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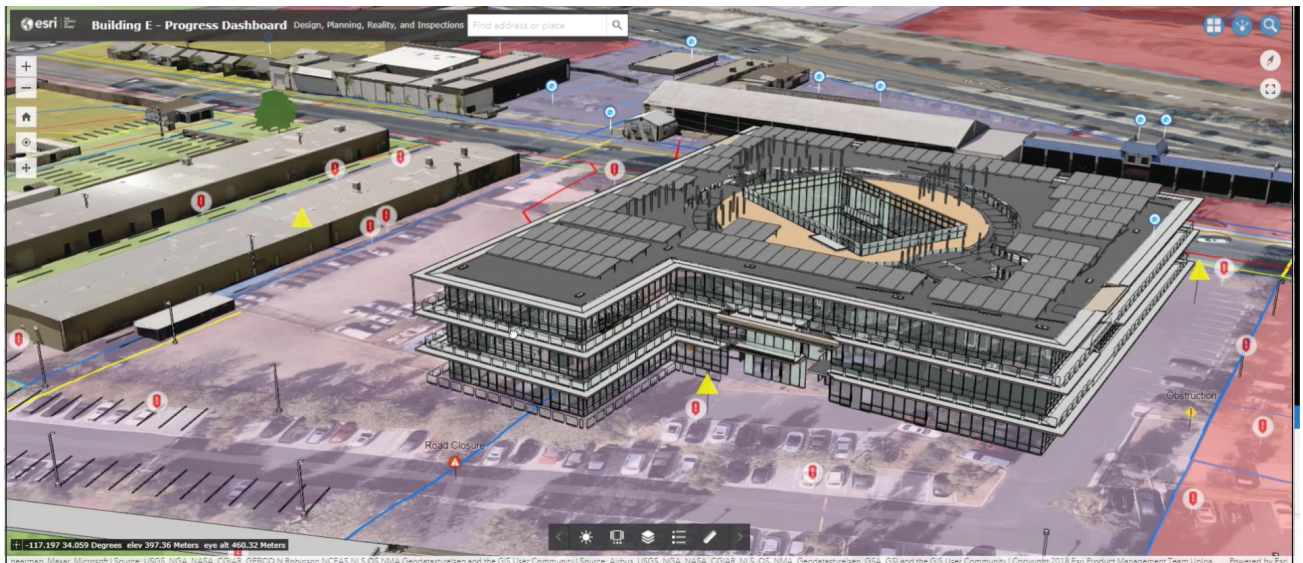
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SOLUTIONS

# Esri: The OG of Digital Twins

BY MARC GOLDMAN



The integration of GIS and BIM is a critical component for the end-to-end digitalization of the AEC industry's value chain.

“The concept and model of the digital twin was first publicly introduced in 2002 by Michael Grieves, at a Society of Manufacturing Engineers conference in Troy, Mich.,” Wikipedia tells us, also noting that the idea was anticipated in computer scientist David Gelernter’s 1991 book *Mirror Worlds*.

Today, we think of digital twins as computer representations that model real-life objects such as buildings, cities and countries by capturing the detailed physical reality of the object as accurately as possible.

“Esri and GIS provide the connective tissue throughout all of this because *everything is somewhere*,” says Esri Solution Manager Andy Lovell. “That is, every project exists somewhere on Earth—or on Mars for that matter—and Esri is expert at connecting real-life information with virtual representations.”

An astute observation but perhaps too modest; a digital twin is not just a good model of an existing site or building, and it's not just a bunch of information about a site, no matter how detailed and accurate. Rather, to be worthy of the name, a digital twin must be both at once, and so the "connective tissue" that Esri provides is not just a feature of a digital twin ... it is the twin.

And so it may be the case that Esri has been in the digital twin business since before digital twins were a thing—since 1969, in fact, when the geospatial giant was founded.

## Location, Location, Location

"By definition, digital twins are virtual representations of the real world, including physical objects, processes, relationships and real-time behaviors," explains Esri Urban Planning Practice Lead Christine Ma. "That's GIS by another name. Our users have been using tools such as ArcGIS Utility Network to manage linear access, linear assets and connectivities. They've developed city information models that support urban planning, project review and citizen engagement. And we're seeing GIS integrated with BIM to visualize and analyze highly detailed representations of structures and facilities."

Like Lovell, Ma points out that, "Since location is the ultimate integrator of all the various data formats and model types, digital solutions such as ArcGIS are the ultimate common data environment needed as foundations for digital twins."

By emphasizing location as the bedrock foundation of every digital twin, Esri instantly dispels much of the noise and confusion associated with the concept. For example, since location is the ultimate measure of scale, it becomes clear digital twins are infinitely scalable in both directions.

"Everything can be modeled in a GIS-enabled digital twin," says Lovell. "Seriously, everything. Our users are building different themes of data for different project types at different scales. The same functional pieces that make up a digital twin—reality capture and sensors and tagging and databases and visual interfaces and everything else—can be applied at every scale. It might be a single city block here in Denver, downtown doing some work at the state capital, looking at irrigation for the plants and the gardens. Great, you build a digital twin for that. It could be a big or small construction project, or one room in a single building. And we've also built out effective digital twins for the entire continent. The scale and resolution of the data we're talking about is different, of course, but the pieces that sit behind the

twin, as far as I'm concerned, are the same. We see no limitations on the scale at which ArcGIS and all Esri's location tools can be applied."

"Resolution" is an interesting word here; it implies that any Esri-enabled twin can be as good and useful as the data used to enrich the model. "Just to list some examples of what our genius users are doing with data and Esri tools," says Ma. "We've seen forecasting of winter storms, droughts and flooding; monitoring of sea ice and carbon footprints; and tracking of fish movements and water quality. And I want to emphasize this ... *all these twins can be interconnected*. Based on the problems they want to solve, both the sustainability advisor and environmental engineer, for example, can analyze climate vulnerability in terms of sea-level rise in the same environmental twin."

Esri is of course the original GIS company. But also, by emphasizing the importance of location in every solution offered, Esri has been in the digital twin business the whole time. **II**

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## Video

Full interviews of Andy Lovell and Christine Ma can be watched at [bit.ly/41MNTcU](https://bit.ly/41MNTcU) or by scanning the accompanying QR code.



## Webcast

A webcast, "Advancing AEC Industry Through Digital Twins," featuring Lovell and Ma will take place on May 11, 2023, at 1 p.m. ET. PDH credit is available. For more information and to register, visit [bit.ly/3LjIULt](https://bit.ly/3LjIULt) or scan the QR code. After the live date, an archived version can be watched for credit.

