BIM and Digital Twins:
Essential Tools for Better Building

The Federal government has a large portfolio of real estate. Managing the lifecycle of that portfolio, from architecture, engineering, and construction (AEC) to operations, has historically occurred in silos. New approaches, however, can connect project teams, reduce costs, and improve environmental sustainability.

MeriTalk recently sat down with Autodesk's Chuck Mies, senior manager of global business development, Bob Bray, vice president and general manager, and Joe Speicher, chief sustainability officer, to discuss how building information modeling (BIM) and digital twins can help agencies ensure seamless project delivery, lay the foundation for efficient operations, and inform future design decisions.

BIM is the holistic process of creating and managing information for a built asset. Based on an intelligent model and enabled by a cloud platform, BIM integrates structured, multi-disciplinary data to produce a digital representation of an asset across its lifecycle, from planning and design to construction and operations.

A digital twin is a data-rich, interactive model that mirrors its built asset, both in appearance and substance. Its value comes from the way it centralizes and contextualizes data for the building's lifecycle. These comprehensive virtual replicas connect real-life assets with their information technology/operational technology data, giving users both holistic and granular visibility of the information that matters most to them.

MeriTalk: The Federal government is focused on digital transformation to improve employee and citizen experiences and use data more effectively to meet government missions. It's been said that BIM is the foundation of digital transformation in AEC. Why is that?

Mies: BIM creates the opportunity to centralize and integrate project information throughout the entire lifecycle of a building or infrastructure project. It is a digital representation of the physical and functional characteristics of a facility. You must have that information available and readily accessible before you can start to drive transformation.

Bray: Federal agencies want to make sure they're executing cost-effective projects and getting the best outcomes. A BIM-based process is the best way for them to have transparency and get the level of data stakeholders need to collaboratively design, construct, and operate buildings more efficiently.

MeriTalk: To what extent is BIM used in the Federal government right now?

Mies: Many Federal organizations have fairly robust BIM standards, from the Department of Veterans Affairs to the General Services Administration (GSA) and the U.S. Army Corps of Engineers, and guidelines are in place within most Federal organizations. The level of implementation and utilization of those guidelines tends to be somewhat variable based on procurement and the way Federal projects are structured.

Bray: The key is ensuring that contracts are written in a way that BIM guidelines are followed and create the outcomes the organization is looking for.

MeriTalk: Where is BIM most useful – or most needed – in the Federal government, and why?

Bray: Federal agencies need building information to be available at their fingertips during and after project execution. Agencies need to ensure that projects are implemented according to their standards, and BIM provides the process and transparency to ensure those standards are met.

Mies: BIM is also crucial because of the length of ownership of government facilities. Depending on the agency, facilities could be temporary or permanent – aging perhaps to 100 years. The potential benefits of BIM extend beyond design and construction into operations and maintenance of Federal facilities over their entire lifecycles.

MeriTalk: GSA owns or leases more than 363 million square feet of space in more than 8,000 buildings. With such a large Federal real estate portfolio, coordination across agency teams and industry partners can be challenging. How does BIM help?

Bray: BIM ensures consistency, so consistent data standards and the way information is delivered apply to every project. This improves coordination and provides partners with a clear picture of expectations.

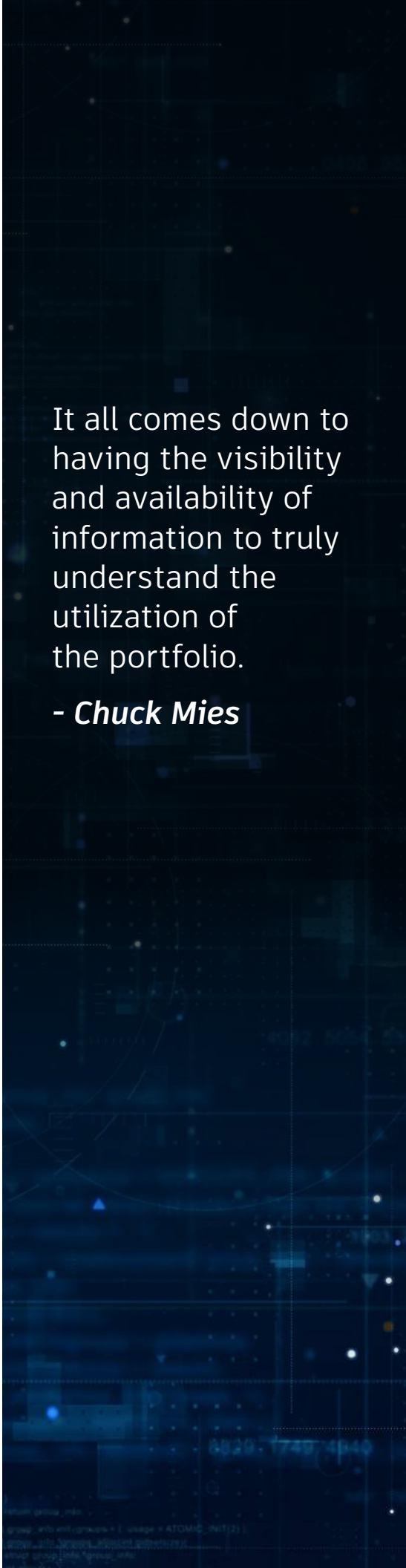
Mies: Expanding on Bob's point, when you talk to everyone involved in delivering a project, you learn that they have different expectations of the information that is required and why the information is valuable. There is great downstream opportunity in having all of the information about the project expressed consistently. While Federal owners are specific with their architects, engineers, and contractors about the information needed to design and construct the facility, the opportunity is for them to be more specific about the information they need to manage the facility over its lifecycle.

MeriTalk: A recent Government Accountability Office (GAO) report found that Federal office space is chronically underutilized, creating unnecessary financial and environmental costs for the government. The GSA is helping agencies optimize their real estate footprints. How can BIM help with this process?

Mies: If this information is inconsistent and locked away in siloed databases, it's very difficult for a portfolio owner to optimize their real estate footprint. BIM is not a solution for underutilization, but it's a catalyst that provides consistent, transparent information that can be absorbed by the systems used to make portfolio-based decisions. Digital twins provide a compelling way to use that information to gain a comprehensive understanding of the utilization rate across the portfolio.

MeriTalk: We're hearing a lot about digital twins today – digital models of physical products, systems, or processes – although the technology can be traced back to the 1960s. Can you tell us more about how BIM and digital twins intersect?

Bray: Simply, BIM is the holistic process of creating and managing information and then integrating data to produce a digital representation of an asset across its lifecycle, from planning and design to construction and operations. This information can be utilized directly to create a digital twin, which provides multi-dimensional views into how an asset is designed and how it's performing, including occupant behavior, energy utilization, space utilization, and maintenance activity. It collects a substantial amount of data in one environment.



MeriTalk: How do digital twins inform planning and design for future projects, as well as current operations and maintenance?

Bray: There are various types of digital twins. There are twins in the construction phase where you're thinking about all of the dimensions of construction. A design twin, for designing or reconfiguring space, is also more of an upstream twin. BIM is useful in all types of digital twins, but I want to talk about the downstream operational twin, which addresses the day-to-day functioning of an asset. There are three big value propositions.

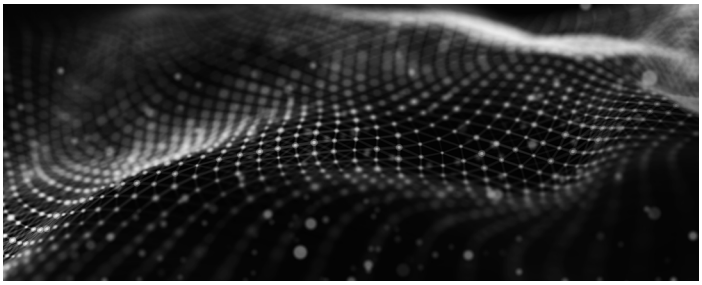
The first is that digital twins can be used to accelerate operational readiness and then evaluate if the building is operating in line with the criteria specified. The second is ensuring that facility operations teams have the information needed to make predictive and proactive decisions for operating that facility as efficiently as possible. Finally, to build better, agencies and AEC teams can review data to determine what factors provide the best performance and implement them in future projects.

MeriTalk: With elevated material costs and a tight labor market in construction, how does BIM help streamline project management and reduce costs?

Mies: The collaborative nature of BIM allows design issues to be fixed proactively in the model instead of in the field. This has enormous implications for reducing rework and material waste, along with improving productivity. BIM can also help agencies develop more effective cost estimates and reduce risks and insurance costs.

MeriTalk: The clean energy executive order issued in 2021 directs the Federal government to use its scale and procurement power to achieve a net-zero emissions building portfolio by 2045, including a 50 percent emissions reduction by 2032. How can Autodesk's BIM and digital twin solutions help the government achieve these goals?

Speicher: By leveraging Autodesk's BIM capabilities, Federal agencies can calculate and address embodied carbon throughout the design and construction process. This enables the identification of carbon-intensive materials, the optimization of design choices, and the selection of sustainable alternatives.



The ability to have all data in place for any given project is the most cost-effective way to measure, manage, and reduce carbon emissions associated with a given building. By leveraging Autodesk's BIM capabilities, Federal agencies can calculate and address total carbon throughout the design, construction, and operations of a building – this includes the energy necessary to power the building, as well as the embodied carbon associated with material choices for new builds and renovations. Essentially, BIM and digital twins provide visibility into sustainability across all phases of project delivery, which is critical information needed to meet these goals.

> The use cases for BIM and digital twins are pretty broad. They're all about optimizing processes.
>
> ***- Bob Bray***

MeriTalk: We've talked a lot about buildings. What are some other ways that the Federal government can use BIM and digital twins?

Bray: When common data environments such as BIM and extended reality (XR) applications are linked, use cases become even more powerful. They enable collaborative, real-time design reviews that improve knowledge-sharing across project teams, identify issues early, and make workflows more efficient – which means fewer errors, reduced waste, and substantial cost savings. This capability has become essential for AEC professionals working on a myriad of project types, from hospital systems to large transportation projects.