Magic Quadrant for Global Industrial IoT Platforms

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Initiatives: Manufacturing Digital Transformation and Innovation

Global IIoT platforms continue to evolve and support IT/OT integration at large scale. CIOs and software engineering leaders seek to use IIoT platforms to drive sustainability, automation, remote operations, and transformation. The best solutions balance technology, partners and domain expertise.

This Magic Quadrant is related to other research:

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Market Definition/Description

Gartner defines the global industrial Internet of Things (IIoT) platform market as a set of integrated middleware software capabilities, with a multivendor marketplace, in order to facilitate and automate asset management decision making. It does this in a sustainable way and at global scale deployment within asset-intensive industries. IIoT platforms also provide operational visibility and control for plants, infrastructure and equipment. The global IIoT platforms are deployed to solve industrial operations challenges such as:

- Sustainability
- Automation
- Remote operations
- Transformation of operational technology (OT) and industrial applications
- Global scalability

IIoT Platforms

The IIoT platform is differentiated from legacy OT by its ability to cost-effectively collect higher volumes of time series and/or low-latency complex machine data from networked Internet of Things (IoT) endpoints. The IIoT platform also orchestrates historically siloed data sources to enable better accessibility and improve insights and actions across a heterogeneous asset group through specialized analysis of the data. For instance, an IIoT platform would connect to and pull live data from equipment, as well as connect to historians or libraries of machine performance in a factory. Those data could be used for predictive maintenance or to improve production planning.

The IIoT platform:

- Securely monitors IoT endpoints and event stream data
- Supports, translates and normalizes data of a variety of manufacturer and industry proprietary protocols
- Aggregates, analyzes, contextualizes and visualizes data at the edge and in the cloud
- Integrates and engages IT and OT endpoints in data sharing and consumption
- Enables application development and deployment
- Can enrich and supplement OT functions for improved asset management life cycle strategies and processes

In some emerging use cases, the IIoT platform may have some OT functions. In concert with the IoT edge and through enterprise IT/OT integration, the IIoT platform prepares asset-intensive industrial businesses such as manufacturing or energy to become digital businesses. The IIoT platform enables digital capabilities by enhancing and connecting their assets or products, in other words their core business with internal stakeholders, customers and business partners.

The IIoT platform may be consumed as a technology suite, or as an open and general-purpose application platform, or both in combination. It is engineered to monitor and manage the requirements of security, safety, sustainability, automation and other mission-critical objectives associated with industrial assets and their operating environments. IIoT platform software that resides on and near devices — such as controllers, routers, access points, gateways and edge compute systems — is considered part of the "distributed IIoT platform."

Horizontal and vertical business applications are out of scope for this Magic Quadrant. However, each IIoT platform provider must exhibit demonstrable value in terms of integration and interoperability with such applications as:

- Asset performance management (APM)
- Building management systems (BMSs)
- Computerized maintenance management systems (CMMSs)
- Condition-based maintenance (CBM)
- Enterprise asset management (EAM)
- Enterprise resource planning (ERP)
- Environmental, health and safety (EHS)
- Field service management (FSM)
- Fleet management
- Manufacturing execution systems (MES)
- Maintenance, repair and operations (MRO)
- Product life cycle management (PLM)

IIoT Platform Capabilities

The IIoT platform is composed of the following technology functions:

- **Device management** — This function includes software that enables manual and automated tasks to create, provision, configure, troubleshoot and securely manage fleets of IoT devices and gateways remotely, in bulk or individually.

- **Integration** — This function includes software, tools and technologies, such as communications protocols, APIs and application adapters, which minimally address the data, process, enterprise application and IIoT ecosystem integration requirements across cloud and on-premises implementations for end-to-end IIoT solutions. IIoT platforms integrate into IIoT devices (for example, communications modules and controllers), IIoT gateways, historians, and other IIoT platforms.
- **Data management** — This function includes capabilities that support:
  - Ingesting IoT endpoint and edge device data
  - Storing data from edge to enterprise platforms
  - Providing data accessibility (by devices, IT, OT, and engineering technology [ET] systems, and external parties, when required)
  - Tracking lineage and flow of data
  - Enforcing data and analytics governance policies to ensure the quality, security, privacy and currency of data
- **Analytics** — This function includes processing of data streams, such as device, enterprise and contextual data, to provide insights into asset state by monitoring use, providing indicators, tracking patterns and optimizing asset use. A variety of techniques, such as rule engines, event stream processing, data visualization and machine learning, may be applied.
- **Application enablement and management** — This function includes software that enables business applications in any deployment model to analyze data and accomplish IoT-related business functions. Core software components manage the OS, standard input and output or file systems to enable other software components of the platform. The application platform — for example, application platform as a service (aPaaS) — includes application-enabling infrastructure components, application development, runtime management, and digital twin and digital thread templates and instances. The platform allows users to achieve “cloud scale” scalability and reliability, and to deploy and deliver IoT solutions quickly and seamlessly.
- **Security** — This function includes the software, tools and practices facilitated to audit and ensure compliance. It also establishes preventive, detective and corrective controls and actions to ensure privacy and the security of data across the IIoT solution.

Targeted Industrial Enterprises

For this market evaluation, Gartner focuses on three asset-intensive industries:

- **Manufacturing and natural resources** — This includes the subsectors of equipment and other discrete manufacturing; automotive and vehicle manufacturing; pharmaceuticals, agriculture, food and consumer process industries; chemicals, metals and other industrial process manufacturing; and other manufacturing.
- **Transportation** — This includes the subsectors of air transport, motor freight, rail and water, warehousing, couriers, and support services.
- **Energy and utilities** — This includes the subsectors of electric and gas utilities, energy resources and processing, pipelines, and water utilities.

Magic Quadrant

Figure 1: Magic Quadrant for Global Industrial IoT Platforms

Source: Gartner (December 2022)

Vendor Strengths and Cautions

ABB

ABB is a Visionary in this Magic Quadrant. ABB's Ability Genix IIoT offering has extended into OT applications that leverage industrial data. Genix supports IT/OT system integration and various IIoT use cases, such as improved energy generation or predictive maintenance, delivered with technology partners. ABB Genix includes the range of capabilities expected in an IIoT platform and has been deployed in a variety of industries. Given its history as a provider of industrial equipment and components, ABB's installed base for Ability Genix is industrial and global in nature. Reported deployments span from traditional on-premises OT to hybrid cloud with a focus on remote operations and automation to improve sustainability. Genix offers a combination of ABB development components and curated capabilities from a range of independent software vendor (ISV) partners (e.g., Microsoft Azure) and open-source projects. ABB's marketing approach emphasizes industrial analytics and AI, and the product roadmap reflects the vendor's intent to continue to deliver more packaged industry- and use-case-specific applications.

Strengths

- ABB's installed base for Genix reflects a well-balanced mix of customers across industrial sectors, including manufacturing, utilities, and transportation and logistics. ABB can readily offer customer examples in all major global regions with the ability to scale globally.
- ABB pursues an organic growth strategy, enabled by the existing base of ABB industrial assets (motors and generators, transmission equipment, drives, and more) with asset templates and prebuilt apps accelerating adoption. ABB has horizontal security on the International Electrotechnical Commission (IEC) 62443 standards with vertical extensions, such as the North American Electric Reliability Corporation (NERC).
- ABB's experience with industrial assets and OT in general has strong multiple protocols, with an open technology stack, supporting a range of deployment models, from on-premises and edge, to hybrid and fully cloud-based. Genix Edge AI provides a differentiating capability from "brownfield" to cloud, creating opportunities for extended automation.

Cautions

- ABB has a strong Microsoft Azure partnership. ABB Genix leverages Azure platform as a service (PaaS) in Azure deployments. For non-Azure cloud deployments, it uses ABB's own, as well as open-source, technologies and leverages the other cloud platforms as infrastructure as a service (IaaS) that will not suit the preferences of some enterprise buyers.
- ABB relies on in-house industry domain expertise and is weaker in the third-party partner communities compared to other vendors. Large projects benefit from system integration (SI) and engineering, procurement and construction (EPC) partners, but there is a gap in partnerships that support smaller customers.
- Ability Genix's digital twin capabilities are less frequently deployed, particularly for scenarios that do not involve ABB industrial assets. Device management is deployed by more than two-thirds of customers, with the balance using third-party tools. Customers with non-ABB assets may require additional software and implementation services.

Amazon Web Services

Amazon Web Services (AWS) is a Challenger in this Magic Quadrant. AWS's IIoT platform is delivered via the AWS IoT Core offerings and relevant services. Customers can create a personalized industrial IoT solution with a combination of numerous AWS cloud and edge services. Common service components across all deployment models are AWS IoT Greengrass, Amazon Monitron and AWS Panorama. More broadly, the catalog available to create IIoT platform capabilities includes various types of AWS services beyond the AWS IoT service portfolio, including general-purpose services for data management, integration, AI, analytics and security. AWS continues to mature its portfolio of capabilities for edge-centric computing that includes the management of data and deployment of analytics and AI models closer to physical assets in the field. A recent increase in focus on partners providing value-added applications, while still at an early stage, aligns with domain and market trends.

Strengths

- The overall size, financial strength and market presence of AWS and its parent company create opportunities and significant market visibility, as a majority of the vendor's IIoT platform prospects are already customers using related AWS services.

- AWS has simplified the customer experience related to procurement and deployment through improvements in bundling, delivering packaged collections of services such as the AWS Industrial Data Platform, Lookout and Monitron. In addition, the introduction of more pricing options, now spanning fixed cost, per-asset and traditional SaaS, gives customers additional flexibility.
- AWS' commitment, via its investments and product roadmap, to both cloud and edge-centric products and related architectures will position the vendor to provide IIoT solutions where analytics reside at various points on the cloud-to-edge continuum.

Cautions

- The vendor continues to provide general IoT products, as well as building industry-specific features. While this doesn't diminish the relevance of AWS's capabilities for industrial IoT use cases, it does create challenges when customers seek deeper industrial knowledge, more industrial-specific capabilities and applications, and industrial-focused communities of partners and developers.
- Despite improvements in IoT-oriented service bundling, AWS resources, and partner solutions, customers deploying AWS in industrial IoT scenarios face an array of choices regarding total solutions and a diverse set of services, which can complicate implementation decisions. Therefore, AWS's offerings in this market are less "out of the box" than most competitors', requiring customers to have deeper technical skill sets for integration, development and support.
- Given its overall cloud-centric perspective and as highlighted through customer feedback, AWS tends to be weaker in on-premises and complete edge-centric deployments. For example, some AWS services (such as AWS IoT Events) useful in IoT scenarios are not available for edge deployment. AWS also tends to be weaker in scenarios requiring sophisticated device management capabilities.

Braincube

Braincube is a Niche Player in this Magic Quadrant. Its main offering is delivered through the Braincube Smart IIoT Platform and related components. It has a well-stated marketing strategy across all channels. It is heavily focused on manufacturing and leverages prebuilt components including templates, applications and connectors to accelerate delivery as part of differentiation. Braincube is expanding its presence into building materials, food and beverage, chemical, and paper and pulp with a growing list of customers. Braincube does business primarily in Western Europe, North America and Latin America.

This year it had an increased focus on business outcomes represented by clear ROI in its customer stories. It is growing its partnership with Microsoft Azure and private-label options through AVEVA, Tiama and ENGIE. Direct sales are its primary channel for delivery. It has demonstrated efforts to improve its visibility.

Strengths

- Braincube's direct connection to customers and industry knowledge and expertise make it an excellent choice for manufacturers, particularly in Western Europe and the Americas.
- Braincube leverages prebuilt components to help it accelerate delivery in target industries to speed up time to value.
- Braincube demonstrates the ability to implement solutions across complex manufacturing environments in a mix of on-premises and cloud/hybrid cloud environments.

Cautions

- Most Braincube customers manage their global Braincube relationship from headquarters in Western Europe and the Americas, limiting the number of regional partners for enterprises deploying it in other regions or creating the need for enterprises to develop skills.
- A complete end-to-end implementation will require efforts by the enterprise and Braincube's partners to combine technology at the edge for connectivity and device management and in the cloud for more-advanced analytics.
- Braincube's limited ecosystem of system integrators will require end customers to invest resources, including scarce developer resources to become proficient with Braincube's IIoT platform.

Davra

Davra is a Niche Player in this Magic Quadrant. The company provides a flexible multiplatform IIoT solution that can be implemented on or across cloud, edge and on-premises deployments or in hybrid scenarios with identical functionality allowing a wide range of use-case implementation options. Davra has a focus on utilities, manufacturing, healthcare, and transportation and logistics and has branched out into natural resources, smart cities and telecom. Within these markets, Davra delivers business outcomes and also deploys packaged business capabilities, which include worker safety, physical security and security compliance. A Tier 1 partner network and ecosystem, which now includes IBM, Accenture, Siemens, Shell, Eaton and Emerson, covers development, technology and industry vertical specialists. New initiatives include the development of DevOps integrations, predictive models, and 3D visual composers. Davra has a growing and loyal customer base and remains one of the few pure-play IIoT platform vendors.

Strengths

- As a pure-play IIoT platform vendor, Davra is able to implement identical solutions across multiple platform types. This allows Davra clients to utilize the Davra platform in multiple implementation scenarios — even within the same end-user organization.
- A strong driver of above-average customer satisfaction with Davra solutions is the library of use-case design patterns with example business outcomes proven by case studies.
- Critical to Davra's market success are the tools it provides to ease the process of integrating and working with third-party products and platforms, and Davra's partner network and ecosystem membership are a key element of solution delivery.

Cautions

- As a small pure-play company, Davra is dependent on third-party relationships and an expanded partner and ecosystem network to deliver entire end-user solutions. This may require the enterprise team to develop the implementation skills in-house.
- Davra has invested in security assessments and accreditation, with support for security requirements such as ISO 9001:2015, ISO 27001, AICPA SOC2, DoD IL5 and the NIST security framework. However, as a Niche Player, Davra needs to continue to invest in its ability to address security for large complex projects.

- Partner training and sales support are a challenge, and as Davra builds out its partner network further, its ability to successfully deliver global projects may be constrained by Davra's ability to continually educate and train both partner sales and support or technical resources.

Envision Digital

Envision Digital is a Niche Player in this Magic Quadrant. The company is headquartered in Singapore, serving customers in 45 countries and driving a strong sustainability and "net zero" emissions objective with its EnOS platform. Envision Digital builds on its energy domain expertise with EnOS Renewables and EnOS City solutions and has presented solid growth into additional industrial sectors with EnOs Ark, supported by a growing partnership program. Envision Digital stands out as an enabler of sustainability and cost optimization outcomes for its clients. This is delivered through open-source frameworks, the EnOS industry application building blocks (or packaged business capability [PBC]), and its advanced application builder. EnOS has an extensive partner network, with strong partner attachment to its projects. The stability, ease of integration and openness of the product were supported by customer experience feedback.

Strengths

- Envision Digital presents solid expertise in the energy sector, serving multiple global-scale deployments, and with the focus on net zero and sustainability efforts, the interest in the EnOS platform in other industrial sectors is growing.
- Efforts to improve and extend the security features around the EnOS platform include compliance with NIST SP800-53 and ISO27001, as well as an expanding range of OEM and partner agreements for security capabilities.
- Positive client feedback cited the company's pricing and contract flexibility, quality of technical support, and timely and complete response to product questions.

Cautions

- The data management capability on the EnOS platform could be improved to keep up with market needs in terms of data preparation and data export capabilities. Enterprises may need to invest in internal teams or partners to explore/implement alternate solutions.
- Growth of Envision Digital into additional industrial sectors and the scaling of its solutions will need to be matched by improvements in its service and support capabilities, especially outside its core geographic markets.

- Envision Digital continues to build out its security roadmap, and a gap the company is investing in is completing its IEC 62443 Certification, the international series of standards that address cybersecurity for operational technology in automation and control systems.

Eurotech

Eurotech is a Niche Player in this Magic Quadrant. In the last year, new Eurotech management has significantly modified and updated its strategy and focus on industrial IoT and edge. The company is in the process of putting in place the resources necessary to support the change. The Everywhere Cloud IIoT platform is still at the core of Eurotech's business, but there is a significant shift toward edge solutions. This is based on Eurotech's 30 years of experience in simplifying edge complexity through both modular hardware and open-source-based software solutions, as well as incorporating security features from the cloud down to the fieldbus. As part of its strategic direction change, Eurotech is focusing on four verticals — industrial manufacturing; energy and utilities; transportation; and medical. Also, as part of the updated strategy, Eurotech is enhancing its customer support and professional services, and prioritizing expansion into China and German-speaking Europe. Eurotech's significant contribution to, support of, and use of open source, particularly through the Eclipse Foundation, and with Red Hat and IBM as partners, provides a high level of multiplatform support and third-party integration not matched by most other vendors. To support the new strategy, in September 2022, Eurotech acquired InoNet, a Germany-focused IPC and edge AI hardware provider.

Strengths

- Eurotech is able to offer integrated edge solutions, incorporating AI at the edge. This reflects its history of working with third-party hardware and software solutions, such as Red Hat and IBM.
- Eurotech's platform offers preintegration and implementation design patterns with multiple leading solution providers, including Microsoft Azure, AWS, Software AG, IBM and others.
- Eurotech is constantly on the leading edge of IoT development due to its involvement in various open-source foundations, leading to a strategic role in development of industry standards and frameworks.

Cautions

- The primary caution for Eurotech stems from the significant changes that it is making in its corporate and product strategies and the realignment of its business. These changes may cause customers to assume greater responsibility and allocate more resources to implement projects.
- The new strategic direction places a bigger emphasis on professional services and support/customer success than previously, but due to its small ecosystem, enterprises may need to work closely with Eurotech to identify partners in their region and vertical domain of interest.
- The absence of strong capabilities in analytics or application enablement and management narrows the competitiveness of the Eurotech platform as value creation shifts to these capabilities. However, its investment in the creation of no-code rapid application development may mitigate this.

Exosite

Exosite is a Niche Player in this Magic Quadrant. The Murano IIoT platform is delivered primarily as a managed service and can be deployed on public cloud infrastructure. The analytic capabilities of the platform are packaged into ExoSense, a condition monitoring application allowing domain-specific development to take place quickly. ExoEdge enables industrial protocol conversion capabilities to support the ingestion of OT data streams into the platform. Exosite approaches the market via direct sales to end users, but it emphasizes in its go-to-market approach a focus on industrial OEMs. As such, the Exosite Murano platform is best suited for enterprises seeking cloud-oriented capabilities to process and analyze data from connected/monitored products.

Strengths

- Strong usability characteristics contribute to a positive customer experience in terms of smooth and rapid deployment. Customer feedback consistently highlights ease of use and ease of deployment as key strengths.
- Exosite facilitates the quick creation of vertically oriented applications through the condition monitoring solution ExoSense, particularly when connecting to OEM hardware and leveraging the bundled Murano and ExoSense capabilities.
- The vendor's depth of experience in helping OEMs deploy connected product monitoring solutions stands out as a differentiator versus the competition and represents the heart of the Exosite go-to-market approach.

Cautions

- Exosite demonstrates a limited number of customers with on-premises deployments, particularly in businesses where interaction with OT environments and brownfield, fragmented device landscapes is common.
- Exosite often struggles to express quantified benefits from its customer deployments, typically citing more abstract and subjective benefits.
- The vendor's product roadmap has most recently focused on delivering functionality for its current customer base, rather than on more transformative functionality that is becoming crucial in the market (such as deeper support for digital twins and targeted applications).

Hitachi

Hitachi is a Visionary in this Magic Quadrant. Hitachi Vantara is a Hitachi subsidiary and home of the Lumada IIoT platform, which has become an important enablement platform for its advisory, implementation and operations services. The platform supports IT/OT system integration and various IIoT use cases as delivered into a broad range of industrial sectors in collaboration with technology partners. In the pursuit of improving operational inefficiencies, capabilities around industrial DataOps have been elevated. Hitachi is able to list customer examples with outcomes including sustainability, cost optimization, automation and remote operations.

Strengths

- Hitachi as an organization brings deep-rooted experience in IT and OT across many decades, including experience across multiple industrial sectors.
- A focus on innovative industrial DataOps offers clients of Hitachi improved data storage, data lineage, data quality and process model capabilities for specific industries.
- Hitachi offers sector-specific solutions, including Lumada Manufacturing Insights, Lumada Video Insights, Lumada Inspection Insights and Lumada Industrial DataOps, as well as a comprehensive list of analytics solutions for manufacturing.

Cautions

- Hitachi remains challenged in terms of ease of deployment and use of standard APIs/tools as part of deployment and ease of implementation, requiring enterprise customers to have mitigation strategies and internal skills.

- Hitachi is still maturing the security features and functionality for its Lumada IIoT platform.
- Organizations deploying Lumada should be aware that its application enablement and management capabilities need to be stronger to align to the market.

Litmus

Litmus is a Niche Player in this Magic Quadrant with its Litmus Edge and its Litmus Edge Manager IIoT platform manager. As a software company, it provides the range of capabilities expected in an IIoT platform across a variety of use cases, although its center of gravity is manufacturing for on-premises or hybrid edge-cloud deployments. Litmus improved its data models and asset frameworks and developed a portfolio of vertical-specific solutions and partner-based machine learning and AI models (with partners Dell and Google Cloud) at the edge. Litmus Edge and Litmus Edge Manager were developed internally with a focus on enterprise scale and security, and Litmus also leverages best-in-class third-party and open-source solutions. Litmus emphasizes its edge data platform capabilities as a use-case-agnostic and scalable platform that supports clients' automation, cost optimization, and remote operations. Google Cloud has white-labeled Litmus as its edge layer for industrial IoT, presenting Litmus with new go-to-market opportunities.

Strengths

- Litmus has experience connecting to assets from multiple site locations. Customers on average deploy its solution at 10 or more sites to deliver operational uses, such as reducing downtime, predictive maintenance and reducing operational costs.
- Litmus' installed base reflects its manufacturing industry experience and partners that can support global operations.
- Litmus' strong experience with a broad range of assets and third-party systems is reflected in its native driver support for more than 250 devices and protocols and over 45 prepopulated applications, as well as support for advanced container deployment at the edge.

Cautions

- At present, Litmus has limited cloud capabilities and is more suitable for an edge or hybrid deployment.

- While Litmus has implementation partners and deployed solutions in North America, Europe, and parts of Asia, end customers located in China or South America or other places outside its core geographies may need to become proficient with the product on their own.
- Litmus has limited implementation expertise beyond its core manufacturing base. Thus customers in other industries need to verify how it can deliver value for their specific industrial challenges.

Microsoft

Microsoft is a Leader in the Magic Quadrant with Azure IoT. Azure IoT capitalizes on Microsoft's broader platform and offers cloud, edge and hybrid deployment options. These products can be combined for a comprehensive end-to-end solution for nearly any use case and industry. However, knowing how to combine them and comparatively price them is challenging for enterprises. Microsoft covers all industries by reaching customers through its broad sales, marketing and partner engines and providing the broad geographical coverage with its cloud services. Microsoft continues its emphasis for its IIoT offering toward delivery by integrators and technology partners. Its strong partner ecosystem gives it broader reach and domain into varying markets. While Microsoft is often centrally engaged, in some cases, the partner ecosystem may distance Microsoft from end customers. Microsoft is focused on making itself the standard platform for key IIoT providers. Over the last two years, many IIoT players (including PTC, GE, Siemens, ABB and Schneider) have publicly announced that their platforms are built on Microsoft cloud, highlighting an emerging ecosystem. Microsoft emphasizes the importance of modernizing security and data management as primary messages to its IIoT clients.

Strengths

- Microsoft has a large partner ecosystem, and end-user organizations will have several integrators and technology partners to choose from for most industries and regions.
- Microsoft demonstrates deep knowledge and support for complex security profiles along with supporting software (Azure Defender, Azure Sphere and Azure RTOS).
- Microsoft demonstrates expertise in adjacent supporting capabilities, including database management, data integration, advanced analytics, visualization, enterprise app integration, security, and support for citizen developers.

Cautions

- The breadth and complexity of the product portfolio can cause confusion for customers, as well as delivery partners, and delay project completion and increase project cost.
- The complex pricing structure and contract negotiations require enterprises to assess project business objectives and clarify how the IIoT platform aligns to them.
- Inconsistency of customer experience across regions, industries and technology partners will require enterprises to set clear project objectives and measurable outcomes.

PTC

PTC is a Challenger in the Magic Quadrant. PTC continues to invest and further its market position through marketing, sales enablement to its partner ecosystem and delivering diverse industrial use cases. However, PTC recently has shown a lack of focus on visionary use cases that industrial enterprises require when either modernizing their facilities to the factory of the future for automation or sustainability, or servitizing their products to create new business models. PTC continues to grow its customer base, such as discrete manufacturers. However, other vendors may be outpacing this growth, which indicates that the competitive landscape is getting fierce. In recent years, PTC has acquired non-IoT companies like Intland Software (application life cycle management), Arena Software (product life cycle management), and Onshape (computer-aided design) that may contribute to a focus away from IIoT and toward the digital thread and digital twin. Note that PTC has agreed to acquire ServiceMax, with its field service management for industrial OEMs, in January 2023. PTC continues to be visible for RFP discussions and in terms of IIoT platform revenue and still has one of the largest industrial footprints among the manufacturing end users. PTC continues to shift its IIoT strategy and investment toward IoT-enabled applications such as digital performance management (DPM), with a decreasing emphasis on the middleware platform.

Strengths

- PTC has extensive experience with industrial customers (manufacturing and utilities), where PTC and its partners, including Microsoft and Rockwell Automation, understand the complexity of problems that its customers face.
- As a recognizable brand in the IIoT platform market, PTC has a broad ecosystem of partners with trained developers with the domain expertise to participate in a significant fraction of IIoT platform RFPs.

- The breadth of PTC software that complements the IIoT ThingWorx platform, such as Windchill, Creo, Arena, and Vuforia, facilitates the creation of a digital twin and digital thread. PTC can be that “one-stop shop” for industrial customers when solving their digital transformation strategies.

Cautions

- PTC demonstrates some experience and an installed base for use cases for automation and remote operations, but not for sustainability, in which Gartner observes fast-growing demand.
- Legacy Axeda platform user frustration may contribute to some legacy clients moving to other solutions and creating bottlenecks for the availability of PTC and implementation partner teams.
- Kepware remains as a known data ingestion solution for industrial asset connectivity at the edge. However, other tech providers’ investments and innovation in data ingestion make them more competitive to Kepware, requiring enterprises to consider third-party ingestion solutions as part of any PTC solution.

ROOTCLOUD

ROOTCLOUD is a Niche Player in this Magic Quadrant. The company’s most extensive installed base for asset-intensive industries resides with manufacturers with some exposure to the utility, transportation and logistics sectors. ROOTCLOUD is the most visible IIoT platform provider to originate in China and migrate into western markets. ROOTCLOUD investors include Matrix Partners China, Hejun Group and Tencent. The ROOTCLOUD platform services add value to a diverse portfolio of industrial assets. The IIoT platform and related software enable real-time data collection, asset performance management, product life cycle management, intelligent services, and analytics across the industrial value chain and ecosystem. ROOTCLOUD Edge is an on-premises solution that allows operators to acquire, process and analyze data in disconnected scenarios (off-cloud). ROOTCLOUD is headquartered in China, where it has a strong presence.

Strengths

- The analytical output of the ROOTCLOUD platform benefits from the acquisition and analysis of diverse sources of internal and external data, including asset health monitoring, computer vision, acoustics, energy, and environmental inputs to ensure the precision and accuracy of automation and decision support.

- ROOTCLOUD has a broad range of support for API and protocol data integration with manufacturing execution systems (MES), industrial control systems and computer numerical control (CNC) machinery. ROOTCLOUD also supports an extensive portfolio of industrial protocols that connect to a series of programmable logic controllers, CNC tools, sensors and select devices from OEMs.
- ROOTCLOUD has increased its focus on security by investing in additional industrial security-centric features for its platform, as well as the security of its own internal application development process.

Cautions

- ROOTCLOUD's center of gravity is China, although it is growing in other parts of Asia, Europe and the U.S. This requires enterprises to invest time and effort to get a global implementation plan and resources from ROOTCLOUD.
- ROOTCLOUD focuses on the manufacturing sector. ROOTCLOUD has minimal experience within the utility sector and transportation sector (excluding warehouses).
- ROOTCLOUD's go-to-market is primarily direct to users, and channel partners generate a small percentage of revenue. Outside of China, ROOTCLOUD's lack of global, value-added partners will make it difficult for ROOTCLOUD to scale globally and support large, multinational enterprises with large project requirements.

Siemens

Siemens is a Visionary in this Magic Quadrant. Siemens' MindSphere IIoT platform has been developed and curated by Siemens leveraging its extensive experience building, installing and operating industrial equipment. Siemens has added more focused solutions for OEMs of equipment and for industrial operations starting with Asset Health and Service Hub, plus an enhanced edge with Kubernetes (K8s) clusters and external identity access management. Customers are using MindSphere for improving operational performance with outcomes centered on automation or sustainability, as well as data sharing between partners. MindSphere has an edge-to-cloud approach using Siemens capabilities, as well as those from partners such as AWS, Microsoft, Alibaba, IBM Red Hat, Tableau, Software AG, SAS, Tangent Works, eQ and others. Global project implementation can be done by Siemens Advanta or by Accenture, Capgemini, Engineering Ingegneria Informatica or others. MindSphere's strategy continued to evolve with Siemens' launch of the Xcelerator digital business platform and increased focus on composability.

Strengths

- MindSphere retains a strong focus on ease of implementation and ease of use, both with the Mendix capabilities and with packaged business capabilities (PBCs) and a variety of industry solutions.
- Europe remains the center of gravity for MindSphere deployments, but the company has demonstrated deployments on a global basis.
- Large-scale manufacturing projects demonstrate ability to deliver automation, monitoring and cost optimization.

Cautions

- Although Siemens MindSphere has a new "start for free," as well as a tiered pricing structure approach for capabilities and assets, pricing has a challenge as it is seen as complex and confusing for the package and for add-on features.
- MindSphere has a limited number of customers in edge-only deployments. It is commonly deployed for cloud and hybrid deployments, and it has some differences in functionality for edge compared to cloud or hybrid deployments.
- Regional-service public cloud rollouts and updates differ between China (on Alibaba) and the rest of the world (on AWS and Microsoft Azure). This will require enterprises to manage global deployments carefully.

Software AG

Software AG is a Leader in this Magic Quadrant. Software AG's Cumulocity IoT platform consists of Cumulocity IoT Cloud and Cumulocity IoT Edge. Software AG promotes self-service capabilities that allow the users to build their own business solutions as a strength and has a comprehensive suite of integration and application enablement capabilities. Cumulocity IoT has a solid customer base in manufacturing and a growing base in the transportation and utilities segments. Cumulocity IoT provides users with a variety of ready-to-use, configurable custom business solutions, including overall equipment effectiveness, condition monitoring and predictive maintenance. Cumulocity IoT is marketed to OEM-connected product manufacturers, including white-label options, as well as to operators in asset-intensive industries.

Strengths

- For customers that require their IoT solutions to operate disconnected from cloud infrastructure, Software AG offers full platform functionality for on-premises deployments with its Cumulocity IoT Edge. Cumulocity IoT Edge is a single-node variant of the Cumulocity IoT cloud platform deployed on local servers, industrial PCs or micro data centers.
- Cumulocity provides low-code Smart Rules, Analytics Builder and Application Builder to enable frontline engineers and nondevelopers to build powerful applications. Customers feel that the Cumulocity IoT solution empowers their frontline engineers to create and manage their business-specific data processes. They also highlight the user interface as simple to use and graphically intuitive.
- Cumulocity IoT maintains a broad and deep catalog of IoT integration capabilities with over 300 connectors to SaaS and on-premises IT applications.

Cautions

- During due diligence investigations of Cumulocity IoT, customers must work to understand features and capabilities that reside in core versus auxiliary portfolio. The enterprise customer will need to build transparency in its engagement with Software AG, as in addition to Cumulocity IoT, the company offers various other products and suites within its IIoT portfolio, including webMethods, TrendMiner, ARIS and Alfabet (among others).
- The pricing structure for Software AG's various IoT software products and various middleware products presented within the IoT constellation is complex.
- Gartner estimates that over 85% of Software AG's IIoT customer base is in the manufacturing sector. Although Software AG is expanding its partner ecosystem, customers in the utility and transportation segments must invest effort to acquire the skills or partners to achieve the depth and breadth of capabilities specific to these markets that Cumulocity IoT enables.

UnifyTwin

UnifyTwin (previously Knowledge Lens) is a Niche Player in this Magic Quadrant. UnifyTwin specializes in manufacturing and helps clients improve plant efficiency and reduce asset downtime. The bulk of UnifyTwin's customers are brownfield sites. Its solutions are optimized for legacy industrial environments, with strategies to optimize the use of standardized sensors to mitigate deployment complexity. To update its market approach, not only has UnifyTwin changed its name, but it also has built out a new U.S.-based team, bringing new direction and products. The updated strategy incorporates a cloud-based knowledge base for analytics, asset predictions and forecast models that also integrates human (worker) knowledge, as well as product knowledge.

Strengths

- UnifyTwin's customer success stories demonstrate business value, particularly in industrial applications, by driving asset performance to improve production and reduce costs. Customers report energy efficiency gains, reduced wastage and quality improvements.
- UnifyTwin continues to demonstrate expertise and implementation capabilities for manufacturing companies across the spectrum, from cement to chemicals to bottling to textiles.
- UnifyTwin's clear pricing structure and pragmatic technology architecture contribute to delivering clear value and short-term payback for its client base.

Cautions

- UnifyTwin is starting to move beyond its core manufacturing base. Customers in other industries, such as utilities and transport, must either become proficient in the platform or find partners to deliver value for their specific industrial challenges.
- UnifyTwin's ambition to grow outside of its core market may stretch the core; customers will need to rely on local partners with a strong track record.
- The company brings security capabilities, such as OWASP, ISO 27001 and 9001, and data diodes instead of a firewall approach, and it works with Microsoft Defender for IoT as part of its extended stack, but it needs to continue investing in security.

XCMG HANYUN

XCMG HANYUN is a Niche Player in this Magic Quadrant. XCMG HANYUN provides an IIoT platform to its parent industrial equipment company, to OEMs and to the industrial market as a whole. XCMG HANYUN has an integrated edge-cloud solution that supports over 1,600 industrial protocols, as well as libraries of microservices and of digital twins. It provides clients with a low-code/no-code platform for agility and flexibility, microservice governance and simplified container deployment. XCMG HANYUN is focused on global expansion leveraging the parent Xuzhou Construction Machinery Group's (XCMG's) global equipment ecosystem, along with key partners. While its customer base is centered in China, the company has made strides in the Middle East, Africa and Latin America. Partners include Alibaba, Huawei, SAP and AInnovation. The company supports ISO 9000, ISO14001 and ISO27001, as well as regulations from the Standardization Administration of the People's Republic of China.

Strengths

- XCMG HANYUN has deep domain expertise to support enterprises engaged in manufacturing, smart products and natural resources.
- XCMG HANYUN provides an extensive set of add-on applications and PBCs to support a broad range of enterprise needs, from MES to logistics management to field service to its global service system for spare-parts warehousing and ordering.
- XCMG HANYUN analytics has invested in defining a large number of operational analytics in advance, enabling a drag-and-drop, low-code way to improve development efficiency, and has accumulated more than 2,600 industrial mechanism models that it has incorporated in the analytics for fault diagnostics, process optimization and other alerts.

Cautions

- While XCMG HANYUN has a strong presence in China, enterprises with operations outside of China will need to ensure that they can get the proper level of support from the vendor and its partners.
- Transportation and energy and utility enterprises will need to assess how XCMG HANYUN and its partners can address specific business needs in their respective domains.
- While XCMG HANYUN has embedded a number of security features, such as data encryption, honeypots and firewalls, it needs to further invest to match evolving global market needs.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant may change over time. A vendor's appearance in a Magic Quadrant one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

- UnifyTwin (new name for Knowledge Lens)
- XCMG HANYUN

Dropped

These tech providers shifted their business strategy to require a joint sale of their IIoT platform and their application software. They thus fell out of our inclusion criterion that the IIoT platform be sold independently of any other hardware or software outside of the defined IIoT platform.

- Altizon

These tech providers could not show the required minimum number of customers, as well as the customers spread throughout the three regions. They thus fell out of our inclusion criterion that they had the minimum 100 production clients or the 10 clients in each of three major regions.

- Flutura
- Samsung SDS

Inclusion and Exclusion Criteria

To qualify for inclusion in this Magic Quadrant, each vendor had to meet the following criteria:

- The vendor must be an IoT platform supplier to asset-intensive industries. The IoT software platform tendered for consideration must be generally available and in production deployments in at least three defined industrial sectors. For this evaluation, Gartner has identified the following allowed sectors (and allowed subsectors) as representing asset-intensive industries:
  - Sector: manufacturing and natural resources (subsectors: automotive, consumer nondurable products, energy resources and processing, heavy industry, IT hardware, life sciences and healthcare products, natural resources and materials)
  - Sector: transportation (subsectors: air transport, motor freight, pipelines, rail and water, warehousing, couriers, support services)
  - Sector: utilities (subsectors: electrical, gas, water)

- The IIoT platform must be able to deliver and support the following capabilities in a single bundled offering, across a distributed architecture:
  - Analytics
  - Device management
  - Integration
  - Data management
  - Application enablement and management
  - Security

- The provider may include, via a formal ongoing partnership(s) with other software vendors, portions of the IIoT platform capabilities. The vendor must demonstrate purpose-built integration, and support for scalability and interoperability relating to partnered IIoT platform capabilities. Partnered solution capabilities can include IaaS and PaaS elements from third-party cloud services providers. If the predominance of the intellectual property that comprises the IIoT Platform is derived from third parties, then the partnered software functionality or capabilities must be accessible only by the evaluated vendor's own APIs. Evaluated vendors cannot consider third-party software sold under a separate contract as an IIoT platform functionality or capability.

- The general availability (GA) date for the IIoT platform must be 15 April 2022 or earlier. We also offer the following enhanced guidance relating to product releases:
  - Product releases must be generally available by 15 April 2022 in order to be assessed in the customer reference survey.

- The IIoT platform must be salable as an independent purchase without requirements for companion hardware or software purchases. Similarly, purchase of the IIoT platform should not be contingent on an existing asset base of vertical applications, software, or hardware (including product life cycle management, asset performance management, manufacturing execution systems, industrial control systems, historians, etc.). However, the IIoT platform can take advantage of the existing legacy installed base, provided the IIoT platform also connects to other third-party applications. Please note that stand-alone IoT-enabled applications and SaaS are not considered part of this market and do not meet the inclusion criteria. Stand-alone IoT-enabled applications and SaaS will be considered an element of "vision," but not considered within "execution" (e.g., product/service evaluation criteria). Manufacturers considered for inclusion within this Magic Quadrant must offer value to the equipment of other manufacturers. At least 50% of assets connected to and interacting with the manufacturer's IIoT platform must be outside of its own product lines.

- The vendor has 100 unique customers that have deployed GA versions of the IIoT platform in production. These customers must demonstrate data acquisition, ingestion and analysis from industrial assets from a diverse set of OEMs in industrial environments for industrial companies.

- The vendor has a minimum of 10 unique customers operating the GA platform in production in each of three major geographies (such as North America, South America, Europe, Asia/Pacific, the Middle East or Africa) for a minimum total of 30 unique customers of the total of 100 unique customers spread globally.

- The vendor has at least 350,000 industrial IoT endpoints connected to its platforms across the installed base of customers. At least 10,000 of these must be industrial gateways. An IoT endpoint enables equipment, assets or other objects to participate in one or more IoT solutions. There are three characteristics of an IoT endpoint when it is enabling an asset or object: (1) sense or activation capabilities; (2) compute (at a minimum data acquisition and control functions); and (3) communication. Gateways may have sense/actuation capabilities, but must provide some compute (even if this is fundamental message filtering and formatting) and communication.

- The product must be available in all of the designated deployment models: cloud-only, hybrid edge-cloud, and on-premises. For on-premises deployments, Gartner will accept containerized solutions where all solution elements are available and the system is able to operate in a disconnected scenario for extended periods of time.

- The vendor must offer, directly or through partnerships, professional services (installation, implementation and integration) and support services (help desk, product support and sustaining engineering) in at least three major geographies and in at least three major languages (such as English, German, Mandarin, Arabic, Spanish, Japanese and Hindi-Urdu).

Honorable Mentions

The evaluation process identified more than 40 vendors that were excluded from this Magic Quadrant, but each has forward-looking or specialized value for industrial enterprises. Application and software engineering leaders have myriad choices for their IIoT platforms beyond the cohort of vendors evaluated herein.

It is important to note that the exclusion of any vendor from this market evaluation is not a de facto assessment that the excluded vendor cannot provide value to industrial enterprises. Exclusion is a function of nonconformance with the inclusion criteria established, which is based on Gartner's view of the evaluated market. Upon determining the criteria, Gartner seeks to evaluate vendors that are relevant and extensible to as many Gartner customers as possible. This evaluation of IIoT platforms focuses on a small number of providers that meet Gartner's inclusion criteria for this Magic Quadrant cycle. Other vendors merit consideration in any due diligence for IIoT solutions.

The following vendors are presented based on platform capabilities, experience with industrial enterprises, and an ability to create related value.

Accenture

Accenture's IoT platform, named Adaptive, is complemented by its AI Insights Platform (AIP+). They span the range of required IIoT platform components for industrial enterprises, and Accenture leverages its professional services team's extensive industrial domain expertise. In addition, Accenture introduced the Accenture Operations Twin in 2020 along with accelerators for engineering and manufacturing. Accenture works with customers across industrial sectors from energy to manufacturing to utilities to transportation. Typical projects involve process optimization or integration of systems and equipment to drive sustainability or automation efforts. The company did not meet the Magic Quadrant criteria, because its new IIoT platform does not yet have 100 unique customers at production scale, nor does it have 10 unique customers in each of three major geographies, for a total of 30 unique customers dispersed globally.

Inductive Automation

Inductive Automation's IIoT offering spans a range of required IIoT platform components for industrial enterprises, with a strong North American presence plus partners for the rest of world. It works with customers in manufacturing, both process and discrete, as well as water and power utilities. Typical projects involve integrating plant data to drive cost optimization or automation efforts.The company did not meet the Magic Quadrant criterion for offering the platform as a stand-alone solution without the need for acquiring third-party software sold under separate contract.

Tulip

Tulip's IIoT offering spans a range of required IIoT platform components for industrial enterprises, with a strong European and North American presence and a primary focus on manufacturing. Typical projects involve digitizing production logs and connecting plant equipment to drive process optimization or compliance efforts.The company did not meet the Magic Quadrant criterion for offering the platform for at least three industrial sectors of manufacturing and natural resources, transportation and utilities.

Evaluation Criteria

Ability to Execute

Gartner evaluates vendors on the quality and efficacy of the processes, systems, methods or procedures that enable IT provider performance to be competitive, efficient and effective. Vendors are also rated on the ability to positively impact revenue, retention and reputation within Gartner's view of the market.

Providers are judged on their ability and success in translating market requirements — and their vision for the market — into products that match market needs and enable clients to achieve a successful outcome with minimal risk.

Table 1: Ability to Execute Evaluation Criteria

Evaluation Criteria ↓	*Weighting* ↓
Product or Service	High
Overall Viability	High
Sales Execution/Pricing	High
Market Responsiveness/Record	Medium
Marketing Execution	Medium
Customer Experience	High
Operations	High

Source: Gartner (December 2022)

Product/Service

This criterion includes the core products and services that compete in and/or serve the defined market for IIoT platforms. This includes current product and service capabilities, quality, feature sets and skills. These can be offered natively or through some OEM agreements or partnerships, as defined in the Market Definition/Description section and detailed in the subcriteria. The subcriteria for this evaluation criterion are analytics, IoT edge device management, integration, data management, application enablement and management, and security.

Overall Viability (Business Unit, Financial, Strategy and Organization)

Viability includes an assessment of the organization's overall financial health, as well as the financial and practical success of the business unit. This evaluation criterion views the likelihood of the organization to continue to offer and invest in the product. Additionally, this criterion works to understand the product position in the current portfolio and within the company's strategic view of IIoT. Ultimately, IIoT must relate to digital business strategy and the digital optimization and transformation of its customers.

Sales Execution/Pricing

This criterion includes the organization's capabilities for presales activities and the structures and tools that support them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of sales channels. Gartner is especially interested in the sophistication and efficacy of the company's indirect channel to enable resellers, integrators and outsourcers of IT and OT to extend the company's platform to asset-intensive companies.

Market Responsiveness and Track Record

This criterion includes the vendor's ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve, and IIoT market dynamics change. This criterion also considers the vendor's history of responsiveness to changing market demands.

Marketing Execution

This criterion involves the clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to:

- Influence the IIoT market

- Promote the brand
- Increase awareness of products
- Establish a positive identification in the minds of customers

This “mind share” can be driven by a combination of publicity, promotional, thought leadership, social media, referrals and sales activities. Gartner views successful engagement of developers, standards bodies, industry consortia and related organizations as key capabilities.

Customer Experience

This criterion includes IIoT products and services and/or programs that enable customers to achieve anticipated results with the products evaluated. Specifically, this includes quality supplier/buyer interactions, technical support or account support. It may also include ancillary tools, customer support programs, availability of user groups and service-level agreements. Considered within this criterion are efforts to educate and transfer knowledge and insight to the market, including users, partners and the growing community of industrial-specific IoT developers.

Operations

This criterion involves the ability of the organization to meet goals and commitments of industrial enterprise customers. Factors include the perceived quality of the organizational structure, skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently. Investments in tools, support structures and marketplaces are considered essential elements in this criterion.

Completeness of Vision

Table 2: Completeness of Vision Evaluation Criteria

Evaluation Criteria ↓	*Weighting* ↓
Market Understanding	High
Marketing Strategy	High
Sales Strategy	Medium
Offering (Product) Strategy	High
Business Model	Low
Vertical/Industry Strategy	Medium
Innovation	High
Geographic Strategy	High

Source: Gartner (December 2022)

Market Understanding

This criterion involves the vendor's ability to understand customer needs in asset-intensive industries and translate them into products, services, and market awareness and trust. Vendors meeting this criterion show a clear vision of their market — listen and understand customer demands — and can shape or enhance market changes with their added vision through the following:

- Product and service development
- Effective market conditioning and awareness
- Innovation spanning platform functionalities
- Business practices creating greater overall demand

This includes industrial enterprises' need for IoT-enabled sustainability or automation or remote operations or transformation of OT and industrial applications — at a global scale.

Marketing Strategy

This criterion looks for clear, differentiated messaging consistently communicated internally and externalized through social media, advertising, customer-facing programs, partner programs and positioning statements to generate platform recognition and positive brand regard in the IIoT platform market.

It also includes the vendor's ability to either identify opportunities to expand adoption through geographic expansion, or identify the underserved or poorly served market subsectors and unique business requirements through microsegmentation analysis and outreach.

Sales Strategy

This criterion involves a focused and structured strategy for selling IIoT platforms. The strategy identifies the appropriate channel mix, including:

- Direct and indirect sales
- Marketing and business development
- Direct and partnered service delivery (partner-led, co-delivery and private label)
- Supportive communication

Developing sales and value-added service partners and market alliances, all of which extend the scope and depth of market reach, expertise, technologies, services and their customer base, is a key consideration.

Offering (Product) Strategy

This criterion includes an approach to IIoT platform development and delivery that emphasizes market differentiation, functionality, methodology and features as they map to current and future requirements for asset-intensive businesses.

Business Model

This criterion includes the design, logic and execution of the organization's business proposition to achieve continued success in selling IIoT platforms to asset-intensive industries.

Vertical/Industry Strategy

This criterion involves the vendor's strategy and approaches to direct resources, skills and products to meet the needs of industrial market segments and industry subsectors within manufacturing and natural resources, utilities, and transportation and logistics.

Innovation

This criterion involves the direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or preemptive purposes to:

- Secure the trust and business of asset-intensive industries
- Apply IoT to internal operations
- Extend product capabilities and services into adjacent and new industrial use cases

Geographic Strategy

This criterion involves the vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography. This may be achieved either directly or through partners, channels and subsidiaries, as appropriate for that geography and market.

Quadrant Descriptions

Leaders

Leaders invest in, and shape, the future of IIoT. Leaders perform skillfully and often exceed expectations regarding outcomes achieved with their technologies and services. The companies within the Leaders quadrant bring to market a stable IoT business unit and a cohort of lead executives with relevant IIoT experience aligned with the overall corporate strategy and vision.

Leaders combine an insightful understanding of the realities of the IIoT market, a results orientation, the ability to influence the market's direction, and the capability to grow with customers with a large global footprint. In the IIoT platform market, Leaders not only have a clear vision of the market's direction, but also develop and bundle targeted competencies and capabilities for sector-specific requirements on a global and local basis. This means they consistently market and sell an IIoT platform as a single solution to any asset-intensive sub sector for industrial use cases. This includes services, capabilities and functions essential to those markets they serve (for example, protocol and regulatory support and conformance). As well as additional applications, packaged business capabilities, and composable services that supplement the IIoT platform. The vision and execution of Leaders are evident in the platform's ability to integrate and interoperate with a broad and diverse installed base of industrial assets, OT systems and IT/OT independent software vendors. Two vendors are rated as IIoT platform Leaders this year.

Leaders help customers, partners and their ecosystem through:

- A focus on customer success, using the metrics of the industry they work in.
- Providing a consistent set of solutions and technologies across cloud-based and on-premises deployments that leverage both custom development or development via marketplaces for microservices, apps, connectors, and more.
- Thought leadership via internal sector-specific use case frameworks and methodologies, as well as via active participation in multiple industry consortia and trade groups.
- Formal technology alliances and service partnerships to facilitate integration and interoperability with third-party IT and OT hardware and software.
- Accommodate unique customer requirements with flexible engagement models and business development activities, and provide value across multiple geographies.

- Engendering trust by presenting numerous compelling and complex industrial reference customers and case studies in industrial environments to the market and prospects.

- Augmenting and/or replacing functions of legacy closed-loop control and automation systems, as well as augmenting industrial enterprise applications, such as MES, EAM and APM.

Customers should note that a Leader is not always the best choice. A focused, smaller vendor can provide excellent support and commitment to suit individual needs. Other vendors may provide a certain capability — such as enhanced security or expertise in a specific submarket like pharmaceutical manufacturing — that is important to your organization.

Challengers

Challengers have excellent IIoT platform technical abilities, but they have to continue to build and grow their vision. Challengers perform skillfully across multiple business-driven use cases and industrial subsectors, often meeting or exceeding expectations regarding planned outcomes achieved with their technologies and services. Challengers bring to market a consistent set of technologies across cloud-based and on-premises deployments. Two vendors are rated as IIoT platform Challengers this year.

Challengers have an emerging and coalescing vision of the market's direction. They develop competencies expressed more in adjacent, value-added application capabilities such as digital business, fleet management or use-case-specific analytics "applets," rather than end-to-end horizontal IIoT platforms/suites. Challengers choose a narrower path to sell their IIoT platforms to a targeted number of asset-intensive subsectors, rather than a broad cross-industrial focus. They transfer knowledge to customers, partners and prospects through a deep and broad library of sector-specific use case frameworks and methodologies.

Challengers have the organizational capabilities and scale to pursue and win multinational opportunities for IIoT consistently. These opportunities are global in terms of supporting referenceable enterprises that build digital solutions using the IIoT platform of the provider in at least three regions.

Visionaries

Visionaries in a market are innovators that drive the market forward by responding to emerging, leading-edge customer demands and by offering new opportunities to excel. Alternatively, these Visionaries have a clear view of the market's requirements and direction, and help drive their customers to new opportunities. Visionaries provide differentiated value in targeted IIoT platform elements to meet the current and future market needs. This year, only three companies are Visionaries.

Visionaries provide a broad continuum of business value in the form of technologies or business and operational models. They expand their capabilities through acquisition, internal development and, increasingly, robust partnering. They must extend market adoption through service delivery partnerships and technology alliances (for example, resell and OEM agreements). Additionally, these vendors must show insightful understanding of market trends and visionary marketing, sales and related product and business management strategies.

Visionaries should eventually grow to become IIoT platform Leaders. Alternatively, they may decide to limit their target markets to focus on their core competencies in technologies, vertical markets and use cases, and become Niche Players. They may also develop their broad portfolio of competencies to advance in execution and become Challengers.

Niche Players

Niche Players focus successfully on a set of products and services and, often, focus on a narrow set of industry use cases. Niche Players focus on the IoT platform to support legacy or new applications and SaaS capabilities. Niche Players can show sales and marketing success in a limited number of industrial enterprises in regional markets or, often, dedicate only a portion of sales and marketing resources to newer, stand-alone IIoT platform opportunities. There are nine Niche Players in this year's Magic Quadrant. They:

- Approach the market from an analytics perspective, and are building up their industrial IoT capabilities.
- Need to expand their execution capabilities or geographic reach.
- Exhibit a vision that is not market-leading or focus on a subset of use cases.
- May be in transition from other markets. Generally, to progress in this market, they need to focus and invest more extensively in industrial IoT.

Niche Players are still very much viable providers of IIoT platforms. They often represent the best choice for a specific category of buyer, or for a particular use case. They typically offer specialized vertical equipment sector expertise, focused support practices, flexible terms and conditions, lower costs, and dedication to a particular market segment and its customers.

Context

Gartner clients should not use this Magic Quadrant alone as a tool for vendor selection. This Magic Quadrant presents a view of the maturing industrial IoT platform market and excludes the commercial and consumer IoT platform markets. Our analysis and opinion emerge from Gartner's unique ability to engage in user dialogue and to research the industrial enterprises across all subsectors and the vast landscape of competitive vendors.

Since market conditions change, historical comparison with Magic Quadrants from previous years (to assess vendor capabilities) is strongly discouraged for projecting capabilities for industrial-specific use cases and driving bid opportunities for vendors not evaluated.

Readers should pay careful attention to the Quadrant Descriptions section to understand the qualities of each quadrant provider type, and to determine the gaps between player types when considering vendor engagement. It is important to determine the most essential provider attributes laid out in the Quadrant Descriptions section and align those with the enumerated Strengths and Cautions of individual vendors.

Gartner advises that platform due diligence, bid solicitation and selection decisions move in parallel with analyst inquiry engagement. Additionally, readers must keep up to date with the relevant reference model documents and other IIoT-centric research.

For insight into vendors considered outside of this Magic Quadrant evaluation, see the Honorable Mentions section.

Market Overview

Customers Have Shifted From Technology Experiments Toward Business Outcomes

Industrial enterprises now understand the concept of IoT in general. Leading enterprises have deployed IoT extensively and have moved beyond the technology experimentation phase. In addition, the past two years of adapting to the COVID-19 pandemic drove a need for operations that minimized human involvement. Although laggard enterprises are still exploring the technology elements of IoT, the enterprises at the center of gravity of the industrial IoT platform market have shifted toward implementing IoT-enabled business objectives such as connecting to siloed industrial control systems or analog systems or improving production and maintenance. These enterprises are pushing technology providers to drive composable approaches so they can meet business outcomes with the IIoT platform and, if need be, with PBCs and/or IoT-enabled applications.

Gartner client engagement shows that IIoT projects still run into technical challenges. IIoT platform projects still require integration into heterogeneous IT and OT systems, with old and new hardware side by side, but requiring very different approaches to get the data out. But the industrial enterprise focus now centers on cost savings, increased days of production for a plant, automation, industrial process optimization, sustainability requirements, and employee safety. Industrial enterprises are thus adopting IoT to meet internal business initiatives centered on automation or remote monitoring or sustainability. In addition, manufacturers are also adopting IoT to support new revenue initiatives that center on smart products, and they are exploring new business opportunities such as “products as a service” and accelerating business model transformations.

Multisite Global Deployments Remain a Challenge

Many industrial enterprises follow project management best practices for IIoT projects. They start small, conduct proof-of-value projects, determine lessons and best practices, and then deploy at scale across sites. But deploying at multiple industrial sites tends to be a challenge for multiple reasons. Some of the barriers tend to be internal. They include the lack of plant or executive management support, lack of adequate cross-functional teams with engineering and operations, and cultural resistance from busy technicians at other sites.

But in many cases, the challenges to industrial enterprises deploying at scale arise from their technology partners. Challenges tend to cover a broad range of issues. Some of the vendors still have technical challenges, for example integrating into heterogeneous industrial assets with their legacy protocols. Vendors' challenges also center on the IIoT code development environment to support the customization needed for each industrial site's unique environment. Part of it centers on the boutique nature of many of the industrial implementation partners the IIoT platform providers work with, and their need to scale up. Individual sites sometimes buy different platforms, creating platform silos that do not integrate, making multisite deployments difficult. And finally, the IIoT platform vendors are working to support their global clients, but tend to do so out of geographic centers to cover specific regions that introduce time and language issues.

OT Vendors Know Industrial Markets Better than IT Natives

Technology providers whose heritage is industrial and operational equipment are starting to demonstrate their domain knowledge and alignment to industrial enterprise needs for IIoT platforms. They have been building their capabilities as they are in the process of developing next-gen systems that converge IT and OT to deliver industrial business solutions. In part they are doing this because they are strategically using technology partners for the more general IT capabilities needed for IoT, and focusing on the differentiated vertical part of the business solution for the customer. Their emergent innovation efforts reflect their heritage and customer engagement. These OT tech providers have shown they can extract OT data from a range of assets, and their deep domain expertise helps them convert it into business insights and improved operations and outcomes. This Magic Quadrant incorporates seven companies with operational technology heritage.

In parallel, the OT companies have been working to improve their marketing and sales teams to ensure they understand the new and broader needs of industrial enterprises. They also have customer success stories to communicate clearly to the critical stakeholders in operations, IT and the business how they can deliver value. But note it is still early days for the OT companies, and the IT vendors are investing in building their domain expertise. The OT vendors have relationships and a level of trust in the operations and business team for their clients; now they have started building that trust with the IT organization.

IIoT Requires a Hybrid Edge-Cloud Approach

Industrial enterprises are demanding that IIoT platforms have flexible deployment models on the edge, in the cloud, and in hybrid modes that involve both edge and cloud IoT capabilities. This aligns to the types of use cases and the typed data being ingested for them (time series and blobs and batch data and events). It addresses the need for millisecond-level processing for targeted or niche uses and the need for broader analysis across platforms and data sources. It also aligns to a significant fraction of industrial organizations that either cannot operate with the latency introduced by cloud, or do not trust cloud services, or need to manage data sovereignty, or want all their data in a central data lake so they can control the access to it.

Analysis of approximately 1,900 enterprise deployments for the global IIoT platform Magic Quadrant highlighted that hybrid remains the primary deployment model with 40% of projects in this mode, closely followed by cloud at 36%, and with the remainder using edge at 24%.

The Secure by Design Imperative

From attacks on Colonial Pipeline to meat packing plants to South African ports, the cybersecurity threat landscape has decidedly shifted toward industrial environments. Because industrial assets are cyber-physical in nature, security incidents can manifest in both the cyber world (with data exfiltration or corruption) and the physical world (with impacts to safety or operational resilience). Security features must therefore be central to all IIoT platforms. This means the security of the platform itself, but also the ability to deploy the platform without introducing additional risks to ongoing operations.

Industry standards such as IEC 62443, protocols and best practices must be embedded right from the start, and must adapt as threat vectors evolve. In addition, the direct link between national security and economic prosperity for industrial organizations that support critical infrastructure is driving more governments globally to roll out security mandates and directives (see Quick Answer: What the Cyber Incident Reporting for Critical Infrastructure Act of 2022 Means for Security and Risk Leaders).

Best-in-class industrial IoT vendors will exhibit the following security behavior:

- Actively participate in vertical industry security groups
- Maintain a close relationship with government entities in charge of cybersecurity information sharing and cross-industry coordination

- Have teams of researchers actively looking for vulnerabilities and performing threat hunting
- Have built-in security controls at all levels of the cyber-physical spectrum, from device to analytics and fieldbus to cloud
- Demonstrate a security-conscious culture not just for their own platform, but also to elevate the security posture of their clients

Evaluation Criteria Definitions

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

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How Markets and Vendors Are Evaluated in Gartner Magic Quadrants

Quick Answer: What the Cyber Incident Reporting for Critical Infrastructure Act of 2022 Means for Security and Risk Leaders

Table 1: Ability to Execute Evaluation Criteria

Evaluation Criteria	*Weighting*
Product or Service	High
Overall Viability	High
Sales Execution/Pricing	High
Market Responsiveness/Record	Medium
Marketing Execution	Medium
Customer Experience	High
Operations	High

Source: Gartner (December 2022)

Table 2: Completeness of Vision Evaluation Criteria

Evaluation Criteria	*Weighting*
Market Understanding	High
Marketing Strategy	High
Sales Strategy	Medium
Offering (Product) Strategy	High
Business Model	Low
Vertical/Industry Strategy	Medium
Innovation	High
Geographic Strategy	High

Source: Gartner (December 2022)