

Data Center Solutions: Helping Financial Enterprises Maximize Performance

Revealing Hidden Value in Existing Data Centers

EBOOK

Who should read this?

- Financial Services Senior Management - IT & Operations
- Data center Designers and Consultants
- Engineers working in IT and Facilities Management

Introduction

Financial enterprises rely heavily on the ultrafast data and analysis enabled by the High-Performance Computing (HPC) housed in their enterprise data centers.

As the industry embraces digitalization for split second decision-making and transactions, uptime and security are of utmost importance. The slightest of failings have huge financial implications and the potential for reputational damage. Managing this risk while ensuring efficiency and capacity means there is a great need to have complete visibility of all aspects of the data center: power, cooling, airflow and capacity utilization.

Capacity at enterprise-owned data centers is growing worldwide. According to Uptime Institute's June 2021 survey focusing on data center capacity trends, nearly three in five respondents (58%), said the overall capacity of their enterprise-owned data centers was growing, versus the 13% who said it was on the decline.¹ This upward trend, combined with the deployment of high-computing servers with more power density, suggests that enterprise operators will struggle with how to maximize operational performance and extend the life of their existing facilities and capital investments.

When one company thought they faced limiting power availability, they thought colocation was the only answer. It was not until Black & Veatch assessed their data centers did they learn they could extend their existing assets for several more years, saving millions while keeping them online and buying them time to secure their long-term digital future.

With this new found capacity, the client needed to understand how to best use the space and capacity to accommodate its high-performing, high-density equipment. Black & Veatch enlisted digital twin software company, Future Facilities, to model the data center environment to optimize space and critical infrastructure systems and maximize performance.

¹ Uptime Institute Global Data Center Survey 2021



Data Center Assessments: Ensure Operational Excellence & Compliance

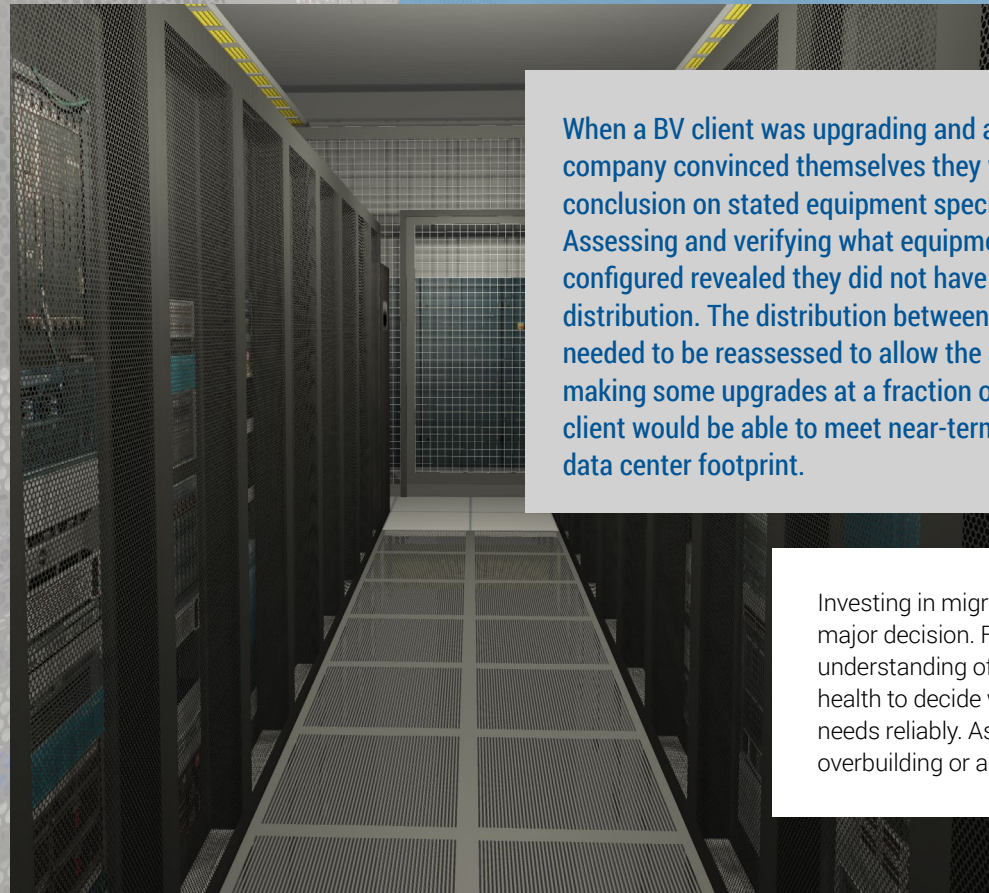
Data Center Assessments provide the visibility into a data center's performance and critical systems to uncover potential risks and inefficiencies related to aging equipment, single points of failure, spacing, capacity and more.

This offers real information that helps prioritize and budget facility infrastructure upgrades that will make a direct impact on reliability, efficiency and resiliency.

For the financial industry, data center assessments are not only essential to operations, but also aid regulation compliance.

Services may include:

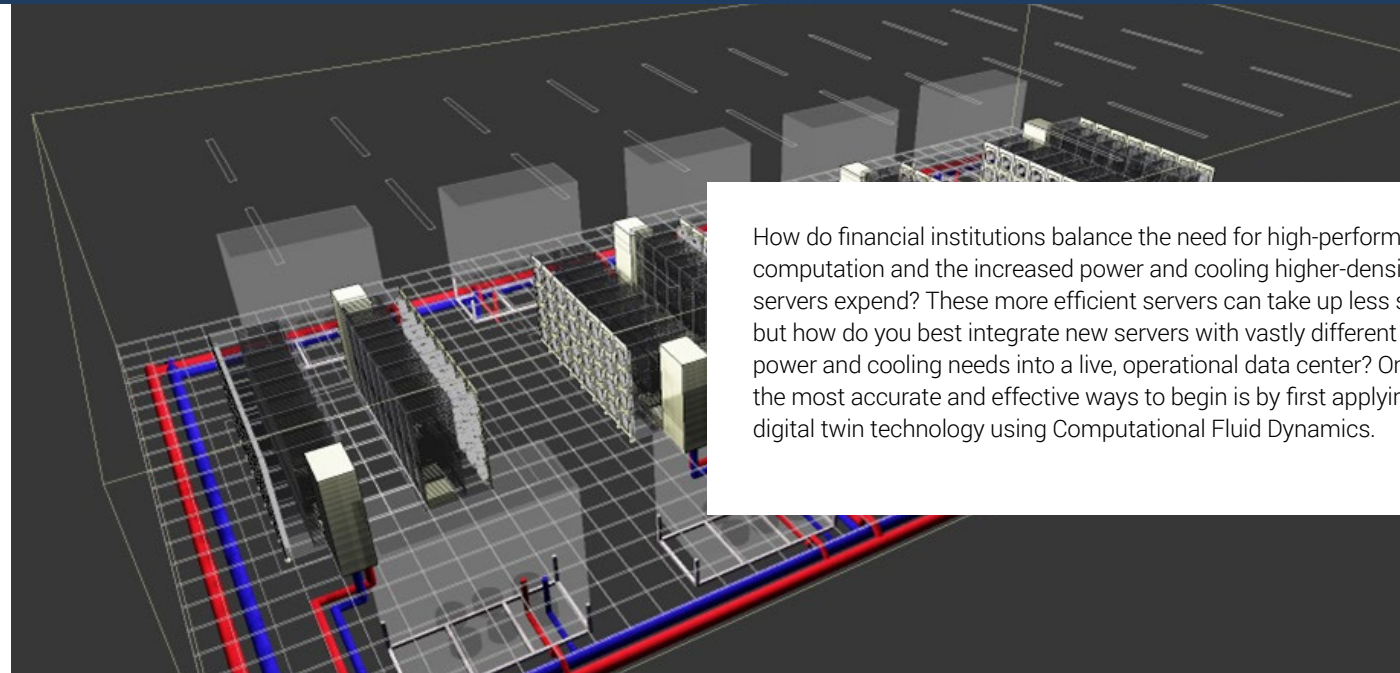
- Assessing procedures to continuously maintain SOPs, EOPs and MOPs to comply with federal regulations and reporting while increasing availability and reliability
- Reviewing and establishing the sequence of operations to prepare emergency response measures to mitigate risks associated with disruption or shutdowns
- Conducting reliability studies to determine the reliability rate, the probability of failure based on age of equipment, key criteria and system configurations
- Assessing the overall connectivity and network for the Building Management System (BMS), SCADA and Power Monitoring System
- Analyzing energy usage to understand how best to deploy and manage future high-density IT loads
- Performing hardening assessments to reduce vulnerabilities of physical infrastructure.



When a BV client was upgrading and adding more data center equipment, the company convinced themselves they were running out of power, basing their conclusion on stated equipment specifications and applying a safety factor. Assessing and verifying what equipment was being used and how it was configured revealed they did not have a problem with capacity or space, but distribution. The distribution between mechanical, electrical and IT systems needed to be reassessed to allow the stranded power to be distributed. By making some upgrades at a fraction of the cost of moving to colocation, the client would be able to meet near-term growth projections within their existing data center footprint.

Investing in migrating to the cloud or new facilities is a major decision. Financial enterprises should have a good understanding of current data center capacity, capabilities and health to decide whether existing data centers can meet future needs reliably. As in the case of our client, this can help avoid overbuilding or an unnecessary cloud migration.

Effectively Scale Computing While Maintaining Reliability



How do financial institutions balance the need for high-performing computation and the increased power and cooling higher-density servers expend? These more efficient servers can take up less space, but how do you best integrate new servers with vastly different power and cooling needs into a live, operational data center? One of the most accurate and effective ways to begin is by first applying 3D digital twin technology using Computational Fluid Dynamics.

Once our client realized they had more capacity and space than they originally thought, Black & Veatch turned to Future Facilities' CFD modeling software - 6Sigma Digital Twin, to determine the best use of existing capacity and space. By running multiple modeling scenarios, the team could determine the best configuration to yield optimal mechanical system performance and PUE. Additional testing, including calculating transient times and failure rates, helped us understand what the future best and worst cases would be, so we could help our client take the right actions now to mitigate any future operational disruptions.

What is a Data Center Digital Twin?

A data center digital twin is a 3D virtual replica of your data center that simulates its physical behavior under any operating scenario.



With this 360-degree view into their operation, the client is able to analyze and make day-to-day operational decisions more quickly and easily.

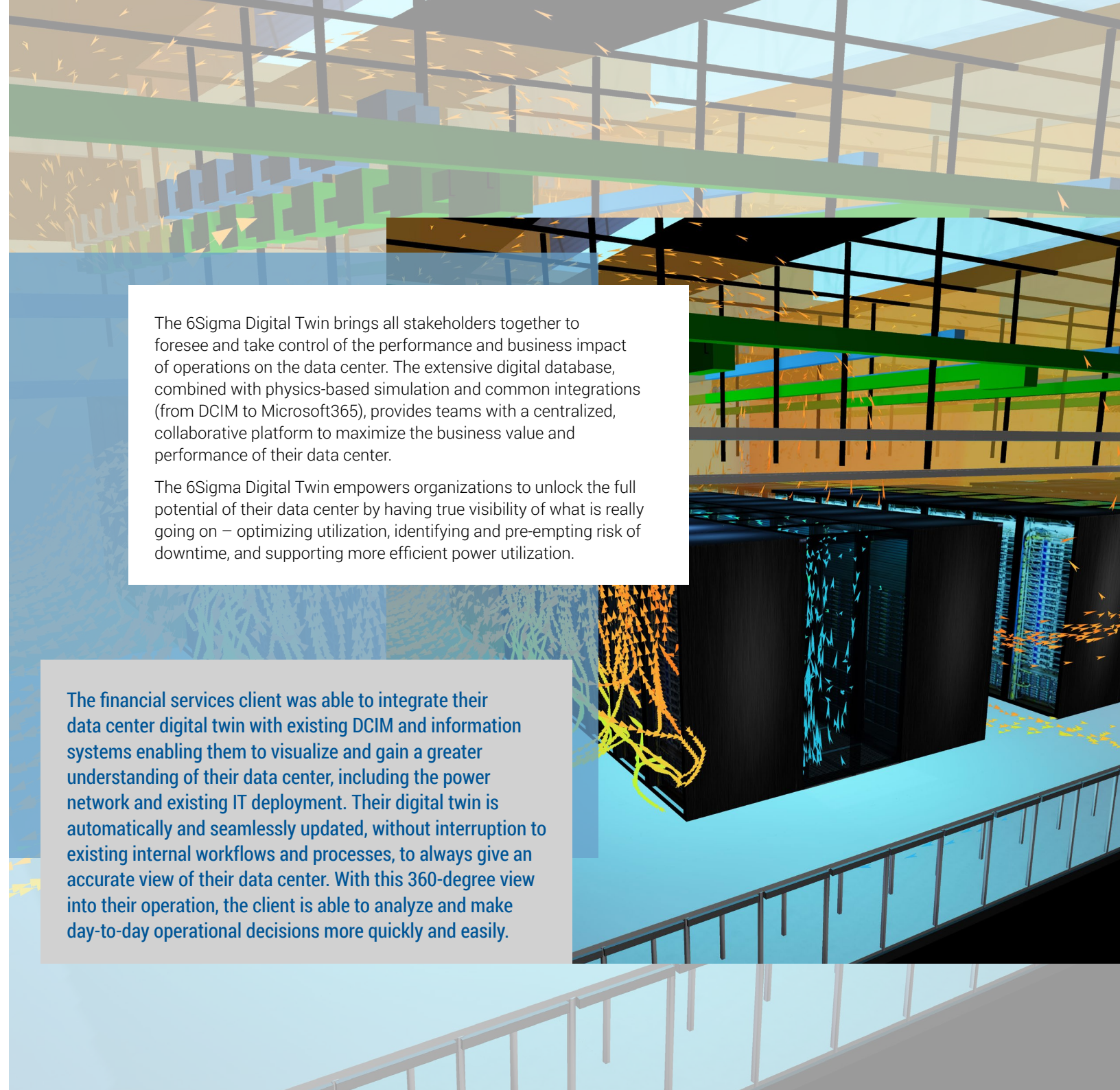


Future Facilities' 6Sigma Digital Twin effectively takes account of precisely which IT equipment is in each IT rack, how the data center is laid out and how this affects airflow, cooling, weight and power. By using Computational Fluid Dynamics (CFD) to calculate the current state and the impact of any potential changes, operators can predict the outcomes of future scenarios. CFD analysis is especially useful for diving into the finer intricacies of a data center's airflow, making it suitable for detecting issues such as hotspots, which can be problematic in multi-density environments. CFD applies science-based calculations to each particular configuration, helping operators plan for higher-powered cabinet loads. It is a key tool for running what-if scenarios to understand failure issues, plan future IT deployments to predict change and reduce risk in an environment where power densities are constantly growing.

The 6Sigma Digital Twin platform encompasses the entire data center ecosystem, including a virtual catalogue of the building blocks of your data center—the power, cooling and IT systems' components from all major OEMs.

It provides a centralized platform for teams to track and plan power, space, cooling, weight, IT assets and network port capacity. It also enables two-way data exchange for monitoring and asset management systems to use this information in the 6Sigma Digital Twin model.





The 6Sigma Digital Twin brings all stakeholders together to foresee and take control of the performance and business impact of operations on the data center. The extensive digital database, combined with physics-based simulation and common integrations (from DCIM to Microsoft365), provides teams with a centralized, collaborative platform to maximize the business value and performance of their data center.

The 6Sigma Digital Twin empowers organizations to unlock the full potential of their data center by having true visibility of what is really going on – optimizing utilization, identifying and pre-empting risk of downtime, and supporting more efficient power utilization.

The financial services client was able to integrate their data center digital twin with existing DCIM and information systems enabling them to visualize and gain a greater understanding of their data center, including the power network and existing IT deployment. Their digital twin is automatically and seamlessly updated, without interruption to existing internal workflows and processes, to always give an accurate view of their data center. With this 360-degree view into their operation, the client is able to analyze and make day-to-day operational decisions more quickly and easily.

The 6Sigma Digital Twin can be implemented in 4 easy steps

01

Create the Model

Input information about the physical data center into a simulation tool with a built-in Computational Fluid Dynamics (CFD) engine. This should include IT asset lists, Computer-aided Design (CAD) floorplans, and branch circuit monitoring data. Much of this data is automatically imported from existing systems, keeping model build time to a minimum.

The Future Facilities team will be there to guide this process.

02

Calibrate the Model

Calibrate the model against real-world measurements using spot check readings and environmental monitoring data. Adjustments can then be made to ensure an exact replica of the data center is created. At this stage, Future Facilities can check if there are any other measures that need to be taken in the simulation to provide an absolute reflection of the real facility.

Once the model is calibrated, initial readings can be generated to create the first assessment report on how the data center is operating.

03

Implement, Integrate and Train

Integrate the 6Sigma Digital Twin into the company's existing tools and systems.

Once tested, the model can be officially deployed by installing the software and security certificates, and finally granting users access to the levels they need.

Train staff on how to use the 6Sigma Digital Twin in the day-to-day operations of the data center to ensure staff can access and interpret all of the features and data required to make informed decisions.

04

Support

Unlock the full capabilities of your data center with your new 6Sigma Digital Twin.

Continue receiving ongoing support, training and integration from Future Facilities to ensure you are always getting the most out of your digital data center replica.

The 6Sigma Digital Twin is used not only to optimize data center operations today, but also to enable the planning and exploration of future changes without risk.

Black & Veatch and Future Facilities' Collaboration

Together, Black & Veatch and Future Facilities apply this tried and tested approach to serve as a trusted advisor to the financial industry.

With their complementary services and software tools, the team works together to help clients with critical decisions to transition to modern, scalable data centers with the utmost reliability, efficiency and security.

Data Center Assessments play a critical role in ensuring financial data centers are up to date with federal regulations and are performing optimally before issues with downtime and security arise.

Modern data centers must always be ready to support future data demand by utilizing the high-computing, high-density racks they need to perform the secure, fast and intelligent transactions that the financial industry and their customers expect.

Black & Veatch and Future Facilities offer solutions that help you plan for increasing data workloads and ensure your facilities can handle the impact rising rack densities will have on cooling, mechanical and electrical systems as well as space and capacity.

With predictive digital twin technology, you'll establish a benchmark of the current data center environment. This, combined with CFD analysis, enables you to calculate and model best and worst case scenarios, so you can engineer and deploy the solutions with the least possible risk to your uptime. Connect with [Black & Veatch](#) and [Future Facilities](#) today and begin adapting your data centers to be ready for future innovations.

Black & Veatch and Future Facilities' Services

- 1** Data center assessment services.
- 2** Digital twin CFD model of data centers.
- 3** Training on digital twin technology, including on-going support.
- 4** Engineered solutions for operational efficiency and cost-saving improvements and risk reduction.
- 5** Construction upgrades, including in a live data center environment.



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