PTC is a Leader in
SPARK Matrix™: Industrial Internet of Things (IIoT) Platform, Q4 2023

Quadrant
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SPARK MATRIX
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Industrial Internet of Things (IIoT)
Platform, Q4 2023

An Excerpt from Quadrant Knowledge Solutions
"SPARK Matrix™: Industrial Internet of Things (IIoT) Platform "

PTC is a Leader in SPARK Matrix: Industrial Internet of Things (IIoT) Platform, 2022

Quadrant Knowledge Solutions defines the Industrial Internet of Things (IIoT) platform as "a platform that includes a comprehensive and integrated technology solution designed to facilitate the seamless connectivity, management, and analysis of industrial devices, processes, and data, helping industrial organizations collect data, monitor, manage, and control connected devices through the applications built on the platform. IIoT platform supports various industrial use cases, such as asset tracking & monitoring, predictive maintenance, and operational visibility & control, to support the complex industrial requirements of large asset-intensive organizations. The key capabilities of an IIoT platform include connectivity, application enablement & management, device management, data management & processing, analytics & visualization, integration, and security."

IIoT platforms empower organizations by facilitating data-driven decision-making, predictive maintenance, remote monitoring, and control of industrial processes. These platforms optimize energy efficiency, enhance supply chain visibility, improve quality control, and increase workforce efficiency using real-time insights. With a focus on cost savings, compliance, and safety, IIoT platforms contribute to operational excellence and innovation. By harnessing the power of connected devices and real-time data analytics, the IIoT platforms enable organizations to gain a competitive advantage, adapt to the evolving digital landscape, and drive overall efficiency, productivity, and profitability.

The IIoT platform market is still evolving through the presence of multiple vendors with varying technological capabilities and market presence, serving a variety of industrial use cases. The key trends of the IIoT platform market include the integration of edge computing and AI/ML capabilities, heightened emphasis on cybersecurity measures, the push for interoperability standards, a demand for customizable & modular solutions, and a growing focus on sustainability initiatives. The industry is shifting toward edge-to-cloud orchestration by optimizing data processing between edge devices and cloud services. Industrial metaverse is another trend that is shaping up in the IIoT platform market. Vendors are trying to build digital twin capabilities for real-time simulation and process efficiency.

Notably, the digital transformation trend in Industry 4.0 is driving specific sectors such as manufacturing, energy, healthcare, and logistics towards IIoT adoption, indicating a recognition of the transformative potential of IIoT technologies in addressing industry-specific challenges and enhancing operational efficiency. IIoT platform vendors are making significant investments in expanding their capabilities through in-house developments, strategic acquisitions, partnership ecosystems, and robust industry-specific and use-case-specific out-of-the-box industrial applications.

Industrial Internet of Things (IIoT) platforms play a pivotal role in the industrial landscape by offering a comprehensive suite tailored to optimize and streamline complex industrial processes. These platforms facilitate seamless connectivity and management of industrial devices, ensuring effective communication and data flow. Their robust data ingestion and processing capabilities involve collecting and analyzing vast datasets in real-time, often by utilizing advanced analytics and machine learning to derive actionable insights. As security is a paramount function, IIoT platforms implement robust measures such as encryption, secure authentication, and access control to safeguard against cyber threats. Device monitoring and maintenance features of the IIoT platforms enable real-time tracking of device health, diagnostics, and predictive maintenance, enhancing operational reliability. The IIoT platform integrates with informational technology (IT), engineering technology (ET), and operational technology (OT) systems to support edge computing and offer flexibility to scale based on evolving industrial needs. IIoT platform provides support for visualization tools and dashboards to offer a clear overview of industrial operations, while protocol translation ensures compatibility across diverse devices and systems. IIoT platforms also facilitate alerting mechanisms to promptly notify stakeholders of critical events, facilitating rapid responses and preventing disruptions. In essence, these platforms serve as the technological backbone for driving efficiency and innovation in industrial environments across various sectors.

The IIoT platform market, though experiencing rapid growth, also faces several significant challenges. Connectivity is its key hurdle. IIoT devices require reliable and secure communication infrastructure. The devices face issues such as bandwidth limitations, network congestion, latency, interference, and coverage gaps. Security poses a significant concern as well. Due to the vulnerability of IIoT devices to cyber threats, hacking, and data theft, they necessitate measures such as encryption, regular testing, and robust authentication. Compatibility and longevity challenges emerge from IIoT device's need to interoperate with diverse

systems, handle data format diversity, integrate with legacy systems, and avoid vendor lock-in. Additionally, maintaining the high reliability and availability of IIoT platforms in industrial settings, particularly during network disruptions, is a crucial challenge. The ability of IIoT platforms to scale as the number of connected devices and data volume grows also remains a significant challenge. Lastly, the initial costs associated with implementing IIoT platforms, including device deployment, connectivity, and infrastructure upgrades, can be substantial. Ensuring a positive return on investment (ROI) and demonstrating the long-term economic value of IIoT implementations is another key challenge faced by the vendors.

The core capabilities of an IIoT Platform include; Connectivity management, which ensures that the platform handles diverse communication protocols and establishes secure connections between devices and components in the industrial environment; Device management, which encompasses functions such as registration, authentication, monitoring, and control of connected devices; Data modelling and storage, which involve collecting, organizing, and analysing data using AI/ML modelling and secure storage solutions; Application enablement & management, which facilitates developers in building and customizing applications, promoting open platforms and extensibility; Analytics capabilities, which involve collecting, processing, and analysing data to derive meaningful insights, while the combined approach of edge and cloud-based analytics ensures efficient data processing for enhanced operational efficiency in industrial environments; Security capabilities, which include identity management, encryption, access control, and adherence to regulatory compliance; and Integration and interoperability capabilities, which ensure seamless connectivity, support for various communication protocols, and interoperability with legacy systems. The deployment modes can be on-premises, edge, or cloud-based, providing flexibility and scalability. Overall, these capabilities contribute to creating a comprehensive and efficient IIoT ecosystem.

The key differentiators for evaluating Industrial Internet of Things (IIoT) platform vendors include; Edge AI, for optimizing real-time processing; Digital Twins, for process simulation & predictive maintenance support; No-Code Data Flow Automation, for simplified configuration; Pre-built Industrial Driver library, for enhanced connectivity; Containerized Deployment, for consistent and reliable deployments; Digital Thread, for seamless data flow across the product lifecycle; and Out-Of-The-Box applications addressing industry-specific use cases. Vendors are enhancing capabilities driven by competition, offering varied functionalities to cater to different industrial needs, requiring organizations to balance commercial and technological factors when selecting IIoT platform providers.

Quadrant Knowledge Solutions' SPARK Matrix™: Industrial Internet of Things (IIoT) Platform, Q4 2023 research includes a detailed analysis of the global market regarding emerging technology trends, market trends, and future market outlook. The research provides strategic information for technology vendors to better understand the existing market and support their growth strategies and for users to evaluate different vendors' capabilities, competitive differentiation, and market positions.

The research includes detailed competition analysis and vendor evaluation with the proprietary SPARK Matrix™ analysis. SPARK Matrix™ includes the ranking and positioning of leading IIoT platform vendors with a global impact. The SPARK Matrix™ includes an analysis of vendors, including ABB, Actility, Altizon, AWS, Braincube, Cisco, Davra, Eurotech, Exosite, Flutura (by Accenture), Knowledge Lens (by Rockwell Automation), Litmus, Microsoft, PTC, Samsung SDS, Siemens, Software AG, Telit, and Univers.

# SPARK Matrix™: Strategic Performance Assessment and Ranking

Quadrant Knowledge Solutions Quadrant Knowledge Solutions' SPARK Matrix provides a snapshot of the market positioning of the key market participants. SPARK Matrix provides a visual representation of market participants and provides strategic insights on how each supplier ranks related to their competitors, concerning various performance parameters based on the category of technology excellence and customer impact. Quadrant's Competitive Landscape Analysis is a useful planning guide for strategic decision-making, such as finding M&A prospects, partnerships, geographical expansion, portfolio expansion, and similar others.

Each market participant are analyzed against several parameters of Technology Excellence and Customer Impact. In each of the parameters (see charts), an index is assigned to each supplier from 1 (lowest) to 10 (highest). These ratings are designated to each market participant based on the research findings. Based on the individual participant ratings, X and Y coordinate values are calculated. These coordinates are finally used to make SPARK Matrix.

Technology Excellence	Weightage	Customer Impact	Weightage
Data Acquisition & Management	8%	Product Strategy & Performance	20%
Price Management & Optimization	15%	Proven Record	15%
Promotion Planning & Optimization	15%	Ease of Deployment & Use	15%
Markdown Pricing & Optimization	10%	Customer Excellence	15%
Analytics, Dashboards & Reporting	10%	Unique Value Proposition	15%
Recommendation Engine	10%		
Competitive Differentiation Strategy	7%		
Application Diversity	5%		
Integration & Interoperability	5%		
Vision & Roadmap	5%		

According to the SPARK Matrix™ analysis of the global IIoT Platform market, "PTC, with the robust functional capabilities of its IIoT Platform, has secured strong ratings across the performance parameters of technology excellence & customer impact and has been positioned amongst the technology leaders in the 2023 SPARK Matrix™ of the IIoT Platform market."

Figure: 2023 SPARK Matrix™
(Strategic Performance Assessment and Ranking)
Industrial Internet of Things (IIoT) Platform

SPARK Matrix™: Industrial Internet of Things (IIoT) Platform, Q4 2023

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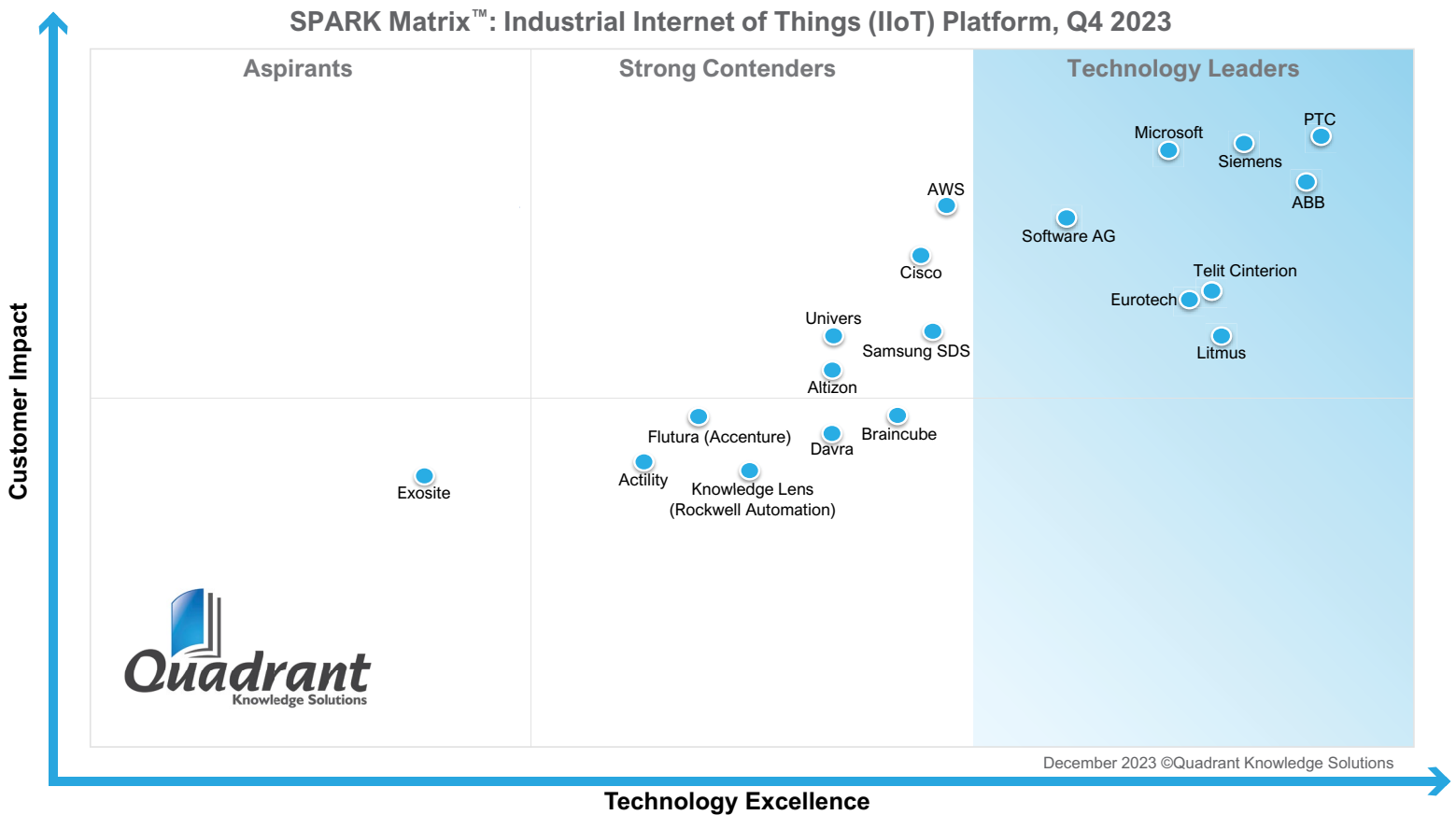
PTC in the Globle Industrial Internet of Things (IIoT) Platform Market

URL: www.ptc.com

Founded in 1985 and headquartered in Boston, MA, USA, PTC is a software development company. It specializes in technologies such as CAD (computeraided design), PLM (product lifecycle management), ALM (application lifecycle management), IoT (Internet of Things), AR (augmented reality), and SLM (service lifecycle management). PTC's unique technology portfolio works cohesively to create a model based closed loop digital thread that spans the entire product lifecycle, leading to improved data continuity and enhanced collaboration across enterprises. The company's technology is primarily utilized by manufacturers to facilitate the design, manufacturing, and service of complex products.

PTC's industrial internet of things (IIoT) platform leverages its in-house products, namely ThingWorx and Kepware, for improving connected operations and products across the enterprise and creating a digital thread. ThingWorx caters to various manufacturing, service, and engineering scenarios, effectively addressing shared challenges across various industries. It empowers organizations to leverage industrial IoT platforms and establish new approaches for connecting, monitoring, analyzing, and acting upon industrial data.

Analyst Perspective

Following is the analysis of PTC's capabilities in the global IIoT platform market:

- • ThingWorx platform is a comprehensive technology platform tailored for the Industrial Internet of Things (IIoT). It offers the necessary features for building and securely expanding mission-critical IIoT solutions. ThingWorx provides a range of tools and technologies that enable organizations to quickly create and launch robust applications and augmented reality (AR) experiences. It comprises a set of interconnected modules that deliver the flexibility, capability, and agility necessary for organizations to implement IIoT applications and AR experiences. Some of the key capabilities provided by PTC's IIoT platform include connectivity, device management, application enablement & management, data management, and IoT analytics & reporting.

- On top of its platform, ThingWorx offers a suite of out of the box, IIoT applications for engineering, manufacturing and services sectors, for example, ThingWorx Navigate, ThingWorx Digital Performance Management, ThingWorx Connected Work Cell, and ThingWorx Remote Service, which simplify configuration and application deployment. ThingWorx also encompasses different application enablement & management tools such as; ThingWorx Mashup Builder, a low code development environment, which streamlines integration with its user-friendly drag-and-drop interface. ThingWorx Mashup Builder's recent enhancements also offer contextualized IIoT data and AR (augmented reality) experiences; ThingWorx Solution Central, a cloud based portal, which aids in deployment and version tracking for custom applications, optimizing data management and scalability; ThingWorx Flow, a solution which offers a configurable business process workflow engine that connects to various business systems. PTC's low-code development approach supports IoT application extensions, and its platform's open & extensible nature empowers organizations to adapt and customize its solutions. PTC's IIoT platform supports multiple languages, such as Java, JavaScript, Python, and Azure Logic Flows.

- PTC's applied analytics strategy focuses on leveraging digital twin and digital thread technologies to provide applied analytics insights within applications by uniting engineering, manufacturing, and service data across the product lifecycle. ThingWorx's analytics capabilities empower IoT application developers and data science teams to build analytics-driven features within applications using the platform's data ingestion and digital twin modeling capabilities. PTC has expanded its Digital Performance Management (DPM) application by introducing features such as Time Loss Analytics, which leverages machine learning to identify operational scenarios related to time loss; and a Bottleneck Analysis module, which automates the identification of production constraints. ThingWorx Edge SDKs (software development kit) enable custom data logic deployment in edge applications, providing real-time insights for operators and control systems while optimizing data processing for cloud applications.

- Kepware+ is PTC's industrial connectivity SaaS offering that enables centralized remote configuration of multiple Kepware servers deployed at the edge for various factories. It enhances visibility and

drives operational efficiency for IT/OT data. Kepware+ allows IT organizations to remotely manage numerous OT assets by providing a unified view of all Kepware instances. Furthermore, ThingWorx platform and applications, complemented by the ThingWorx Remote Service Agent and SDK, offers features for remote access, control, and software content management.

- ThingWorx provides robust data management capabilities by offering three notable differentiators. Firstly, it provides data management flexibility, which enables organizations to secure data storage in the cloud, on-premises, or in hybrid configurations, making it suitable for a range of customer requirements. Secondly, its extensibility and connectivity features offer an array of connectors for integrating data from various systems and enabling custom integrations. Thirdly, ThingWorx supports digital twins and data contextualization with a robust data model, facilitating the creation of customized digital twins for physical products and assets. Its data management capabilities are complemented by PTC's CAD and PLM offerings, which contribute to the creation and customization of digital models that serve as the basis for Digital Twins.

- The key differentiator of PTC is its digital thread strategy that leverages IoT across the value chain and the suite of high impact, fast time to value, OOTB ThingWorx applications. Some of the other key differentiators of PTC's IIoT platform include its comprehensive analytics capability, asset management & optimization capabilities, remote service, digital twin, scalability, and edge computing capabilities.

- The key use cases of PTC's IIoT platform include democratizing PLM data, digital performance management, connected worker, connected services, predictive maintenance, asset condition monitoring.

- From a geographical perspective, PTC has a significant presence in the Americas, Europe, and APAC. From an industry vertical perspective, the company caters to industries such as industrial machinery, aerospace & defence, automotive, electronics & high-tech, government, consumer goods, medical devices, and pharmaceuticals.

- PTC's key challenge is the growing competition from established & emerging vendors with innovative technology offerings. PTC is exploring further enhancing its offerings by integrating features such as generative AI while continuing notable investments in applied analytics. With its strong, sophisticated technological platform and a comprehensive vision and roadmap, PTC is well-positioned to maintain and grow its market share.