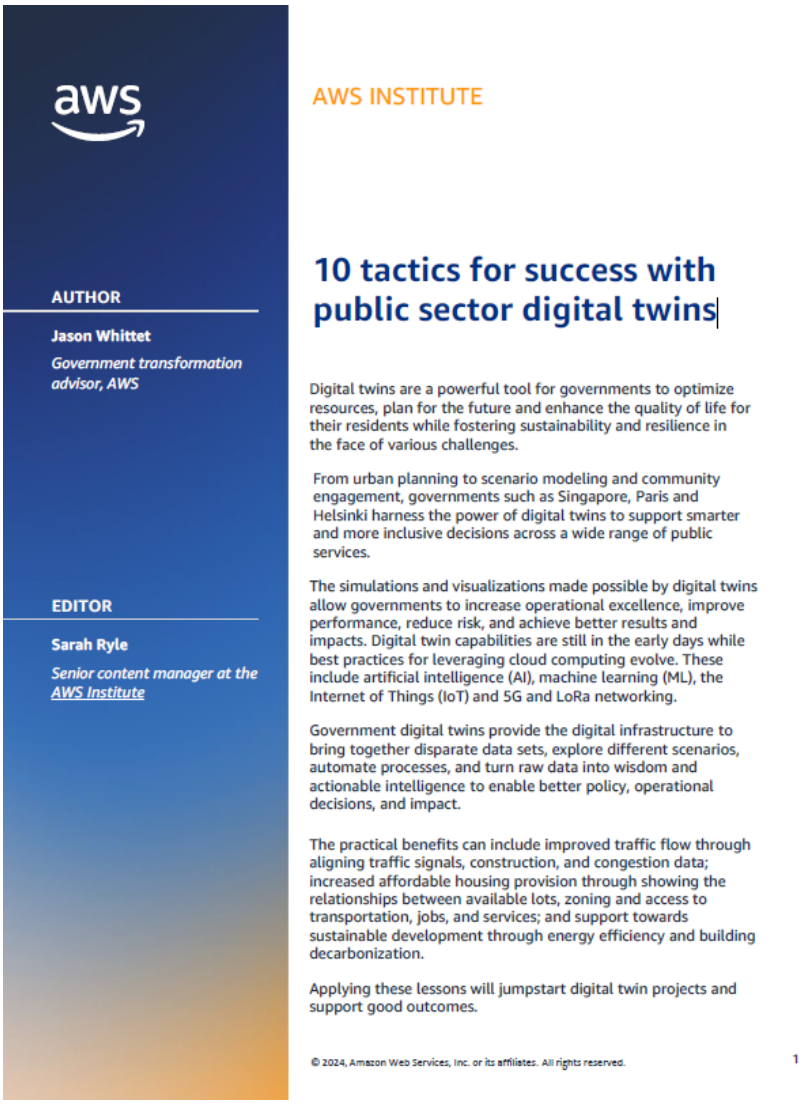
10 Tactics for Success with Public Sector Digital Twins



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10 tactics for success with public sector digital twins

Digital twins are a powerful tool for governments to optimize resources, plan for the future and enhance the quality of life for their residents while fostering sustainability and resilience in the face of various challenges.

From urban planning to scenario modeling and community engagement, governments such as Singapore, Paris and Helsinki harness the power of digital twins to support smarter and more inclusive decisions across a wide range of public services.

The simulations and visualizations made possible by digital twins allow governments to increase operational excellence, improve performance, reduce risk, and achieve better results and impacts. Digital twin capabilities are still in the early days while best practices for leveraging cloud computing evolve. These include artificial intelligence (AI), machine learning (ML), the Internet of Things (IoT) and 5G and LoRa networking.

Government digital twins provide the digital infrastructure to bring together disparate data sets, explore different scenarios, automate processes, and turn raw data into wisdom and actionable intelligence to enable better policy, operational decisions, and impact.

The practical benefits can include improved traffic flow through aligning traffic signals, construction, and congestion data; increased affordable housing provision through showing the relationships between available lots, zoning and access to transportation, jobs, and services; and support towards sustainable development through energy efficiency and building decarbonization.

Applying these lessons will jumpstart digital twin projects and support good outcomes.

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What is a digital twin?

Digital twins are digital replicas of physical objects. Their four key components are: a physical system, a digital representation, connectivity between the two, and business outcomes. Governments can twin a process, such as an election, a system such as a transport or water network, or the built environment like a building, campus, and even a whole territory. The digital twin matures as analytics, simulations, and visualizations are applied. A leveling guide with four stages is used to measure progress and maturity. Most government digital twins in 2024 start with a Level 1 or 2, which is a detailed base model. Level 3 includes robust sensor data that brings the twin to life. Consider these steps to help plan, develop, and deploy government digital twins to transform public services.

1 Define a clear vision and scope

What is the problem to solve or opportunity to realize? A clear vision and scope are central to determining the skills, partners, data, IoT sensors, and algorithms required to build and maintain twins. Digital twins can take time to build so clear objectives, including quick wins, and milestones for each stage will keep stakeholders engaged. Identify and highlight potential risks, such as data sharing, model availability, risk of change in process, to be transparent and earn trust.

2 Identify and understand user needs

Work backwards from the customer. Take the time to understand user experience and include users in the planning and design to increase the twin's usefulness and adoption. Wireframing is an effective exercise for mocking up the twin's design and flow before getting into the cost and time of building an actual digital twin at scale.

3 Collaborate to build the right skills

Do you have the skills needed to develop and maintain a digital twin? These include data science, Geographic Information System (GIS), IoT, and simulation building. Staffing development for a digital twin platform differs from provisioning and using an existing platform. Consider collaborating with specialists and external partners from universities, NGO's, and other government organizations to access resources.

4 Establish ownership and governance

Different digital twins need different ownership structures. For example, a digital twin serving a single purpose, like non-revenue water loss, may exist comfortably within one government department. Digital twins may have several purposes that cross over agencies, such as urban planning, public safety, and social services.

Be clear about which department has overall ownership and establish governance for collaborations with other departments and external agencies, including commercial entities. Resources for digital twins such as GIS teams with Python skills, or required data sets such as aerial imagery, or Light Detection and Ranging (LiDAR), may come from multiple departments. The best owner for a test or proof of concept might not be the long-term owner.

5 Build or to buy?

Different government organizations have different interests and digital capabilities. The decision whether to build a twin in-house, hire a vendor to develop one to spec or purchase a digital twin platform is an important one. Consider the ongoing maintenance and use of the twin and who will do the work. As more and more digital twins are developed there may also be an opportunity to reuse components from other projects, especially as open source algorithms and simulations are produced and shared. A lesson here is to consider the digital twin as an on-going, living project that will require updating and maintenance to keep up-to-date, accurate and useful.

6 Assemble the essential ingredients

Data is the essential ingredient in all digital twins. Digital twins need Internet of Things (IoT) data, such as optical, acoustical, proximity and flow data from sensors. Sensor data is the key to connectivity between the physical and digital world. Different simulations need different kinds of sensors, and all sensors must have a communications network to reach a platform that will receive the data and then assemble it for use in the twin. The number and cost of sensors, plus the complexity to install and maintain are considerations that will impact the ability to generate the data.

7 Start with a solid base model

The base model in a government digital twin is the representation of the physical object such as a city or mountain, or system, such as electrical grids or rail lines. The base model is a three-dimensional model of the object or system with varying levels of detail. The base will carry the additional data layers and simulations that bring to life the digital representation of the system. Base models use high-resolution aerial imagery and AI and ML tools to turn 2D imagery into the 3D model. Additional data from computer added design and building information models systems is used to add finer levels of detail to the base. Consider the objective and design the base model to support the long-term intended use.

8 Expand use cases with analytics and simulations

Digital twin use cases for government include addressing climate change, measuring decarbonization, land-use planning, and zoning compliance. Each use case has its own recipe or algorithm. Understanding how to transfer the applicable laws, regulations, procedures, and practices for government activities into a simulation is important for the compliance, usefulness, and accuracy of the use case. Digital twins are a revolution in technology, and business processes have to be digitized so governments may access the benefits.

9 Engage and train the community

Digital twins are a powerful tool to improve community engagement, promote transparency, and engage citizens. Establish training programs to increase community skills with data and digital twins to drive participation, adoption, and impact.

10 Measure, evaluate, and refine models

A digital twin is a living digital resource that grows as more data and functionality are added. Continually measure and evaluate accuracy, test against the original vision and objective, and refine the model. A digital twin is living digital infrastructure.

Learn more about Digital Twins

Digital twins on AWS
What is digital twin technology?

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