space. The space will need to think for itself and react to the world around it. And these large-scale changes, enabled by the predictive capabilities of a digital twin, will be the drivers behind a dramatic disruption of the real estate industry in the years to come.

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