

GIS DIGITAL TWINS

Turning Complexity into Clarity

Integrating real-time data into campus, installation, and city maps transforms them from static references into dynamic, situational awareness tools that enhance resilience and efficiency.

Data is the backbone of a GIS Digital Twin; more specifically, data aggregation and continuous data management are critical. Without aggregation, the twin lacks context and depth. Without management, the twin quickly becomes outdated and unreliable. When both are done right, the digital twin becomes a living, breathing system that evolves with the real world. DSA has developed a data aggregation process for collecting and

unifying data from multiple sources (e.g. Industrial Control Systems, IoT sensors, BIM models, satellite imagery, meteorological data, and historical records). This unified data model allows the digital twin to reflect the full complexity of the real world—across space, time, and systems. DSA utilizes two commercially available software platforms, and a DSA-developed integration tool, to deploy digital twins:

01

AVEVA PI System

The AVEVA PI System is a best-in-class operational technology data management platform. DSA utilizes the PI System to centralize various data sources into a structured data model. This data model is informed by standards including Brick Schema, Project Haystack, ASHRAE 223, and Esri models (e.g. Utility Network Model and Water Utilities Data Model).

02

Esri ArcGIS:

ArcGIS Pro is the industry-leading geospatial information system. DSA utilizes ArcGIS Pro to further refine the digital twin data model with feature classes, attribute rules, topology rules, and other parameters. Initial dashboards are then created within ArcGIS Pro to provide enterprise-level situational awareness with the ability to 'zoom in' on specific regions, districts, buildings, and zones. The digital twin's fidelity can be improved by incorporating Esri's ArcGIS Indoors and BIM models to deliver additional indoor space capabilities including asset mapping, wayfinding, and incident response.

DSA appreciates the difficulties in creating a ‘perfect’ digital representation of any physical system.

The goal is not perfection and our digital twin philosophy follows the saying attributed to George Box: “all models are wrong, but some are useful”. DSA’s GIS Digital Twin solutions provide value to many different decision-makers and stakeholders. In the context of electrical outage management, our data-enriched maps enable operators to visualize disruptions as they unfold, pinpoint affected areas, and coordinate rapid response teams with far greater accuracy. Instead of relying on phone calls or dispatch logs, decision-makers can see in real time where electrical faults have occurred, which buildings are affected, and which circuits are still active—all of which streamlines troubleshooting and restoration efforts.



All Models Are Wrong,
But Some Are Useful.

GEORGE BOX



WatchPost



In disaster preparedness and operational forecasting, the integration of real-time utility data into maps acts as a predictive and preventive mechanism.

For instance, in the event of an incoming storm, facility teams can use historical and live data to model potential impact zones, pre-position equipment, and reinforce vulnerable infrastructure. During emergencies, these maps enable coordinated decision-making across facilities, public safety, and emergency response, offering a shared, continuously updated visual language.

Beyond crises, this real-time geospatial intelligence supports day-to-day operational efficiencies—like load shifting to avoid peak charges or scheduling maintenance based on live system health—which together build a more agile, data-informed ecosystem.



BY VISUALIZING UTILITY USAGE PATTERNS SPATIALLY, planners can simulate “what-if” development scenarios, mitigating risks and optimizing system performance.