IDC MarketScape: Worldwide Industrial IoT Platforms and Applications in Manufacturing 2021 Vendor Assessment
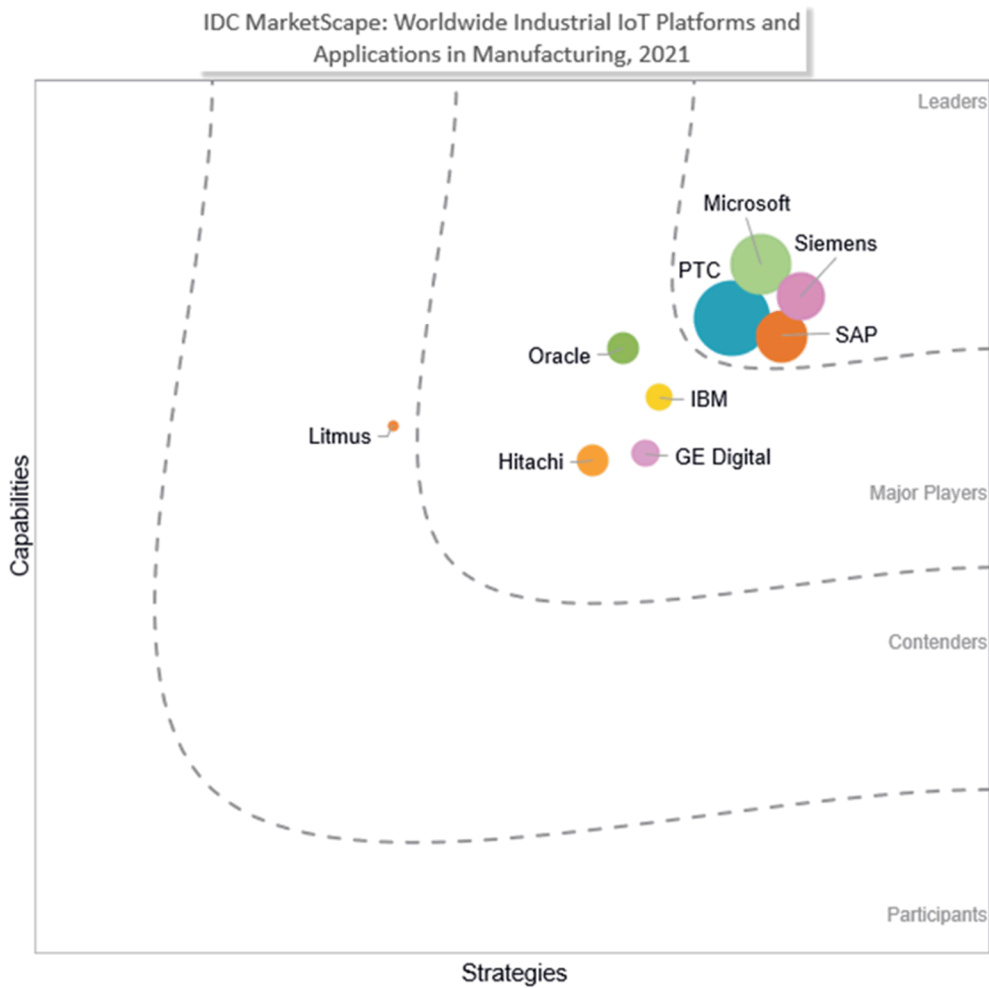
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IDC MARKETSCAPE FIGURE

FIGURE 1

IDC MarketScape Worldwide Industrial IoT Platforms and Applications in Manufacturing Vendor Assessment

Source: IDC, 2021

Please see the Appendix for detailed methodology, market definition, and scoring criteria.

IDC OPINION

While the entire world has had to deal with the disruption caused by COVID-19, manufacturers, on average, have felt the pressure more than most. In fact, IDC's Worldwide ICT Spending Guide has shown that roughly $1.3 trillion has been lost because of COVID-19, with the manufacturing industry bearing the greatest impact of the crisis by far. Manufacturers are still struggling to respond to supply chain disruption, evolving government/regulatory requirements, and shifting production capabilities to meet public demand for their goods and services. In response, manufacturers are beginning to define their future success by how well they react to market disruptions. They are doing so through a process IDC calls resilient decision making. This process is the combination of ongoing efficiency measures by manufacturers and a new focus on providing employees with near-real-time information, detailed insights on performance, and analytics to improve the decision-making process

Manufacturers recognize that technology will play a key role in their long-term success. Internet of Things (IoT) in particular, will be among the technologies with the greatest impact on the manufacturing industry over the next five years, especially as remote access to information has become essential. IoT provides manufacturers access to more data than ever before, which can fuel a company's transformation efforts. IoT is pervasive throughout the manufacturing value chain, with ongoing activity across the four primary strategic priorities:

- **Supply chain optimization —** Using IoT and sensors to improve supply chain orchestration
- **Smart manufacturing —** Using IoT and sensors to improve factory performance in the plant
- **Product innovation —** Using IoT and sensors to improve new product introduction (NPI)
- **Field service —** Using IoT and sensors to enhance service offerings and delivery

The biggest opportunity for transformation comes from a product/service standpoint. Manufacturers (discrete manufacturers in particular) are looking to IoT-connected products as a way of transforming business models that capitalize on the intersection of products and services. This link between customer products and real-time IoT data is an opportunity for manufacturers to better understand customers, as well as their behaviors and what they value, in order to deliver customized offers.

IDC MARKETSCAPE VENDOR INCLUSION CRITERIA

The vendor inclusion list for this IDC MarketScape is intended to include the most prominent industrial IoT (IIoT) platforms and applications providers focused on the manufacturing industry.

To qualify for this study, an organization had to provide:

- A commercially available – and generally available – software platform that can be used to build and deploy IoT applications and manage IoT devices
- Native support for industrial protocols within the platform offering, OPC at a minimum
- Edge application frameworks and runtimes, in addition to cloud development capabilities
- Analytics tools including dashboards and advanced analytics (machine learning/artificial intelligence [ML/AI])

- Security capabilities within the platform architecture
- Tools to create a "thing model" (This model abstracts raw sensor data into a hierarchical semantic model and presents it as a "thing" to an application.)
- API access to IoT data
- Commercially available IoT applications

In addition, participating vendors had to:

- Have cleared at least $15 million in IoT platforms and applications software revenue for 2020
- Be able to support global IoT deployments (the Americas, EMEA, and APAC)
- Have at least 20% of their current IoT revenue stemming from the manufacturing vertical
- Be able to provide a minimum of two customer references for the manufacturing vertical (Reference customers had to have had at least six months experience with the platforms and applications by January 2021.)

For this IDC MarketScape, vendors had to meet a strict series of criteria as laid out previously. Other vendors that may play in the industrial IoT platforms and applications software space for manufacturers but that did not meet the criteria for inclusion in this document include:

- ABB
- Altizon
- Augury
- AVEVA
- AWS
- C3.ai
- Elevat IoT
- Honeywell
- Huawei
- MachineMetrics
- Plataine
- Schneider Electric
- SoftwareAG
- Tulip
- Uptake

ADVICE FOR TECHNOLOGY BUYERS

This IDC MarketScape assessed the capabilities of vendors in three areas: the offering and offering portfolio, the go to market, and the business itself. We suggest technology buyers pay particular attention to these areas, which are discussed in the sections that follow.

Offering and Offering Portfolio

- **Platform functionality:** In this study, we evaluated the core IoT platform functionality from many aspects, including how applications can access data, device management, data management, analytics, security, app development, deployment options, DevOps support, and the user

interface (UI). However, IoT platforms have varying requirements in terms of the depth of technical skill needed to work with them so organizations should also internally assess their skill sets when choosing an IoT platform.

- **Integration:** We suggest technology buyers thoroughly vet possible suppliers for their integration capabilities with both the systems that generate the IoT data and the back-end systems they want to integrate this data with:

  - **Front-end integration:** Although some customization may be unavoidable due to equipment that speaks proprietary protocol formats, vendors that are serious about this space are investing in capabilities to more directly communicate with various types of industrial equipment. In addition to the ability to access the data, such tools may also be able to get data from disparate sources into a common data model so that it can be more readily used by applications.

  - **Back-end integration:** While there are some IoT use cases that can be driven off IoT data alone, we believe much of the value of IoT will be realized by the integration of that data with other key systems driving business processes. In the manufacturing space, we recommend evaluating integration with systems such as ERP, CRM, supply chain, asset management, manufacturing execution systems, and product life-cycle management (PLM).

    IIoT platforms and applications vendors should also be able to integrate with historians as these systems hold important historical and contextual information about equipment and processes.

- **IIoT data and analytics:** As the IoT market matures, and more data becomes available, the opportunity exists to analyze data using various tools and techniques. In addition, the cloud adds the ability to be able to gather data across geographically dispersed areas and do cross-site analysis. However, an effective analytics strategy does require a strong data management foundation that feeds clean, trustworthy, and properly contextualized data into the analytics model. The data and analytics strategy should also take data access into consideration. The more people that can access and work with the data, the more overall value an organization can derive from this valuable asset. Finally, organizations should assess what prebuilt models and algorithms the vendor offers for the manufacturing industry that may be able to speed up their own deployment time.

- **Deployment options:** Over the past several years, it has become increasingly apparent that, for most organizations, workloads will live in a hybrid cloud, multicloud world. IoT applications are no different, and in fact, they can drive up the complexity by needing to run in offline edge scenarios. It is important to understand how well the vendor you are engaging with can support your unique application deployment needs. In addition to the proper infrastructure to run distributed applications, we would recommend asking if you can use the same programming model for applications that run on different endpoints and if those applications can be managed in a similar way to your other workloads.

- **Solution/application portfolio:** In recent years, there has been a clear shift by providers in the space to focus more on the outcomes achievable through IoT rather than IoT platforms themselves. This has led to the rise in importance of solution/application portfolio as it will enable manufacturers to quickly deliver results on the outcomes they prioritize. IDC expects this shift to continue to occur as IoT portfolios continue to mature:

  - While IoT can be utilized across the previously mentioned four main manufacturing strategic priorities, platform providers usually have certain use cases they are stronger in than others. IDC recommends that you examine a provider's current portfolio and future

road map to ensure it aligns with your overall transformation goals. Select the vendor that can help you achieve results today but also set you up for future success.

Go to Market

- **Ecosystem development:** The Internet of Things is highly ecosystem driven, and the development of industry ecosystems is a major trend as the world becomes more and more interconnected. IoT software (as covered in this assessment) is only one part of a full IoT solution, however. Therefore, it is important to understand how well the vendor you are working with has built up its partner ecosystem, specifically in the manufacturing vertical. Organizations we speak with consistently bring this factor up in terms of their choice to work with a certain vendor. A vendor with a strong ecosystem can help customers be successful in a number of ways: by doing pre-integrations with other software, hardware, and connectivity providers that help an organization get to market faster, by helping customers find services companies knowledgeable in their software to make the implementation smoother, by providing user groups that allow organizations to share best practices among themselves, and by providing opportunities to monetize software built on the platform, and more.

- **Customer success:** Historically, many IoT projects failed to move past the proof-of-concept (POC) stage. There is no single reason why this happens, but one of the most prominent causes is that the organization failed to consider how the IoT project fed into the larger digital transformation (DX) goals of the company. We recommend evaluating IoT platform providers that not only have good technology but also take the time to understand – or help you work through – the key goals and KPIs for the project. This consultative approach is important for not only exploring the initial alignment between the vendor offering and your requirements but also ensuring that the vendor's longer-term road map is well synchronized with your strategy.

- **Pricing:** IoT platforms and applications can be priced in a variety of ways. We asked about 4 different types of pricing and licensing terms and 10 different pricing models, and at least one vendor said yes to almost every category. The most common *pricing and licensing term* for IoT platforms and applications is the *subscription model,* and the next is on premises. A few vendors offer consumption-based pricing; none of the vendors that participated in this study offer outcome-based pricing for the platform. For pricing *models* for the platform, the most popular model is tiered pricing based on number of assets or devices. Other popular models are pricing based on named users or pricing based on data streams/tags. For pricing *models* for applications, the most popular model is pricing based on named users; the second is tiered pricing based on number of assets or devices.

  We recommend carefully assessing if a pricing model used for a POC will scale, taking into consideration your specific IoT use case and any business models you plan to put in place based on IoT data. It is also prudent to ask vendors if they offer any try-before-you-buy options.

Business

- **Investment in IoT:** IoT is a complex phenomenon that spans across heterogeneous hardware, networks, and software – and therefore requires significant investment from vendors for successful market participation. This effort includes not only internal R&D into innovative technology but also externally focused ecosystem development, which beyond the typical partnerships and integrations may also include participation in consortia, test beds, and the like. While not every vendor can invest at the same dollar amount, IDC recommends ensuring that the platform vendor you partner with is seriously invested in IIoT and Industry 4.0 for the long run.

- **Connected products past POCs:** A noticeable shift from the 2019 version of this IDC MarketScape is the number of customer references highlighting their work on connecting their products and the new service opportunities available to them. While most manufacturers tend to start with smart manufacturing use cases for IoT, the product/service opportunity is being realized by a growing portion of the industry and will only become more important as competitive differentiation and revenue growth are top priorities. One reference stated the top challenge they had to get past in their connected product initiative was from a security perspective, namely keeping customer data secure as they remotely monitored assets in their factories. This security piece is an important aspect to keep in mind from the start for manufacturers with connected product/service aspirations.

- **Industry knowledge:** There are unique industry challenges and business processes within different segments of manufacturing, and it is critical to understand these differences to be successful in an IoT deployment. IDC recommends you work with a platform provider that recognizes the requirements for your industry. Included in this IDC MarketScape are providers with offerings for manufacturing, which includes product-centric organizations across four distinct value chains:

    - **Asset-oriented value chain (AOVC) —** Industries include chemicals, metals, and pulp and paper.

    - **Brand-oriented value chain (BOVC) —** Industries include consumer packaged goods (CPG), food and beverage (F&B), fashion, and life sciences.

    - **Engineering-oriented value chain (EOVC) —** Industries include automotive, aerospace and defense (A&D), and industrial machinery.

    - **Technology-oriented value chain (TOVC) —** Industries include electronics and semiconductors (high tech).

VENDOR SUMMARY PROFILES

This section briefly explains IDC's key observations resulting in a vendor's position in the IDC MarketScape. While every vendor is evaluated against each of the criteria outlined in the Appendix, the description here provides a summary of each vendor's strengths and challenges.

GE Digital

GE Digital is positioned in the Major Players category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

GE Digital is an industrial software and services provider that was founded in 2015 by GE to consolidate digital capabilities from across the organization. It is headquartered in San Ramon, California, with over 130 offices worldwide. GE Digital provides technology for all major industrial verticals including process and discrete manufacturing, oil and gas (O&G), mining, and utilities, as well as of GE's own industrial operations GE Digital restructured in September 2019 and brought in asset performance management (APM) capabilities from Baker Hughes, a GE Company.

IoT Platform Offering

- GE's industrial IoT Platform is called Predix:

- The Predix Platform provides a set of industrial services to build, develop, deploy, manage, and extend applications for industrial organizations.
- GE no longer sells Predix as a standalone platform as a service offering; however, Predix continues to provide a common foundation for GE's suite of industrial applications.
- The company does offer subscriptions to Predix Essentials, which is a SaaS version of the platform focused on industrial data monitoring and event management.
- The company offers Predix Edge, which allows organizations to extend their Predix-based IoT applications with edge analytics and processing.
- GE offers horizontal applications such as asset performance management, operations performance management, and field service management.

Manufacturing IoT Offering

- GE Digital offers solutions across all four manufacturing value chains, with EOVC being the company's largest manufacturing customer segment, with increasing focus and growth in AOVC and BOVC.
- GE Digital offers IIoT applications in two manufacturing DX strategic priorities, smart manufacturing and field service, with smart manufacturing use cases being the company's strongest area.
- For manufacturing, GE Digital offers plant control and management, which includes on-premises HMI/SCADA and historian and MES System software to operate plant equipment and manage processes.
- GE Digital aims to transform traditional manufacturing into a digital industrial model, with a specific intent to drive lower risk/cost, improve productivity, improve quality, improve availability, and expand revenue through new business models.

Strengths

- **Customer support:** Manufacturing references consistently mentioned the level of support that GE Digital provides them as a strength. GE Digital offers three tiers of support with a global team of customer success managers, and references cited that managing tickets/requests was a smooth process. This focus on support will continue as GE Digital is continuing to add self-service features and is becoming more proactive with customer communications.
- **IIoT analytics:** GE Digital has built-in analytics across its IoT applications, with the Proficy CSense, Proficy Operations Analytics, and APM being the most relevant to manufacturing. These applications employ machine learning, pattern recognition, probability modeling, statistical analysis, and other methods to detect anomalies, predict failures, optimize performance, and provide decision support for smart manufacturing use cases.
- **Manufacturing expertise:** GE has been in the manufacturing industry for decades and has a wealth of knowledge to bring to IIoT projects. Manufacturing references cited GE Digital's industry expertise as an important factor in their selection and a benefit to their business as a whole. This is a key consideration for manufacturers looking for industry expertise in IIoT solutions that can scale beyond pilots/POCs.

Challenges

- **Solution UI/configurability:** Multiple references cited the UI and configurability of the solution as an area of improvement. One manufacturing reference stated that the UI can be useful for operators that need to see data quickly but has looked outdated for a while.

- **Financial health/growth:** Since GE Digital's formation, the company, and GE as a whole, has undergone multiple restructures and leadership changes. These changes are reflected in the company's assessment and represent an area for improvement for manufacturing. However, the leadership of Larry Culp and Pat Byrne has been in place for roughly two years, so maintaining this stability and executing on its strategy should help address this area.
- **Enterprise systems integration:** While GE is strong when it comes to integrating operational technology, improvement could be made for enterprise systems. Manufacturing references cited challenges with integrating the company's CMMS and the need to develop API customizations to work around this.

Hitachi

Hitachi is positioned in the Major Players category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

Based in Tokyo, Japan, Hitachi Ltd. is a multinational conglomerate that includes over 800 companies as part of its portfolio. Many of these companies are in the industrial domain, such as automotive, autonomous rail, power plants, wind turbine production, construction machinery, transmission, and distribution – and thus IoT is a pan-Hitachi initiative, leveraged internally to optimize operations and offered externally to serve customers and society. In addition to these industrial businesses, Hitachi is a major player in IT, providing systems, solutions, and consulting to organizations around the world. This mix of capabilities, including operational technology (OT), IT, and systems integration, provides Hitachi with a well-rounded IIoT strategy, which sits within the Lumada portfolio of businesses within Hitachi. Hitachi leverages the Lumada portfolio to support the company's social innovation agenda.

IoT Platform Offering

- Hitachi's IIoT platform services are branded under Lumada Software for IIoT.
- Lumada Software for IIoT includes edge services, data services (that run on the cloud/core), and frameworks and solutions.
- Hitachi offers a composable set of containerized microservices for IIoT that span integration, data management, analytics, application development, device management, security, and capabilities to support the development of digital twins.
- Frameworks and solutions include APIs, Hitachi's solution cores, and various applications.
- Underpinning the Lumada Software for IIoT is Hitachi's DataOps strategy, which aims to help customers maximize the value of their data through processes and technology.

Manufacturing IoT Offering

- Hitachi offers solutions across all four manufacturing value chains; however, discrete industries (EOVC and TOVC) are the company's largest manufacturing customer segments.
- Hitachi offers IIoT applications across three manufacturing DX strategic priorities – supply chain optimization, smart manufacturing, and field service – with smart manufacturing use cases being the company's strongest area.
- In 2019, Hitachi introduced a new dedicated solution for manufacturing customers (Lumada Manufacturing Insights), as well as a horizontal solution suite (Lumada Video Insights), which is designed to support the development of smart spaces for a number of industry verticals, including smart manufacturing and smart factory environments.
- In July 2020, Hitachi acquired ABB Power Grids. This acquisition provides Hitachi with a broader portfolio of business applications for asset-intensive industries, including enterprise

asset management, asset performance management, workforce management, and field service management. These apps now run on the Lumada platform foundation and are branded as Lumada EAM, Lumada APM, and Lumada FSM. This new capability is most applicable to energy at the moment; however, it could be applied to the manufacturing industry with additional work.

Strengths

- **Real-world experience:** Hitachi brings real-world operational technology experience to the table and can differentiate with a depth of knowledge in Japanese manufacturing techniques. It can test out its offerings within its own manufacturing facilities before bringing functionality to market commercially. And the company is well positioned to create digital twins of Hitachi hardware as it has the knowledge to build out asset models for those pieces of machinery.

- **Services capabilities:** Hitachi Vantara's consulting services capabilities are beneficial to its IoT strategy, allowing the company to uncover the common patterns of usage for manufacturing IoT applications, and then bring that functionality to market. In addition, its cocreation methodology is important for helping the company guide its manufacturing customers down the right path. In 2019, Hitachi Consulting was integrated into Hitachi Vantara to drive Lumada-based solutions and digital capabilities for its customers and partners.

- **Established presence in AP:** Hitachi is a global player with a strong presence in Japan, while its United States-based competition has more work to do to penetrate these markets. Asia is a hot bed for industrial IoT due to the abundance of factories in the region.

Challenges

- **Partner ecosystem maturity:** Hitachi's global manufacturing partner ecosystem is not as well developed as some of its competition.

- **Competitive landscape:** Hitachi Vantara is known for its data-oriented hardware and software products. The industrial IoT software market has become more vertically focused; however, vendors deeply entrenched in enterprise application software have become more prominent in the market. Hitachi's acquisition of ABB Power Grids provides more strength in this arena, though the existing customer base largely sits in the energy industry.

- **Global visibility:** While Hitachi is well established in its home market of Japan, the company could use more global visibility to drive the Lumada strategy. Customer references in the United States and EMEA did not have Hitachi on the short list of possible IoT providers. Hitachi ABB Power Grids, however, is well diversified geographically and will help Hitachi gain more momentum on a global basis in asset-intensive manufacturing organizations, as well as various energy subindustries.

Hitachi did not actively participate in the IDC MarketScape research process. Scoring in this document for Hitachi is based on IDC's ongoing research in the IIoT space, which includes conversations with vendors and technology buyers and publicly available information.

IBM

IBM is positioned in the Major Players category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

IBM is an American multinational technology and consulting company headquartered in Armonk, New York, with more than 350,000 employees serving clients in 170 countries. IBM has a large portfolio spanning hardware, software, and services across all industries including manufacturing, oil and gas,

utilities, and mining. Notable investments in recent years include acquiring the digital part of the Weather Company in 2015 and the acquisition of Red Hat in 2019. Given the complexity of IoT solution deployment, IBM's IoT software strategy is complemented by the IBM Services business, which offers consulting, systems integration, and managed services for these projects.

IoT Platform Offering

- The company offers enterprise applications infused with IoT and AI capabilities such as IBM Maximo, IBM TRIRIGA, and IBM Engineering Lifecycle Management.
- The IoT capabilities within these applications are served by the company's IoT platform, IBM Watson IoT Platform.
- The IBM Watson IoT Platform is a managed, cloud-hosted service that offers capabilities for device connectivity, device management, data management, and visualization.

Manufacturing IoT Offering

- IBM offers solutions across all four manufacturing value chains; however, discrete industries (EOVC and TOVC) are the company's largest manufacturing customer segments.
- IBM offers IIoT applications across all manufacturing DX strategic priorities, with supply chain optimization and customer engagement use cases being its strongest area.
- IBM is focused on building out manufacturing-specific capabilities and combining them with AI and analytics to maximize performance.

Strengths

- **Easily configurable:** IBM's IoT offerings are highly configurable, allowing various users (line of business [LOB] or IT) and implementation partners to easily adapt the system to the organization's unique needs without custom code. Implementations of the SaaS deployment are often completed in months and exceed customer expectations.
- **Services capabilities:** IBM's broad service capabilities are beneficial to its IoT strategy, allowing the company to uncover the common patterns of usage for manufacturing IoT applications, and then bring that functionality to market. In addition, its cocreation methodology is important for helping the company guide its manufacturing customers down the right path and deliver value.
- **Implementation:** Manufacturing references noted that they were very happy with the implementation experience. IBM takes a program/project management approach that allowed a reference to stand up new locations within six months, with any delays occurring because of its own internal issues rather than issues related to IBM.

Challenges

- **IoT focus:** While IBM offers an industrial IoT platforms and applications, the overall focus of the company has shifted away from IoT and more toward AI. This shift in priorities is specific to the IoT business.
- **Mobile experience:** Manufacturing references stated that the mobile experience could be improved, with work being ongoing to address this. One reference noted it turned to a partner mobile solution instead, although with recent updates it is piloting the IBM mobile functionality to see if it would now be a fit.
- **Internal alignment:** Although IBM brings technical and services strength to the table, customers report that separate business units within IBM are not always as well aligned as they could be.

IBM did not actively participate in the IDC MarketScape research process. Scoring in this document for IBM is based on IDC's ongoing research in the IIoT space, which includes conversations with vendors and technology buyers and publicly available information.

Litmus

Litmus is positioned in the Contenders category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

Litmus is a software company with headquarters in San Jose, California, and founded in 2014. Litmus focuses on enabling Industry 4.0 through the company's Litmus Edge platform, which collects data from any industrial asset; offers prebuilt applications, KPIs, and analytics; provides the ability to build and run custom applications; and integrates data with any cloud or enterprise system. Litmus is funded by venture capital over the past five years since the founding of the company. Litmus' mission is to be the foundational data and computation layer on every plant floor in the world.

IoT Platform Offering

- Litmus has two products as part of its IoT portfolio:
  - **Litmus Edge:** Providing data connectivity, analytics, and application enablement
  - **Litmus Edge Manager:** Providing centralized device, data, and application orchestration
- Litmus provides industry-specific solutions for a variety of industrial verticals (manufacturing-specific offerings are provided in the section that follows).
- Litmus has plans in place to work with strategic partners to develop applications to sell through their app marketplace.
- Litmus utilizes OEM channels to achieve wider adoption and partners with hyperscale cloud providers.

Manufacturing IoT Offering

- Litmus offers solutions across all four manufacturing value chains; however, discrete industries are the company's largest manufacturing customer segments.
- Litmus offers IIoT applications across most manufacturing DX strategic priorities, with Industry 4.0/Smart Manufacturing being the top focus area for the company.
- Litmus is focused on connecting heterogeneous data sources onto a single platform and applying analytics to that data to improve performance and deliver value.

Strengths

- **Integration:** Litmus comes out of the box with over 250 industrial device drivers, and integrating various OT data sources is a focus of the platform. References noted that Litmus was compatible with all of their PLCs and custom drivers, allowing for them to quickly get the data they needed.
- **Edge computing:** Litmus has made edge computing a central part of its IoT platform. The Litmus Edge Manager provides a single point of control to manage and aggregate data from edge devices. This allows manufacturers to perform local analysis at the edge or send that data to the cloud for further analytics.
- **Price point:** References consistently cited Litmus' price point as an important part of their selection. In addition, Litmus offers multiple pricing model options, providing more flexibility

depending on a manufacturer's needs. This allows for a low barrier to entry for manufacturers looking to start connecting their assets and deliver quick value to the business.

Challenges

- **Size/limited resources:** References noted that at times it felt like resources were limited and it hindered the rapid pace of deployment that they wanted to achieve. In addition, improving the planning and communication of projects was cited as an area for improvement. Litmus' size compared with other providers in the IIoT space may be viewed as an inhibitor depending on the scale of a deployment.

- **Consultative approach:** References noted that they would like Litmus to take the lead more when it comes to overall strategy and execution. More effort was required by the business than was expected that slowed down the project. This consultative approach has become even more important to the industry, as combining industry expertise with technological expertise is essential to long-term success.

- **Customer support:** While Litmus offers multiple support tiers for its customers, references noted that different locations had different experiences depending on who they worked with. In general, they felt the main support team they dealt with was highly skilled, but there are some less trained people who caused delays when trying to fix things.

Microsoft

Microsoft is positioned in the Leaders category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

In recent years, Microsoft has been sharing its vision of Azure as a ubiquitous computing platform that powers the intelligent cloud and the intelligent edge. From an IoT perspective specifically, the company sees the Azure IoT portfolio moving from enabling intelligence about assets to intelligence about environments and, eventually, underpinning intelligent ecosystems. Azure IoT provides a broad spectrum of capabilities to support this strategy, including IoT software at the device level and various PaaS to build, deploy, manage, and secure IoT applications, as well as SaaS applications and IoT reference architectures and accelerators. A key initiative within Microsoft moving forward is the company's industry cloud strategy. These industry clouds combine Azure, Dynamics 365 (D365), and Microsoft 365 (M365) into a solution stack. Therefore, Microsoft's industrial IoT efforts for the manufacturing vertical are now being led out of Microsoft's Manufacturing Cloud group.

IoT Platform Offering

- The Azure IoT portfolio consists of three categories of IoT products: IoT and Edge Device Support, Azure Services for IoT, and Azure IoT Solutions.

- Organizations can leverage individual platform services to develop an edge to cloud IoT architecture, or they can choose to purchase Microsoft's Azure IoT Central solution, which is a SaaS-based IoT platform.

- Microsoft services for IoT span a wide variety of functionality across the cloud and edge, including messaging, integration, data management, analytics, device management, security, mixed reality, and DevOps.

- Microsoft offers guidance on recommended architectures for various industrial IoT use cases, such as an asset monitoring solution.

Manufacturing IoT Offering

- Microsoft offers solutions across all four manufacturing value chains: AOVC, BOVC, EOVC, and TOVC.

- Microsoft offers IIoT applications across all manufacturing DX strategic priorities, with supply chain optimization and smart manufacturing use cases being the company's strongest area.

- Microsoft offers first-party applications/solutions through the Dynamics portfolio and has a robust partner network of industry-specific providers to offer manufacturers a variety of options.

- Microsoft focuses on fundamental application and solution enablement, while its partners often offer vertical-specific variants.

Strengths

- **Ecosystem consideration:** Microsoft has been thoughtful in its approach to IoT, offering capabilities up and down the technology stack, but also making sure the company's portfolio appeals to a wide customer base. Developers are obviously a key audience for the IoT services, but Microsoft also developed an offering that citizen developers could take advantage of with IoT Central. The company has also made significant efforts to appeal to OEMs with its plug-and-play device strategy. While Microsoft was born in the IT realm, the company also has significant presence within operational technology infrastructure and is bringing new capabilities to market especially for these environments, such as nesting for Azure IoT Edge.

- **Focus on security:** Microsoft offers a wide variety of capabilities in the realm of security. For instance, Azure Sphere offers IoT security capabilities that span from device to cloud. Microsoft's Defender for IoT helps provide visibility across the device landscape and integrates into Microsoft's SIEM to enable security across the entire landscape of devices. Customers see the ability to use Active Directory, a common access management tool within organizations, as an advantage for the company in the IoT space as well.

- **Innovation at the edge:** Microsoft has a broad strategy to support edge computing that spans hardware and software across a variety of form factors and use cases. The latest offering, called Azure Percept, is a platform of hardware and services that aims to simplify the ways in which customers can use Azure AI technologies on the edge. Azure Percept could be used in the manufacturing environment for use cases that require computer vision, for example.

Challenges

- **Portfolio simplification:** Although developers appreciate the ability to have a broad variety of tools to build applications, it can be overwhelming to keep up when new products and features are added constantly. As Microsoft moves more toward the industry cloud approach, the company should look for ways to combine and integrate services for common patterns required by industrial customers. This would help the company market more effectively for specific use cases while reducing the engineering burden for customers.

- **Industry ecosystem support:** Advances in technology are reshaping competition and value creation in every industry. Owing to these shifts, organizations are increasingly relying on industry ecosystems for shared operations and expertise, shared data and insight, and shared applications. Although Microsoft has a vision around how its technology can enable connected ecosystems, customers see an opportunity for the company to develop industry-based user groups to facilitate this knowledge sharing.

- **OT integration:** Customers generally thought Microsoft is stronger in terms of being able to integrate with IT systems over OT systems. When Microsoft is working with a partner-led

solution, the partner may have expertise in various types of OT equipment, but for customers that are building their own solutions on Azure, it will be important for Microsoft to keep developing its own capabilities in this area.

Oracle

Oracle is positioned in the Major Players category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

Oracle is an enterprise software provider based in Austin, Texas, and founded in 1977. The company sells database software and technology, cloud engineered systems, and enterprise application software products across numerous industries. Oracle's IIoT offerings are designed for business users, and the primary goal is to drive real-time visibility, operational intelligence, and workflow automation into enterprise business applications such as supply chain management, manufacturing, logistics, ERP, and customer experience.

IoT Platform Offering

- Oracle's IoT offerings consist of a portfolio of purpose-built SaaS applications for industry use cases, built on top of a horizontal end-to-end IoT technology platform for application enablement called Oracle IoT Cloud.
- Oracle IoT Cloud functional components include:
  - IoT Foundation consists of device connectivity, real-time analytics, time series data management, machine learning pipelines, and application integration.
  - IoT Insights and Intelligence is a series of modules that can be used across the application templates that are described in the section that follows. These modules provide capabilities in the areas of digital twin, situational awareness, trends and anomaly detection, predictions and forecasts, recommended actions, and intelligent workflows.
  - Oracle IoT Edge helps customers gather edge data and send it to the Oracle IoT Cloud via an SDK for devices via gateway software or cloud-based IoT connectors that can do protocol translation, and then send messages to the cloud service. Oracle also offers special gateway software to connect to OPC-UA servers or OSIsoft PI System servers. Oracle's Exadata database now supports time series data, making it a viable option for companies that want to store and process data on the edge.
- Oracle IoT Cloud runs on Oracle Cloud infrastructure, with all underlying dependencies bundled as part of the monthly subscription.

Manufacturing IoT Offering

- Oracle offers solutions across all four manufacturing value chains, with discrete industries (EOVC and TOVC) being the company's largest IIoT manufacturing customer segments.
- Oracle offers IIoT applications across all manufacturing DX strategic priorities, with Supply Chain Optimization and Smart Manufacturing use cases being the company's strongest area.
- Oracle offers four SaaS-based IoT applications: asset monitoring, production monitoring, shipment and fleet monitoring, and connected worker.
- Recent updates to Oracle IoT applications include the fact that the apps are now deployed on a containerized architecture, as well as improvements in configuration, visualization, predictive analytics, integration to Oracle apps, the rules engine, and edge connectivity.

Strengths

- **Artificial intelligence:** Oracle has adaptive intelligence workflows, several of which are included within IIoT. Oracle has applied AI and ML through time series algorithms along with predictive algorithms to drive anomaly detection and predictions. This is accomplished by analyzing contextual information, and then selecting appropriate models and tuning them without any user intervention. Oracle's approach enables customers to get insights from their IIoT data in a faster timeline.

- **Systems integration:** Oracle once again received high marks for integration, which also figured into positive comments about the implementation experience. This applies not only to general enterprise systems, such as ERP or HCM, but also to other manufacturing-specific systems such as MES and SCADA/PLCs. We note that IoT projects are sometimes being done in the context of broader cloud ERP projects with Oracle, so that it can make the overall process go smoother.

- **Customer support:** References once again praised Oracle highly when it came to customer support/satisfaction. If issues were ever encountered, Oracle was very responsive and quick to assist. Organizations also felt they had good visibility into the future road map.

Challenges

- **Limited deployment options:** Oracle's deployment model is cloud only and Oracle cloud only. This can be limiting to customers with any aversity toward cloud (which is still common in manufacturing) or that want the flexibility to deploy apps on other clouds.

- **Pricing:** Customers noted that pricing was geared toward larger companies. As more small and medium-sized businesses adopt IoT strategies, Oracle should reevaluate how the current pricing needs to evolve to meet the needs of those customers.

- **Market visibility:** While IDC surveys tend to show decent adoption of Oracle's IoT technology, the company's efforts in this space would benefit from additional marketing, specifically toward different manufacturing buyer personas.

PTC

PTC is positioned in the Leaders category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

PTC is a provider of technology solutions that help industrial companies transform how they create, operate, and service smart connected operations and products. The company's heritage is in the PLM and CAD space, offering solutions for digital engineering, manufacturing, and service organizations. PTC's IoT strategy is anchored in the concept of the digital thread that offers various stakeholders within an organization the ability to leverage a single source of truth for data related to an asset or a process across multiple systems and business processes. PTC's industrial IoT solutions platform, ThingWorx, plays a key role in this strategy, enabling organizations to gather, contextualize, and orchestrate real-time data within the digital thread. From a partnership perspective, the company continues to work closely with Rockwell Automation around the FactoryTalk InnovationSuite, powered by PTC, with Microsoft, that provides a scalable foundation for the ThingWorx platform and with Ansys for customers that are looking to build physics-based simulations for digital twin models.

IoT Platform Offering

- PTC's IIoT Solutions Platform is ThingWorx.

- ThingWorx consists of a core IoT platform that allows developers and LOB staff to create IoT applications centered around the concept of a Thing Model and a set of applications and solutions that address common industrial IoT use cases.
- The focus for ThingWorx is to provide the tools for organizations to connect to various industrial devices and applications; build or extend applications; analyze IoT data; manage connected devices, processes, and systems; and create engaging experiences for the end users of IoT applications.
- PTC's Kepware product is a key contributor to the "connect" capabilities of the portfolio. This product can translate a broad range of proprietary protocols into a common format to give applications a single source of industrial automation data.
- PTC's Vuforia Studio allows companies to leverage their IoT data in an augmented reality (AR) experience.

Manufacturing IoT Offering

- PTC offers solutions in all four manufacturing value chains, with discrete industries (EOVC and TOVC) being the company's largest manufacturing customer segments.
- PTC offers IIoT applications across all manufacturing DX strategic priorities, with Field Service and Product Innovation use cases being the company's strongest areas, traditionally.
- Over the past two years, PTC's partnership with Rockwell Automation around the FactoryTalk InnovationSuite powered by PTC has bolstered the company's smart manufacturing capabilities.

Strengths

- **Enabling the digital thread:** IoT is an enabling technology for designing, managing, and improving products, services, and experiences that manufacturers require today. PTC's software portfolio (IoT, AR, PLM, ALM, and SLM) has the ability to support the integration, unification, and decision support of data, processes, resources, and people from business, IT, engineering, R&D, production, supply chain, and service.
- **Continued focus on digital/physical convergence:** The first step in IoT maturity is being able to visualize the current status of digital things and processes using IoT data; the next step is being able to interact with and optimize things and processes using analytics, simulation and, in some cases, augmented reality. The value of the company's augmented reality strategy and increased focus on SaaS was demonstrated during the pandemic, where organizations relied on these technologies to connect employees across different locations to support the operation, maintenance, and repair of all types of products and equipment.
- **Feature breadth:** Customers gave ThingWorx high ratings for breadth of platform functionality, flexible deployment options, and integration capabilities. Customers have consistently rated the company well in this area over the past few years.

Challenges

- **Competitive landscape:** The competitive landscape for industrial IoT is challenging as tech giants continue to fold industrial IoT capabilities into other core product lines. PTC has created a "better together" strategy with Microsoft and Rockwell Automation, but as the middle layer of this three-tiered partnership, PTC must continue to create its own differentiating market value.
- **Balancing the strategy:** There are two branches of PTC's IoT strategy: smart connected products (SCP) and smart connected operations (SCO). As a company in the engineering software space, PTC's original focus in IoT was more in the realm of product and service innovation, or the SCP side of the strategy. Therefore, the company's partnership with

Rockwell was to be better able to access smart factory use cases, as well as an expanded set of verticals, which plays to the SCO strategy. Although the messaging around the SCO use case has been strongly amplified over the past two years due to this partnership, it is important for PTC to continue to focus on the SCP opportunity as well. While these types of use cases aren't always the low-hanging fruit in the market, they are well aligned with PTC's portfolio, and once organizations are able to successfully get connected products initiatives off the ground, there is a strong opportunity to scale.

- **Pricing:** Although PTC's pricing is considered well within the average range for the market in IDC's analysis, customers mentioned that they would like the company to offer additional pricing and contracting options.

SAP

SAP is positioned in the Leaders category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

IoT is a key enabler of SAP's intelligent enterprise vision. SAP's IoT technology has always been part of the company's intelligent technologies portfolio, which is now housed within SAP's Business Technology Platform (BTP). Although BTP is horizontal in nature, the company decided to shift ownership of the IoT strategy under a more industry focused initiative in 2020. This initiative, called Industry4.Now, sits within SAP's broader resilient supply chain strategy and focuses on the role that SAP technology can play in enabling Industry 4.0. SAP focuses on four key use cases within Industry4.Now: intelligent assets, intelligent factories and logistics, intelligent products, and empowered people. SAP customers can consume IoT data in three ways: they can build net-new applications on the platform, they can buy SAP applications with IoT embedded, or they can infuse their existing applications with IoT data.

IoT Platform Offering

- SAP's IIoT platform is called SAP IoT.
- SAP IoT offerings:
    - Provide the ability to connect to IoT devices and ingest data from those devices and store it in the cloud. Integrations with Azure IoT and AWS IoT provide customers choice on how they want to connect to and manage IoT devices.
    - Provide a set of microservices that customers can leverage to build IoT applications. Features include thing modeling, thing authorization modelling, event management, business partner management, and application development templates.
    - Offer IoT support for advanced analytics for data in motion (such as streaming analytics), data at rest (including data science), data processing (e.g., physics-based simulation), and machine learning.
    - SAP IoT enriches applications with real-world IoT context to respond to critical events and assist decision making proactively and intelligently.
    - A recently general availability capability of SAP IoT is the ability to automatically enrich events from Auto-ID technologies (e.g., RFID) and integrate them into business processes such as Kanban without human intervention.
- SAP Edge Services are microservices meant to be deployed on edge computing devices. The key services include data persistence, streaming analytics, predictive analytics, and the ability

to bring operational data together with the enterprise business context from SAP systems to make decisions locally.

Manufacturing IoT Offering

- SAP offers solutions across all four manufacturing value chains, with an even split in process and discrete manufacturing customers.
- SAP offers IIoT applications across all manufacturing DX strategic priorities, with supply chain optimization and smart manufacturing use cases being the company's strongest area.
- SAP applications that sit within the Industry 4.0 portfolio and leverage IoT data include SAP enterprise product development, SAP digital manufacturing cloud, SAP predictive asset insights, and SAP asset intelligence network.
- Industry 4.0 solutions from SAP are designed to bring relevant business context for analytical and transactional scenarios to machine data independent of ownership of underlying data infrastructure.

Strengths

- **Design to operate strategy:** SAP's product portfolio offers capabilities across the entire manufacturing life cycle, from design to plan and manufacture to the delivery and operation of the products. IIoT/Industry 4.0 deployments generally require multiple vendors, so being able to gain a wide variety of functionality from any one single vendor can help simplify the deployment and time to value.
- **Manufacturer familiarity with SAP:** In connected products use cases, SAP's direct customer is often an OEM that is then asking to collect data from its customer's environment. In these use cases, security and data privacy can be barriers to successful engagements. OEMs found that working with SAP helped them win these projects, as their own customers felt comfortable with SAP's security and data privacy model.
- **Infrastructure choice:** Customers appreciate that SAP offers them choice on where to run their workloads, including a variety of cloud options. This is becoming increasingly important in a hybrid cloud and multicloud world.

Challenges

- **Pricing:** Customers feel the pricing model could be difficult to understand and benchmark against. SAP says it is addressing pricing simplification through more flexible pricing models and easy-to-consume information for customers.
- **Integration:** One of SAP's key market motions is to integrate IoT data with SAP systems. While customers believe it is easier to integrate their IoT data with SAP systems using SAP software, they did believe there was an opportunity to make these integrations more seamless. SAP says it is on a journey to address this feedback with the Intelligent Enterprise vision.
- **Configurability:** Customers felt the UI and configurability of packaged applications can be improved in the future, with references wishing it were easier to build content specific to different user roles. SAP says it is addressing these customers wishes with tools and a framework to build extensions.

Siemens

Siemens is positioned in the Leaders category in this worldwide 2021 IDC MarketScape for IIoT platforms and applications in the manufacturing sector.

Company Overview

Siemens is a multinational conglomerate company headquartered in Germany and founded in 1847. Siemens has a wide range of offerings geared toward industrial use cases, ranging from automation to enterprise software. Siemens has built a separate development organization with complete responsibility for the conceptualization and development of the company's industrial IoT platform. The industrial IoT group leverages broader Siemens technology and R&D capabilities for use in the platform and as an opportunity to embed and enhance other Siemens products.

IoT Platform Offering

- Siemens MindSphere is Siemens' Industrial IoT Platform and is offered as an industrial IoT as a service solution. It can be consumed in a SaaS or PaaS format and provides the basis for all of Siemens, as well as Siemens' external partners, to develop vertical-specific applications and digital services.

- Siemens industrial IoT portfolio includes:

    - **Mendix:** It is a low-code platform for application development.

    - **MindSphere:** The MindSphere platform offers centralized compute and storage as well as a variety of services to build IoT applications. MindSphere applications are built upon this platform.

    - **Industrial edge:** It provides edge compute and storage with device runtimes, applications, and management capabilities.

    - **Field control:** This provides runtime for automation devices and engineering connectivity.

Manufacturing IoT Offering

- Siemens offers solutions across all four manufacturing value chains, with discrete manufacturing (EOVC and TOVC) being the company's largest manufacturing customer segment.

- Siemens also has industrial IoT customers within hybrid (pharma/packaging) and process (chemicals/O&G) manufacturing.

- Siemens offers industrial IoT applications across all manufacturing DX strategic priorities, with Smart Manufacturing and Product Innovation use cases being the company's strongest area.

- Within manufacturing, Siemens is currently focused on connecting/remote monitoring operational assets, guiding manufacturers along the digital transformation path. For those manufacturers that are further along the path, Siemens also has solutions for analyzing the data to predict outcomes, do predictive maintenance, and for using the data to offer new digital services (i.e., "product as a service" model).

Strengths

- **Industry expertise/ecosystem:** Siemens has over 170 years of operational experience to draw from when building out industrial IoT solutions. Not only does Siemens possess this expertise itself, but the company also has a large ecosystem of manufacturers customers that can be utilized. This is backed up by references who stated how they rely on the MindSphere ecosystem to continually learn and innovate.

- **Digital twin strategy:** Digital twins are an important innovation area for Siemens' long-term R&D goals. Siemens offers product, production, and performance digital twins to optimize decision making throughout the asset life cycle.

- **Customer support:** Manufacturing references consistently mentioned the level of support that Siemens provides them as a strength, with one reference highlighting how Siemens helped it

quickly resolve an issue it had late at night. This focus on support will continue as Siemens is continuing to add content and training so customers have more resources available to them.

Challenges

- **User interface:** The UI of Siemens was cited as an area needing improvement, with references saying it can meet basic needs but is not very feature rich. Even for users that were more advanced, they could still struggle with the UI at times. It was noted by references that Siemens has recognized this concern and is investing to provide improvements and new frameworks.

- **Project management:** References also shared that project management was an area for Siemens to improve, with rework occurring at times, impacting the implementation of the IoT project. One reference attributed this to the amount of turnover at Siemens specific to its IoT project.

- **Integration:** For general enterprise and manufacturing-specific systems (MES, SCADA/PLCs, etc.), Siemens offers the ability to connect to these systems out of the box, but references indicated that this was not as easy to accomplish as anticipated. References cited limited flexibility with the naming of assets as an area where issue was encountered.

APPENDIX

Reading an IDC MarketScape Graph

For the purposes of this analysis, IDC divided potential key measures for success into two primary categories: capabilities and strategies.

Positioning on the y-axis reflects the vendor's current capabilities and menu of services and how well aligned the vendor is to customer needs. The capabilities category focuses on the capabilities of the company and product today, here and now. Under this category, IDC analysts will look at how well a vendor is building/delivering capabilities that enable it to execute its chosen strategy in the market.

Positioning on the x-axis, or strategies axis, indicates how well the vendor's future strategy aligns with what customers will require in three to five years. The strategies category focuses on high-level decisions and underlying assumptions about offerings, customer segments, and business and go-to-market plans for the next three to five years.

The size of the individual vendor markers in the IDC MarketScape represents the estimated market share of each individual vendor within the specific market segment being assessed.

IDC MarketScape Methodology

IDC MarketScape criteria selection, weightings, and vendor scores represent well-researched IDC judgment about the market and specific vendors. IDC analysts tailor the range of standard characteristics by which vendors are measured through structured discussions, surveys, and interviews with market leaders, participants, and end users. Market weightings are based on user interviews, buyer surveys, and the input of IDC experts in each market. IDC analysts base individual vendor scores, and ultimately vendor positions on the IDC MarketScape, on detailed surveys and interviews with the vendors, publicly available information, and end-user experiences in an effort to provide an accurate and consistent assessment of each vendor's characteristics, behavior, and capability.

Market Definition

IDC's IoT software platform market is a competitive software market representing portions of selected application development and deployment and system infrastructure software markets. There are two main segments of the market that IDC currently tracks: IoT application platforms and IoT connectivity management platforms. Vendors in this study primarily sit in the IoT application platform segment of the market. Further:

- **IoT application platforms** are software platforms that provide a bundled set of capabilities required to continuously connect, manage, and visualize IoT devices and data, often offered in a platform-as-a-service (PaaS) model.
- **Industrial IoT platforms** covered in this study represent a subsegment of the IoT application platform market that are specifically focused on providing applications with access to data gathered from industrial equipment and systems.
- An **IIoT application** is a code set designed to automate specific sets of business processes in an industry or a business function.

For a more detailed description of the IoT platform and analytics market, see *IDC's Worldwide IoT Platforms and Analytics Taxonomy, 2021* (IDC #US46462521, April 2021).

Included in this IDC MarketScape are providers with offerings for manufacturing that includes product-centric organizations across four distinct value chains:

- **Asset-oriented value chain (AOVC) —** Industries include chemicals, metals, and pulp and paper.
- **Brand-oriented value chain (BOVC) —** Industries include consumer packaged goods (CPG), food and beverage (F&B), fashion, and life sciences.
- **Engineering-oriented value chain (EOVC) —** Industries include automotive, aerospace and defense (A&D), and industrial machinery.
- **Technology-oriented value chain (TOVC) —** Industries include electronics and semiconductors (high tech).

Strategies and Capabilities Criteria

Tables 1 and 2 provide key strategy and capability measures, respectively, for the success of selecting an industrial IoT platforms and applications vendor for the manufacturing vertical.

TABLE 1

Key Strategy Measures for Success: Worldwide Industrial IoT Platforms and Applications in Manufacturing

Strategy Criteria Categories	Definitions	Weight (%)
Customer service	A vendor effectively retains customers and continues to innovate in customer retention and service areas, with the implication that the company will be able to achieve the level of service and support demanded by customers over the next three years.	12.00
Delivery model	Plans are in place for support of offering delivery models that will match customers' shifting preferences for adoption/consumption in the next five years. In this market, that means planning to support multiple deployment models.	6.00
Functionality and offering road map	Future plans for offering functionalities are well aligned with current and future customer needs. Future plans for a broad range of functionality were assessed including device connectivity, device management, security, data integration, data management, analytics, application development, edge functionality, DevOps, and UI customization.	12.00
Growth strategy	Management has a strong formula for growth for the company and one that aligns well with the market trends anticipated over the next three to five years.	12.00
Innovation	The company's innovation model maximizes its potential to generate market value.	6.00
Integration and ecosystem	The vendor places importance on ecosystem alliances and has a strategy to support various IoT endpoints as well as plans to integrate with various enterprise back-end systems and third-party services. Here, road maps for integration were considered.	10.00
Marketing	There is a robust game plan/strategy for all relevant facets of marketing (e.g., brand development, promotion, and demand generation) that matches where revenue is predicted to flow over the next five years.	9.00
Portfolio strategy	The offering is well supported and enhanced by a portfolio of complementary offerings offered by the company or its ecosystem of partners. IDC considered the current portfolio and plans the vendor had in place to expand upon that in its road map.	12.00
Pricing model	The supplier's pricing model strategy is directly aligned with customers' preferences for payment (e.g., license, service, per seat, and per transaction). We looked to understand any changes the vendor plans to make to the pricing strategy in the future.	8.00

TABLE 1

Key Strategy Measures for Success: Worldwide Industrial IoT Platforms and Applications in Manufacturing

Strategy Criteria Categories	Definitions	Weight (%)
Sales/distribution strategy	The sales/distribution strategy is aligned with the way customers want to buy the offering (e.g., online, offline, direct, and indirect). A channel program strategy was also taken into consideration. IDC considered any plans the vendor has in place to enhance its existing sales/distribution strategy.	9.00
Services strategy	IoT platform implementations generally require some level of services during the life cycle of the project. The vendor has a comprehensive strategy in place to fulfill these needs — on its own or via partnership.	4.00
Total		100.00

Source: IDC, 2021

TABLE 2

Key Capability Measures for Success: Worldwide Industrial IoT Platforms and Applications in Manufacturing

Capability Criteria Categories	Definition	Weight (%)
Portfolio benefits	The offering is well supported and enhanced by a portfolio of complementary offerings offered by the company or its ecosystem of partners.	12.00
Customer service delivery	According to customer feedback, the company's service organization is executing well. Customer feedback was the primary scoring mechanism used here.	7.00
Delivery model options	Delivery model options, such as public/private cloud, on premises, and multicloud, were assessed.	6.00
Financial/funding management	IDC assessed the vendor's current financial standing and how well the vendor is positioned to grow the IoT business based on these criteria.	12.00
Go-to-market capabilities	This capability is achievable by the enablement of manufacturing partners and the marketing message.	9.00
Growth strategy execution	Management is executing well on its formula for growth for the company (e.g., by acquisition and organic). IDC assessed revenue estimates, customer growth, device growth, and other factors.	6.00

TABLE 2

Key Capability Measures for Success: Worldwide Industrial IoT Platforms and Applications in Manufacturing

Capability Criteria Categories	Definition	Weight (%)
IIoT analytics	A broad range of IoT analytics functionality was assessed as part of the vendor's offering.	3.00
IIoT platform functionality and offering	A broad range of functionality was assessed including device connectivity, device management, security, data integration, data management, analytics, application development, edge functionality, DevOps, and UI customization.	6.00
Innovation/R&D pace and productivity	Reference and analyst evaluation of innovation/R&D is based on customer and prospect discussions and industry knowledge.	6.00
Integration	Front-end and back-end integrations were assessed. Front-end integration refers to the ability to connect to and support various IoT endpoint devices. Back-end integration refers to the ability to integrate IoT data with enterprise or third-party systems and services.	10.00
Pricing/contracting	There are many IIoT platform pricing models. They can be based on data exchanged with the platform, CPUs, devices/sensors/assets, or users — or some combination thereof. There is no one-size-fits-all model because different pricing models fit different business use cases. Customer feedback was the primary scoring mechanism used here.	7.00
Sales/distribution capabilities	The current sales/distribution structure is aligned with the way customers, especially those in high-growth market segments, want to buy (e.g., online, offline, direct, and indirect). Channel programs are in place to enhance growth.	9.00
Range of services	IoT projects are often part of a larger digital transformation. Customers often need help at various stages of the project — from the initial consulting on project goals to technology implementation to managed services. IDC assessed how well the vendor's services portfolio complements the vendor's IoT platform strategy.	4.00
Customer satisfaction	Customer satisfaction is based on the ease of use of a vendor's product and reference ratings on configurability and support.	3.00
Total		100.00

Source: IDC, 2021

Related Research

- *Asset-Oriented Manufacturing Value Chain 2021 Investment Guide* (IDC #US47583821, April 2021)
- *Brand-Oriented Manufacturing Value Chain 2021 Investment Guide* (IDC #US47583921, April 2021)
- *Engineering-Oriented Manufacturing Value Chain 2021 Investment Guide* (IDC #US47584021, April 2021)
- *Technology-Oriented Manufacturing Value Chain 2021 Investment Guide* (IDC #US47584121, April 2021)
- *IDC's Worldwide IoT Platforms and Analytics Taxonomy, 2021* (IDC #US46462521, April 2021)
- *Top 5 Trends for IoT Platform and Analytics in 2021* (IDC #US46462221, March 2021)
- *IDC Market Glance: IoT Platforms and Analytics, 1Q21* (IDC #US46462021, February 2021)
- *Worldwide Internet of Things Software Platform Forecast, 2019-2023* (IDC #US43880319, September 2019)

Synopsis

This IDC study uses the IDC MarketScape model to provide an assessment of vendors participating in the industrial IoT platforms and applications market. This study specifically analyzed these offerings from a manufacturing industry perspective.

"IoT is not a new topic for manufacturing; companies have been utilizing the technology for years, and it remains a high priority. What has been noticeable this year is the number of manufacturers utilizing IoT to connect their products and uncover new service opportunities," says Reid Paquin, research director, IDC Manufacturing IT Priorities and Strategies (ITP&S).

"By providing industrial companies with a common way to access, manage, and visualize IoT data, as well as build and deploy IoT applications, industrial IoT platforms play a key role in supporting the goals of manufacturing organizations today," says Stacy Crook, research director, IoT, IDC. "As the market has matured, manufacturers can now take advantage of prepackaged IoT applications that can help them realize value from their IoT data faster."

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world"s leading technology media, research, and events company.

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