Digital Manufacturing and the IIoT

Success with a Single Platform

IoT World Today

DASSAULT SYSTEMES

In the current trend toward digitalization, manufacturers increasingly rely on a range of technology platforms to help streamline and accelerate their production processes. These organizations often deploy multiple, single-use systems and tools, such as Artificial Intelligence (AI), data analytics, or Virtual Reality (VR). One of their goals is to better understand and utilize Industrial Internet of Things (IIoT) data. However, vendors sell these technologies individually and since they lack integration, companies are unable to capitalize on the information they've gathered.

It's only after deployment that business and IT leaders realize the value and effectiveness of a unified platform. Instead of achieving their goal of fast and improved production and operations fueled by the IoT, these companies become mired in pilot purgatory, unable to meet the digital demand across their internal value chains and broader supply chains.

In fact, a recent report from McKinsey found that only 30% of survey respondents transitioned diverse IIoT deployments into unified, large-scale rollouts. In this white paper, we examine the reasons for IIoT pilot purgatory and explore the importance of a single, unified platform for meeting strategic business and manufacturing production goals.

Moving Beyond Pilot Stage Purgatory

Digital transformation represents a major shift and a top strategic priority for manufacturers across the globe. According to IDC, Industrial Internet of Things (IIoT) spending in discrete manufacturing will exceed $150 billion by 2022[1]. The transition from traditional industrial manufacturing approaches to digital platform adoption offers the potential for significant value and meaningful ROI across all areas related to the manufacturing process, from design and engineering to production and customer service.

In general, data generated by IIoT devices can provide companies with deep insights enabling them to build products **faster** and **more effectively.**

Manufacturing executives and operations leaders largely assume that these digital, IoT-connected technologies, such as artificial intelligence (AI), machine learning (ML), and data analytics, can provide new capabilities to help them achieve their production goals.

However, these isolated, single-use technology platforms are insufficient for meeting the broad range of manufacturing needs. Ultimately, they function as a collection of ineffective, siloed technologies as compared to the value of having one unified platform. Organizations thus lack the ability to gain a comprehensive view of their internal value chains, improve production, and enable the necessary collaborations. As a result, single-use deployments simply mirror outdated manufacturing hierarchies.

In general, IIoT systems span IT, operational technology (OT), and core business functions and thus require broad stakeholder alignment. Success also hinges on executive buy-in and forward-thinking leadership to spearhead these deployments. True transformation is driven from the top, spurred on by the ability to communicate the intrinsic value of the IoT and its potential for driving digital manufacturing at scale.

Yet companies still face hurdles. For example, vendors position the IIoT as simply a connectivity resource. Lacking effective integration, companies simply store massive amounts of data they're unable to incorporate into their manufacturing processes. This leads to overspending and an inability to establish large-scale deployments beyond the pilot stage.

In order to achieve business value and a strong ROI, manufacturers require a unified collaborative environment that can synchronize operations across design, engineering, production, and supply chains.
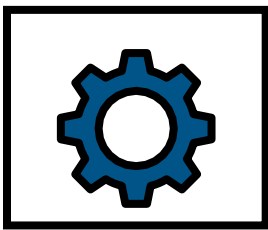
Confronting Data Challenges

In key use cases, companies are employing digital solutions at scale to address operational pain points, create competitive advantage and drive bottom line impact. In many instances, IIoT deployments enable the management of remote assets in heavy industries (oil & gas, chemical, etc.). For example, companies are increasingly using predictive maintenance (PM) to monitor and optimize equipment as needed while also achieving a robust ROI.

To be sure, the true value of an effective IIoT deployment is realized through actionable insights derived from collected sensor data. Yet organizations still face obstacles that prevent them from using that data effectively. By any measure, the inability to digitize data in today's competitive digital marketplace can have severe repercussions.

Excel spreadsheets and proprietary CAD specs shared via email lack the **speed**, **granularity**, and **scale** necessary to meet the constantly evolving demands of modern manufacturing.

In the current era of digital design, on-demand manufacturing, and responsive customer service, organizations must drive the flow of relevant data to the right decision makers in real time. For example, the urgency around product recalls demands swift value chain collaborations and fast resolutions. Depending on the severity of issues, different coordinations are required to make the necessary
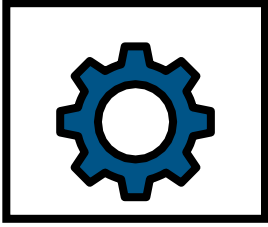
data available. And how companies manage their information today—from data duplication and sorting to cleansing and dissemination—is critical.

To ensure that the right information is used for collaborations across every segment of a manufacturing company, IIoT data needs to be contextualized and relatable. That is, whether the information is derived from design, QA, manufacturing support or production schemas, it must be accurate and able to be immediately consumed by the appropriate stakeholder.

The inefficiencies that manufacturers are confronting today are due in part to the reliance on multiple, technologies and systems that lack a coherent, unifying connection. By contrast, a comprehensive, unified platform offers a closed-loop system in which all the constituents across an organization's internal value chain and supply chain can collaborate, coordinate, and work hand-in-hand using real-time, accurate data.

In addition to boosting asset performance and operations, improving supply chain efficiency, and enhancing customer support, IIoT deployments can open up **additional revenue opportunities** through new product and service offerings.

An effective IIoT platform-centered strategy creates new opportunities at every manufacturing level. Moreover, a unified IIoT platform is more than just software architecture and wireless connectivity. Effective use of IIoT deployments can help define business processes, workflow and coordination, data management, and product integrity and performance.
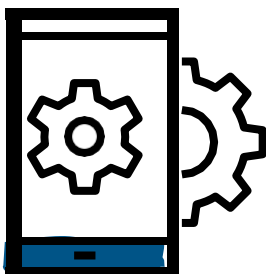
IIoT Success: More Than Just Connectivity

In the same way that digitalization enables businesses to dynamically connect production, distribution, marketing and customer service resources, a single, scalable platform fills in the missing gap in traditional IIoT manufacturing approaches. It can foster invaluable collaborations by enabling internal

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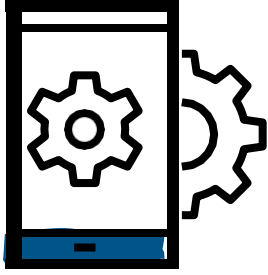
manufacturing teams to instantly view comprehensive production data where and when they need it.

A single, unified IIoT-based solution allows business teams to frame data in context. In addition to making better decisions, these teams can devise new ways to capture and deliver value. For example, manufacturers can evolve from a product-focused approach to a service-centric model. Using sensor data and analytics, business teams can pinpoint and prioritize services offered to customers based on where the greatest source of value exists.

In addition to delivering innovative ways of commercializing products and services, organizations can **transform** their overall business approach.

These IIoT-driven capabilities enable business processes with higher level of flexibility, efficiency and responsiveness. Business professionals can instantly access powerful tools to support evolving organizational needs. In turn, these teams gain important insights through customer-facing data analytics as well as accurate and timely updates on production and supply chain conditions.

On the manufacturing side, digital modeling for engineers and increased automation on the shop floor result in sophisticated smart products that more truly meet consumer expectations. For example, operations teams can speed up response times and perform tasks based on precise, streamlined information. In one use case, a well-known A&D manufacturer optimizes factory logistics to meet stringent requirements for complex assembly of aircraft wings in real time.

Employing a single, unified platform to incorporate IoT data and provide an operations framework, the company employs heavy machinery and equipment (AGVs, cranes, etc.) across 89 factory zones. To meet production goals, engineering and production teams combine complex event processing with real-time sensor data to orchestrate 2400 assembly moves per day.

In addition to ensuring product quality (due to composite wing material constraints), operations teams can simulate events in advance while establishing high production throughput and shop floor safety. These capabilities offer a
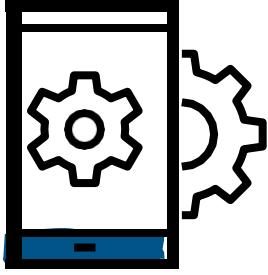
prime example of how combining experience with data-driven innovation is made possible by connecting the real world to the virtual world.

It also demonstrates how successful IT and operational technology (OT) convergence can actually deliver use cases that will meet a manufacturer's business goals. Of course, employing a flexible, scalable platform for end-to-end visibility of design, manufacturing, support and production is an integral part of that success.

The ability to gather and contextualize different IIoT data streams for meaningful insights is **fundamental** to competing in today's digital arena.

For example, in the transportation and mobility market, a major automotive OEM validates and optimizes ergonomic passenger and driver designs through simulations based on IoT sensor data. Using real-time motion capture with AI, designers can identify ergonomic issues early in the design process and avoid costly mistakes. Designers employ a single interface to simulate the way humans interact with seats, spaces, and controls on a vehicle under design. In addition to reducing the number of design iterations, a single platform ensures collaboration throughout the build process and instant access to any design.

These collective workflows provided by one comprehensive platform contrast sharply with single-use technology systems. For example, organizational requirements that dictate how a certain technology is utilized, such as data analytics, may not meet the departmental requirements of business teams. Moreover, companies regularly accrue vast amounts of structured and unstructured data in different file formats from a variety of systems (design, engineering, support, production, etc.). Siloed and isolated solutions aligned to one specific technology simply lack the integration necessary to coordinate all this data to achieve meaningful insights into the manufacturing process.

For a manufacturer that supplies the diesel engines used in commercial vehicles, innovation from engine design to production is critical. Deploying a unified platform enables this manufacturer to boost both productivity and efficiency. The company has advanced from producing ten engines per hour to forty. In addition,

due to increased statistical and data support provided by the new unified system, operations teams have increased the hourly output year over year. The company also achieved significant cost reductions through greater efficiency and quality improvements.

For example, by relying on a single, comprehensive system, operations teams can pass on manufacturing knowledge and experience to ensure continuity and maintain high levels of consistency. In addition to fast scalability, a unified platform not only ensures a single view of all manufacturing processes, it also provides integration with legacy systems. As a result of these innovations, the company's manufacturing output doubled in three years.
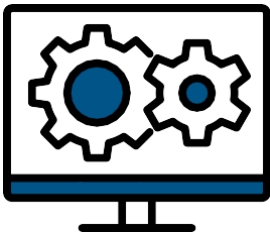
The Value of Single-Platform Collaborations

In general, it's critical for manufacturing organizations to have a high degree of cooperation across their internal value chains. For example, by using one unified platform at the design level, concept ideas can be shared, tracked, and discussed with all stakeholders participating via one unified interface. By relying on one correct version of a prototype or product, all stakeholders can have accurate visibility of project status at all times.

That's partly the concept behind digital twin technology. Using a complex array of software-based systems, companies can create digital twins to accurately duplicate and simulate the real-world properties and performance of individual products, manufacturing processes or entire plants. This digitally informed design approach eliminates the need for physical prototypes, reduces development time, improves overall quality and enables faster design iterations. It's a revolutionary approach that enables manufacturers to capitalize on real-time data, making design changes as needed or in response to customer feedback.

In the same way, a unified IIoT platform enables manufacturers to access, monitor and control their production processes. It offers a consistent, uniform way to deal with all the data challenges that manufacturers face across their supply chains. Within the manufacturing environment, a single platform integrates a range of applications that rely on diverse data streams, whether they're focused on design, operations, or testing and analysis.

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In fact, that's one of the driving principles behind the **3D**EXPERIENCE® platform from Dassault Systèmes. The scalable, unified platform enables manufacturers to take concepts and prototypes all the way to sophisticated, final products. In addition to gaining valuable insights through real-time data, teams can leverage the information they gather to move into predictive maintenance as well as ensure overall optimization through scenario planning.

In contrast to standard IoT-based storage, connectivity, or device management platforms, **3D**EXPERIENCE offers a **very different type of platform approach.**

It effectively coordinates all the applications that manufacturers rely on and enables them to function together through seamless integration of their individual data streams. Moreover, companies can leverage data to move into maintenance as well as scenario planning and optimization. Such an approach ensures that manufacturing insights based on accurate data are always available at the right time and place. It also guarantees that the most critical ROI for manufacturers—the customer experience—is front and center.

Ensuring Customer Satisfaction

In terms of creating positive consumer experiences, the **3D**EXPERIENCE platform harnesses emerging technologies to incorporate customer feedback into the design process and increase customization. It capitalizes on the fusion of traditional approaches to retail with digital channels to build smarter products and create more personalization opportunities.

For example, employing a single platform for ideation, design, engineering, and production translates to more meaningful products that accurately reflect customers' values. In addition, creating a more personalized buyer's journey results in higher levels of interest, longer product interactions and increased sales conversions.

The **3D**EXPERIENCE platform's single, closed-loop system places the customer experience front and center by incorporating analytics, virtual simulations and engineering to build better products that more effectively meet consumer

demands. The platform not only offers the ability to replicate product functionality from an experience perspective, but also to simulate key aspects of the manufacturing environment and the supply chain. Through immersive virtuality on the **3D**EXPERIENCE platform, designers, engineers, and production teams can visualize prototypes with a high degree of fidelity well before the product is actually delivered.
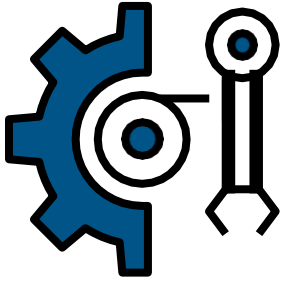
Outlook

As manufacturers assess their digital transformation efforts and formulate their IIoT goals, they face questions over the business value of single-use technology deployments and dead-end IIoT data. In many instances, they must overcome significant obstacles coordinating platforms, scaling accordingly and integrating diverse data streams. As a result, these manufacturers are often unable to capitalize on their digitalization efforts and risk falling behind the competition. According to recent market analysis, by 2020 half of IoT spending (50%) will be driven by the manufacturing, transportation, and logistics sectors[2].

The deployment of scalable and reliable end-to-end integration platforms represent a critical factor in the success of these use cases. These solutions not only provide a holistic approach encompassing every aspect of the manufacturing process, they also offer a strong ROI and a foundation for continued innovation. Moreover, in the current era of explosive data growth, a single, integrated platform that can process ever-increasing data complexity is invaluable.

Dassault Systèmes' **3D**EXPERIENCE platform provides a comprehensive operations framework at the core of what manufacturing is all about.

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1. IDC Forecasts Worldwide Technology Spending on the Internet of Things to Reach $1.2 Trillion in 2022.
   https://www.idc.com/getdoc.jsp?containerId=prUS43994118.

2. Winning In IoT: It's All About The Business Use Case.
   https://www.bcg.com/publications/2017/hardware-software-energy-environment-winning-in-iot-all-about-winning-processes.aspx.