aws

Speed Digital Transformation with an End-to-End Industrial Data Strategy

Unlock the value of your industrial data
with AWS Industrial Data Fabric

Table of contents

Connecting the data dots

Data is at the center of every industrial application, process, and business decision. While forward-thinking manufacturers use data to unlock insights that drive innovation, too often those efforts are confined to point solutions that don't scale across the enterprise. That's because industrial data systems are often sprawling, siloed, and complex, with diverse data sets spread out across data lakes, cloud databases, IoT devices, and on-premises systems. What's more, the machines, sensors, and devices found in industrial organizations all generate a massive, tangled trail of performance-tracking, real-time, and other unstructured data. Further, disparate IT and OT data sets bring not only physical challenges, but cultural and organizational challenges as well, making them difficult to unify. As a result, manufacturers struggle to know where all their data sits, how to connect and act on that data effectively, and how to manage data access.

A comprehensive industrial data strategy connects, unifies, and enables accessibility to the massive quantities and types of data generated in an industrial setting to accelerate engineering efforts, optimize operations, reinvent supply chains, and so much more. It provides a governed, data-driven approach that can be cost effectively scaled across organizational use cases to achieve business outcomes. An industrial data strategy not only breaks down data silos, it also structures data and makes it more available, enabling manufacturers to capitalize on advanced, real-time, and predictive analytics or use artificial intelligence and machine learning (AI/ML) to determine the next best action to improve production.

Amazon Web Services (AWS), the world's most comprehensive and broadly adopted cloud, has helped dozens of leading manufacturers transform their operations using the power of data to optimize productivity, quality, and sustainability. Read on to learn how an end-to-end industrial data strategy can help you create a standard way of managing asset data to drive results for your business.

Challenge: Scaling from proof of concept solutions

Without a comprehensive data strategy, most industrial customers start with a single use case, such as predictive maintenance in one of their plants. They typically do a proof of concept, and when that's successful, they decide to roll it out to other plants. But because those plants have different data structures, different standards, and different tooling, the solution that worked so well in the first case may not work in others—even if the problem is exactly the same.

A better way to digitally transform is by first managing all the data across the business before launching a use case. Companies that take that approach position themselves to address multiple use cases, with a fraction of the time and effort and a much greater chance of success. What's more, driving data management at scale enables greater innovation and agility organization-wide.

AWS knows industrial data management

The potential uses of industrial data, particularly when combined with the power of the Industrial Internet of Things (IIoT), are immense. Time-series and discrete data sets from IT and OT systems across many consumption patterns, such as real-time, analytics, and historical, can be used for everything from predicting and addressing factory equipment issues before they happen, to accurately measuring the cost of shopfloor tasks to reduce labor expenses, to automating maintenance workorders to improve machine availability.

The reality is that every manufacturer has multiple use cases, types of data, users, and applications that require different tools--and those needs will evolve over time. Your organization, therefore, needs more than a single database, data lake, data warehouse, or business intelligence service and must be intentional about picking the right data specific to the use case. To truly unlock the value of your data and drive timely insights and innovation, you need an end-to-end strategy—one that makes working with data easier for everyone who needs it to drive results.

With services proven in Amazon's Fulfillment Centers and across segments ranging from automotive and energy to manufacturing and pharmaceutical, AWS can make industrial data management easier at every point.

The AWS approach to industrial data management is:

- **Comprehensive**, delivering the right tools at the optimal price for any user, data type, and use case.

- **Integrated**, bringing together data that is stored and analyzed in different tools and systems to drive greater business understanding and more accurate predictions.

- **Governed**, with solutions designed to give users secure access to the data they need when and where they need it, at the speed change demands.

- **Open**, enabling collaboration between operaWtions, maintenance, supply chain, and engineering to optimize design, source, make, and supply across the value chain—and unleash innovation.

"

Insight Centers on AWS allow us to look at our whole value chain from the start to the end, from how we source our start material, how to do demand forecasting, how we operate on the show floor, to how we supply to our customers and our patients.

—Amit Nastik, Global Head of Strategy and Operations, Novartis

Read the blog ›

aws

AWS Industrial Data Fabric: Maximize the value of your data at scale

To help meet the data needs of manufacturers, AWS offers the AWS Industrial Data Fabric, a well-architected framework with prescriptive guidance that enables manufacturers to accelerate ingestion, contextualization, and the ability to act on their industrial and enterprise data across the value chain. The Industrial Data Fabric is a way of relating raw data from multiple industrial data sources into formats associated with an entity (for example, asset, equipment/ line, material, process) so that it can be easily consumed by analytics and digital applications. By providing economical, secure, and easy access to high-quality data sets, it enables business leaders to build the foundation for digital industrial transformation and optimize operations across use cases.

With the AWS Industrial Data Fabric, you can ingest, store, query, analyze, and act on your data across workloads and data types to achieve desired business outcomes. The AWS Industrial Data Fabric is comprised of AWS solutions, AWS Partner Solutions (like HighByte and Element), and AWS services such as AWS IoT, AWS IoT TwinMaker, AWS IoT Sitewise, and Amazon Monitron. Manufacturers select the combination of services and solutions that's right for them to accelerate the ingestion and contextualization of industrial and enterprise data and more quickly act on that data across the value chain. Using insights derived from the AWS Industrial Data Fabric, your organization can make better decisions that improve the quality of outputs, drive innovative designs, boost supply chain resiliency, and build smarter products.

BMW GROUP

BMW Group uses AWS-based data lake to unlock the power of data

For the past several years, the BMW Group has worked to stay at the forefront of the automotive industry's digital transformation by using data and predictive analytics. In 2015, the company created a centralized, on-premises data lake that collects and combines anonymized data from sensors in vehicles, operational systems, and data warehouses to derive historical, real-time, and predictive insights. However, the data lake's inability to scale made it difficult for the BMW Group to quickly deliver the innovative products its customers demand.

In response to these challenges, the BMW Group decided to re-architect and move its on-premises data lake to AWS to create what it calls its Cloud Data Hub (CDH). The CDH creates the foundation for developing data-driven IT solutions and enables the company to automatically and independently scale on a serverless architecture, speeding innovation. The BMW Group plans to scale out the CDH platform's capabilities to further accelerate its digital transformation and drive additional value across the business.

Read the case study ›

AWS Industrial Data Fabric

With the AWS Industrial Data Fabric, you can combine your industrial data sets with AWS Services, AWS Partner Solutions, industry standards, and best practices. Quickly ingest, store, contextualize, and act on your data to achieve business outcomes.

Ingest: Processing and handling of batch, streaming and intermittent data simultaneously.

Store: Persisting and maintaining the relationships as source data changes.

Contextualize: Screening, filtering, interpolating, and other data conditioning functions, which may also include the use of ML. Aligning various data types, especially in the time dimensions.

Act: Providing access to data consumers in the format they need to consume it. This usually means supporting bi-directional flow from the consumer through the data infrastructure and down to the other systems and applications.

Make innovative design decisions faster

Design and engineering teams can increase their agility and innovate more freely with cloud-based simulation, remote access, and high performance computing (HPC). Their designs get into production faster, accelerating time to market.

Designing and testing products in the virtual world is faster and less expensive than making physical prototypes. When running on cloud infrastructure, the right level of HPC allows product developers and engineers to solve complex problems using 2D and 3D model-based design and large-scale, parallel simulations. The result is the reduction or elimination of time-consuming prototype production. Product teams can explore manufacturing-ready outcomes early in the production process to optimize for cost, material, and the best manufacturing techniques. By quickly running large-scale simulations and parameter sweeps, HPC enables faster advanced simulation, reducing time to results and time to market.

For generative design, which enables engineers to create thousands of design options by simply defining their design problems, HPC can run hundreds of simulations in hours instead of days. In addition, AWS IoT TwinMaker makes it faster and easier to create digital twins to better understand new designs before prototyping.

GUC

The Advanced ASIC Leader

GUC increases ASIC reliability and quality at scale with AWS

Global Unichip Corporation (GUC) helps system and semiconductor companies develop application-specific integrated circuits (ASICs), or microchips. Each generation of ASICs has a more complex design and uses more advanced semiconductor processes, making it harder to reach quality targets. What's more, these ASICs become components in data center systems, where uptime and system reliability are critical.

To meet these challenges, GUC engaged AWS Select Technology Partner proteanTecs, which uses deep data and machine learning to predict failures in electronics. ProteanTecs uses AWS to achieve the scalability and flexibility it needs to support high-performance computing workloads running millions of simulations each day. The AWS-powered proteanTecs analytics platform combines data derived from Universal Chip Telemetry technology embedded in the ASICs with predictive artificial intelligence and data analytics to track and repair silicon defects before they cause system failure. Thanks to proteanTecs and AWS, GUC has increased chip quality and reliability and extended visibility and repairability into the field.

Read the case study ›

Carrier and AWS collaborate to reduce food spoilage across the cold chain

AWS is helping power digital transformation to improve food sustainability for suppliers, manufacturers, logistics, consumers, and everyone in between. For example, AWS and Carrier collaborated to develop Lynx, a digital platform that unifies the highly fragmented cold chain to reduce food spoilage, support end-to-end visibility, and increase efficiency throughout the various stages of refrigerated storage and transportation.

Multi-company supply chains are complex webs of loosely connected providers and technologies that share little information or systems with each other. When it comes to cold chains, which transport and store perishable items like food with refrigeration technology, gaps in the cold chain can lead to spoilage and damage. Lynx uses a foundation of AWS IoT, machine learning, and analytics technologies to provide customers with a comprehensive view of cargo location, temperature conditions, and external events that could impact cold chain operations. Carrier can also apply machine learning to identify potential issues that could affect food cargo and then develop recommendations to prevent or eliminate them.

Read the blog ›

Improve supply chain visibility and resiliency

In recent years, supply chains have experienced unprecedented volatility accelerated by widespread resource shortages, geopolitics, and natural events. These disruptions put pressure on manufacturing organizations to plan for potential supply chain uncertainty, respond quickly to changes in customer demand, and keep costs low. Organizations need supply chain analytics to sense, analyze, and respond to major disruptions.

With data services from AWS, you can build a supply chain that delivers a unified view of data with end-to-end visibility, providing the predictability your organization needs to make faster decisions. AWS Supply Chain helps you track and trace the entire production process, make more informed decisions powered by ML, mitigate risks associated with overstock and out-of-stock, and lower operational costs.

Reduce downtime and increase efficiency with ML-based predictive maintenance

When data from equipment, assets, and products is easily accessed, industrial customers can address trouble spots before they cause real problems. ML adds intelligence to existing processes, automates time-intensive manual tasks, and accelerates innovation with the creation of new products and services. AWS offers the most comprehensive set of AI and ML services, including purpose-built services for industrial such as Amazon Monitron and Amazon Lookout for Equipment, which require no machine learning experience. Additionally, Amazon SageMaker makes it possible to build, train, and deploy ML models for any use case with fully managed infrastructure, tools, and workflows.

Baxter

Baxter provides data-driven insights and improves operational efficiency with AWS

Baxter International Inc. (Baxter), a global medical technology leader, is driven by its mission to save and sustain lives. As part of its digital transformation on AWS, Baxter developed TrueVue, which connects the company's continuous renal replacement therapy devices to AWS IoT Core. TrueVue securely and seamlessly transmits device data to a patient's electronic medical record, providing auto documentation and visibility into how the therapy is being delivered. Baxter can collect and analyze this data remotely, gather near-real-time metrics, and perform proactive monitoring, ultimately providing patients and clinicians with a richer understanding of patient treatment and health.

Read the case study ›

Baxter also worked with AWS to improve operational efficiency across its global manufacturing network through more effective predictive maintenance. Using Amazon Monitron—an end-to-end condition monitoring system that uses machine learning (ML) to automatically detect abnormal conditions in industrial equipment—Baxter was able to avoid over 500 hours of unplanned machine downtime, positively affecting the lives of approximately 10,000 patients.

Read the case study ›

UNOX drives innovation with AWS IoT technologies

UNOX designs and manufactures professional ovens for food service operators that provide customers with data, information, and artificial intelligence-generated ideas using AWS IoT. UNOX leveraged IoT services and AWS Lambda to develop a new web application for domestic kitchen ovens within a matter of weeks. The company also used IoT services to develop three apps that help customers take advantage of more oven features, monitor and remotely program ovens from anywhere, and set up cooking programs to drastically streamline production.

Going forward, UNOX plans to integrate new AWS technologies into its products. The company is in research and development for progressive machine learning that incorporates Amazon SageMaker. It is also considering moving its fluid dynamic tests of cooking effectiveness within ovens onto AWS infrastructure for faster performance simulation. Overall, using AWS has shortened time to market, increased operational efficiency, and improved customer satisfaction.

Read the case study ›

Build smarter products to meet customer needs

By connecting customer data across all touchpoints of a customer journey, AWS helps manufacturers better understand their customers and create smarter, more personalized products that meet their demands. Services like AWS IoT Greengrass, AWS Lambda, and Amazon DynamoDB deliver secure IoT applications that help you act on smart product and machine data. To test and monitor these applications, you can use AWS IoT Device Simulator to build a large fleet of virtual connected devices and simulate data publication at regular intervals.

Jumpstart your journey

The journey to innovation begins with data, and successfully becoming a data-driven organization begins with implementing an end-to-end data strategy that democratizes data access. The AWS Industrial Data Fabric creates the foundation manufacturing organizations need to model data at scale, centralize data management, ensure seamless data access, unify governance, and benefit from AI/ML innovations. With the AWS Industrial Data Fabric, manufacturers have the data they need to derive critical insights, predictions, and models that improve processes, optimize outputs, and respond to customer demands.

Learn more about <u>how AWS enables manufactures</u> to implement an end-to-end data strategy with <u>AWS Industrial Data Fabric offerings</u>.