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High-Resolution Aerial Imagery
Crucial Data for Your Digital Twin

Nearmap content developed from high-resolution aerial imagery.

When first introduced, a digital twin can seem to be a complex, futuristic tool that's difficult to understand what it is and how it works. But the concept is as simple as the name sounds: it's a virtual ("digital") representation ("twin") of real-world entities and processes that enables stakeholders to evaluate and test proposals and scenarios in a digital realm, at minimal cost, before implementing them in the real world.

With the proper technology and data, any small piece of machinery or vast transportation network can be modeled in a digital world to see if it will work; track how an actual system is operating (for efficiency and economics); and foresee how the live twin will react to events—planned or unexpected—in the future. Digital twins are the future of the infrastructure industry (and in some progressive areas are the present).

According to Jeff Saunders, Nearmap solution product manager for commercial business, a digital twin can be used across every phase of an asset's lifecycle.

"It can provide context for design and permitting," he adds. "It can help manage progress and compliance during construction, and it can monitor and predict behavior throughout operations and maintenance."

Don't Forget the Data

Many of the original proponents of digital twins were the organizations creating the digital models. They're some of the largest companies in the industry, and often showcase digital twins that were fully developed and functional.

As any programmer or developer will tell you, a model or program is only as good as the data that goes into it. A digital twin with poor or incorrect underlying data will lead to a model that can lead to lost investments of capital, poor use of taxpayer dollars or even catastrophic disaster with loss of life. And data accumulation often requires the most upfront time and money.

There are many possible types of foundational data for a digital twin, and where they come from should depend on the goal of the model.

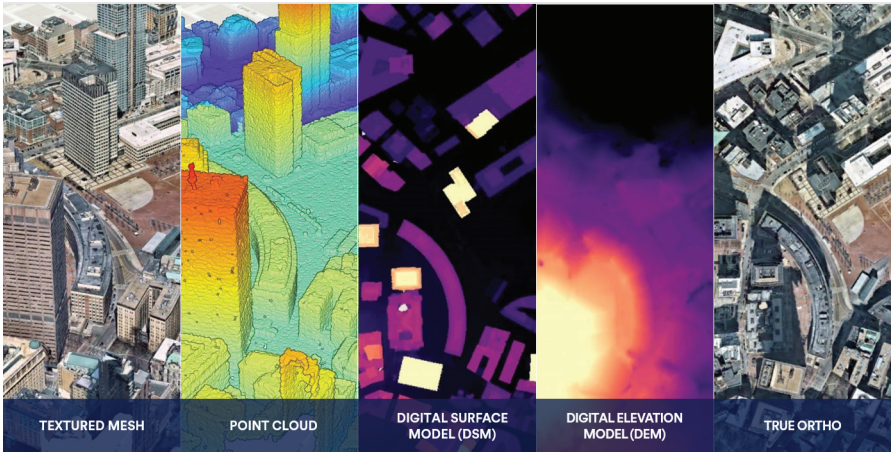
"Digital twins can take different forms depending on the types of

Nearmap's Support for Digital Twins

To learn more, watch an Informed Infrastructure video interview with Jeff Saunders, Nearmap solution product manager for commercial business, at *bit.ly/3pfiD5d* or by scanning the accompanying QR code. Also visit the Nearmap website at *www.nearmap.com*.

questions and what-if scenarios organizations are trying to answer or solve," explains Saunders. "It's important to first identify what details and information is really needed."

Common data inputs include many of the latest scanning and sensing technologies, including laser-scanned point clouds; reality meshes from aerial photos; BIM; terrain maps; and high-resolution imagery from satellites, planes and drones. The data sources you choose should depend on your specific models and goals.

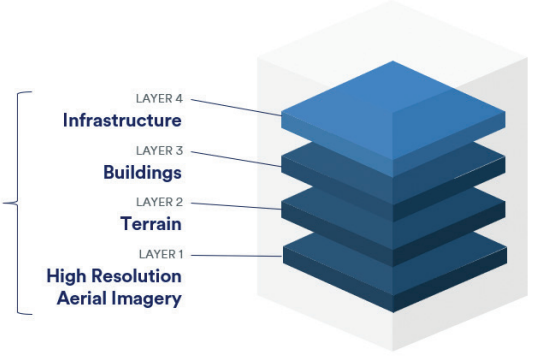


Key 3D content from Nearmap based on high-resolution aerial imagery.

Several Inputs at Once

One advantage high-resolution aerial imagery has over some other data sources is that it can provide several data inputs at once. High-resolution imagery from Nearmap, for example, can provide 3D meshes, point clouds, and digital elevation and terrain models as well as high-value AI-based geospatial features extracted from that information.

"Nearmap is also helping to provide this data at a massive scale that can accommodate nearly any project, and it's continuously updated so information can evolve as the environment changes," adds Saunders.



Building blocks for constructing a Digital Twin model.

Common Use Cases

"A number of our customers are looking at digital twins to propose, win, conceptualize and plan new infrastructure projects," explains Saunders. "They do that by helping stakeholders visualize existing conditions and immersing them in the digital world to allow them to experience projects before moving forward with design and construction."

Digital twin customers include projects at airports or campuses that are continually looking to grow and expand, sometimes while retrofitting existing facilities. Telco providers build digital twins to enhance design concepts for 5G networks. Cities and private-public partnerships are looking to better understand urban mobility as well as how the future of cities and urban environments can benefit by assessing shared-ride, autonomous vehicles and public-transit alternatives, and how that will play out in particular environments. The models also have been used to review logistics for large event planning and construction as well as public-safety and emergency-management planning.

Final Advice

For those ready to embark on a digital twin, Saunders notes that context is critical. In addition to the main asset, it's important to see how it fits into the context of the rest of the environment. It's also important to track the data sources (i.e., metadata) of where the information came from, so as changes happen in the real world, that information also can be updated in the digital realm.

If proper care is taken in planning and laying the foundation for a digital twin, Saunders notes there are many benefits to the virtual models, including improved monitoring, concept testing, risk reduction and return on investment.

"The latter is especially important when we're seeing contingency margins being squeezed and input prices changing," he says. "Material costs are rising, labor shortages continue and supply chain delays remain persistent. All these issues support the increasing value of building digital twins at the beginning and throughout the lifecycle of your assets." II


Example digital twin model from aerial imagery and AI-extracted buildings