What Should I Do To Ensure Digital Twin Success?

Published 23 March 2021 - ID G00739453 - 6 min read
Alfonso Velosa

Initiatives: Applications and Software Engineering Leaders

As digital twin adoption accelerates, applications and software engineering leaders should focus on these recommendations to support an incremental approach to development of a digital twin portfolio that delivers near-term commercial value while ensuring long-term investment protection.

Quick Answer

What Should I Focus On To Ensure Digital Twin Success?

- **Adopt a minimum viable product approach** — Prioritize “quick wins” and incrementally enhance your digital twins investments over time.

- **Address your IT competency gaps** — Expand your existing IT competencies (e.g., information management) to address new digital twin needs (e.g., Internet of Things [IoT] time-series data).

- **Plan for end-to-end system integration** — To fully capitalize on your digital twin investments, integrate them with business applications to enhance business process automation.

- **Incorporate governance from the beginning** — Adopt sustainable digital twin governance models to address software configuration changes, security and full life cycle management.

More Detail

Implementing digital twins is a journey. If you are in a heavy-asset industry (e.g., manufacturing, utilities, natural resources or facilities management) consider that you may have dozens, hundreds or even thousands of classes of assets and equipment. It is likely that — over years — you will benefit from eventually “twinning” many of these asset classes. If so, this could mean that you will be developing dozens, hundreds or even thousands of digital twins. Figure 1 reveals how creating a digital twin for even just one asset has the potential to generate multiple versions of the object class and many instances of runtime software.
Figure 1. Your Digital Twin Portfolio Grows as a Multiple of Digital Twin Class, Version and Instance

Your Digital Twin Portfolio Grows as a Multiple of Digital Twin Class, Version and Instance

As illustrated, there will likely be multiple versions of a digital twin object class for just one asset class — e.g., for just one specific original equipment manufacturer (OEM) make and model of industrial pump. This is because the digital twin developer (either you, the industrial pump OEM, or a third-party technology and service provider) will likely produce new versions of the digital twin object class over time (e.g., to improve the analytics or to detect additional equipment failure modes). And you will be running multiple instances of the digital twins runtime software, one for each pump deployed in your operations. Which begs the question: If there will be so many digital twins, what should you do from the beginning to ensure a successful digital twins software journey?

Adopt a Minimum Viable Product Approach

There are many digital twin value propositions (e.g., improving user experience), but cost optimization of commercial and industrial assets, equipment and processes is initially the most often sought-after value proposition (see Survey Analysis: Companies Heavily Use Digital Twins to Optimize Operations).
If you have many assets, pieces of equipment or process activities it is better to initially focus only on the most essential needs for your “problem children” — those assets or processes in your operations that are:

- Unpredictable or inefficient because of situation awareness blindspots,
- Have a high commercial impact when behaving inefficiently or when they fail, and
- Can be cost-effectively improved using digital twin technology.

Then design digital twins to initially address your most urgent needs (e.g., the highest impact equipment failure analysis), and then utilize the least possible number of sensors, least amount of data, and least sophisticated form of analytics and visualization needed to achieve your desired outcome. Over time incrementally expand your digital twins capabilities as needed (see Use 4 Building Blocks for Successful Digital Twin Design). A good example of a digital twin capability that is often desired but not always essential for many applications is simulation. While useful for modeling complex systems (e.g., predicting “what if?” scenarios on how changes to equipment or processes will affect manufacturing yield), many benefits of digital twins can be realized using commonly available analytics without necessarily having to simulate the system. When simulation is needed, be prepared to learn how to use model-based system engineering (MBSE) techniques or partner with a technology and service provider that has appropriate skills (see Innovation Insight for Model-Based System Engineering).

Address Your IT Competency Gaps

To be successful in most digital twin projects be sure to address any gaps across seven required IT competencies:

1. Device management
2. Communications
3. Integration
4. Data management
5. Application enablement
6. Analytics
7. Security

For example, when implementing digital twins you will likely ingest, organize and govern large quantities of high velocity IoT time series data. For many companies, this will require new information
management skills beyond traditional RDBMS. Implementing IoT will often involve the use of IoT edge computing, which involves new skills beyond cloud computing. For more details on some of the new IT competencies needed for IoT and digital twin projects see Use the IoT Platform Solution Reference Model to Help Design Your End-to-End IoT Business Solutions.

Plan for End-to-End System Integration

The majority of digital twin projects are not islands of innovation but instead involve two basic forms of integration:

1. Digital twin to IoT device integration

2. Digital twins to business application integration

For digital twin to IoT device integration, plan for your portfolios of commercial and industrial assets and equipment to be heterogeneous. You’ll likely need to support multiple approaches to integration including, for example, operational technology (OT) and IoT device adapter portfolios (e.g., OSIsoft), messaging protocols (e.g., MQTT), edge computing architecture (e.g., MS Azure IoT Edge), and API’s (for newer OEM connected products). For details on which approaches companies use to integrate IoT and OT devices (see Survey Analysis: Companies Recognize Integration as a Key Competency for Internet of Things Projects).

For digital twin to business application integration, plan to implement choreography to support enhanced business processes in-between digital twins and business applications. This will often involve more than one business application, and will typically require the use of readily available COTS integration tools such as an ESB or iPaaS — for details on how digital twins are integrated with business applications (see What to Expect When You’re Expecting Digital Twins).

Incorporate Governance From the Beginning

Digital twins are not static software objects — they change to align to the evolving operational circumstances and to changing needs of the business environment.

They do this over the lifetime of the entity they support. This requires the application leader to work with their business partners to implement a governance policy, preferably at the beginning of the digital twin journey. For example, the entity — whether it is a procurement process or a combined cycle gas generator — may require patches, software updates and changes in who has access to the models. All of this has to be approved by the enterprises’ central authority for digital twins, has to be funded for its lifetime and has to meet KPIs for its output. Key stakeholders need access to it as well as the ability to update it as business requirements change, and it needs to meet internal security, privacy policies and so forth. Finally, the digital twin needs to be monitored to make sure it has not drifted from reality in a way that
precludes its contributing value (see Strengthen 4 Elements for Successful Management and Governance of Digital Twins).

**Recommended by the Authors**

**Tool: 50-Plus Digital Twin and IoT Cost Optimization Examples**

**Strengthen 4 Elements for Successful Management and Governance of Digital Twins**

**Toolkit: Enterprise Readiness for Digital Twin Deployment**

**Survey Analysis: Companies Heavily Use Digital Twins to Optimize Operations**

© 2021 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner is a registered trademark of Gartner, Inc. and its affiliates. This publication may not be reproduced or distributed in any form without Gartner’s prior written permission. It consists of the opinions of Gartner’s research organization, which should not be construed as statements of fact. While the information contained in this publication has been obtained from sources believed to be reliable, Gartner disclaims all warranties as to the accuracy, completeness or adequacy of such information. Although Gartner research may address legal and financial issues, Gartner does not provide legal or investment advice and its research should not be construed or used as such. Your access and use of this publication are governed by Gartner’s Usage Policy. Gartner prides itself on its reputation for independence and objectivity. Its research is produced independently by its research organization without input or influence from any third party. For further information, see "Guiding Principles on Independence and Objectivity."