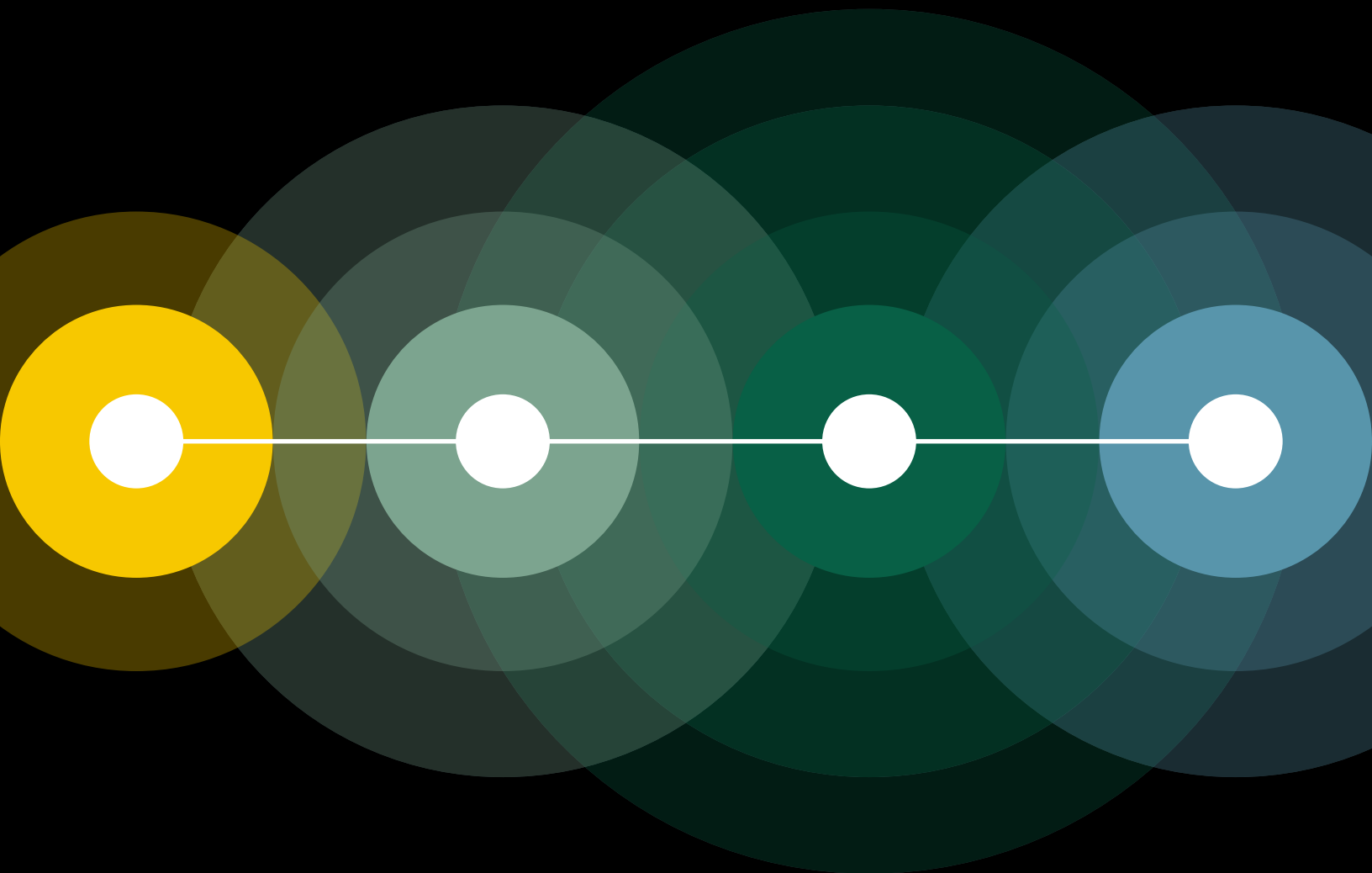LITMUS

Buyer's Guide

Industrial IoT Platforms

Expanding IIoT at Enterprise-Scale

LITMUS

2022 is the year enterprise adoption of Industrial IoT accelerates and goes mainstream. The use cases are real, and they are built on complete OT data to drive new operational efficiencies. Now is the time to put the right Industrial IoT platform in place not only to harness the power of OT data locally, but to set the foundation for the next wave of expanded enterprise-wide IIoT adoption and outcomes that prioritize secure OT-IT data integration and centralized control over IIoT devices, deployments, and applications at scale.

McKinsey reports IIoT implementations increase productivity by up to 90 percent, reduce machine downtime by 50 percent, and reduce maintenance costs by up to 40 percent. Many of these projects are still young – meaning the potential ROI is even greater when scaled - and industrial companies are trying to figure out how to replicate IIoT success at tens or hundreds of sites rapidly and securely.

This guide will look at what enterprise IIoT is focused on now, how the right IIoT platform can meet those needs, the vendor landscape in 2022, and how IIoT deployment has evolved for maximum flexibility. Learn what platform capabilities are critical to successfully implementing and scaling IIoT this year to drive operational improvement across the business.

What Enterprise is Focused On

Table stakes IIoT has matured – the technology is available and there are solutions out there with few barriers to entry. Any company with a desire can connect a few machines, perform basic analytics, and use the data to solve a single problem. Enterprise IIoT requires more. To successfully scale to tens or hundreds of sites for business-wide, data-driven operational improvement, companies must be selective about their criteria and the technology they choose to deploy.

Enterprise requires an IIoT platform that can meet the complex needs of OT along with IT requirements for speed, scale and security. Security is always the number one concern. Manufacturers do not want to expose their OT systems to the Internet, they do not want to put their day-to-day production systems at risk. True enterprise-grade IIoT must create a barrier between production systems and the cloud, a bridge to share OT data safely while preventing any outside intrusion.

Another primary focus is how to manage IIoT across any number of sites. Enterprise wants to standardize on a flexible platform that can be piloted at one site and then deployed seamlessly at any number of sites, even when the shop floor looks different at each location. They are looking for a platform built for scale that can templatize devices, deployments, KPIs, application orchestration and management, ultimately making it very easy to replicate success over and over again across the enterprise.

Digital transformation can be slow, but it does not have to be. Enterprise knows showing quick ROI is key, so a platform that can be deployed rapidly for immediate business value is also a top priority. As a result, they need IIoT solutions that do not require a lot of expertise or coding and come pre-built with drivers, analytics and integrations to leading enterprise systems for rapid time-to-value.

While enterprise IIoT needs evolve, so does the vendor landscape. Industrial automation vendors have proprietary solutions that focus on managing IIoT at one plant or even on one production line, while cloud hyperscalers do a lot of AI and ML but do not have the OT expertise and capabilities needed to completely solve that side of the puzzle. The market is consolidating as enterprises require a bridge – an Industrial IoT platform built with strong OT capabilities – that can connect to every OT asset and integrate with cloud and enterprise tools to enable any use case and then scale it to any number of sites.

> "More than 70 percent of companies find it difficult to implement and scale Industrial IoT in a way that delivers significant improvement in return on investment."
>
> McKinsey, Leveraging Industrial IoT and advanced technologies for digital transformation

Core Industrial IoT Capabilities

Core Industrial IoT capabilities are best rolled out with an edge-first solution to solve OT challenges and bridge the OT-IT gap. An Industrial IoT platform should have four minimum foundational capabilities: device connectivity, edge analytics, data integration and application enablement. Any vendor assessment should start with these critical building blocks to implement table stakes IIoT, and next we'll look at the expanded requirements for enterprise-grade IIoT.

Collect Data

An IIoT platform must handle the four essential parts to device connectivity – drivers, data collection, data normalization and data storage. IIoT platforms offer rapid data connectivity to all modern and legacy industrial systems with no coding required – then structure and store the data into a common format ready for use by edge and enterprise applications.

Analyze Data

IIoT platforms perform analytics at the edge for insights that transform the factory floor and show quick ROI – from condition-based monitoring to better understand how assets are performing, to OEE to improve manufacturing productivity. With a drag and drop interface and pre-built KPIs, customers can pull data and build out custom analytics in minutes.
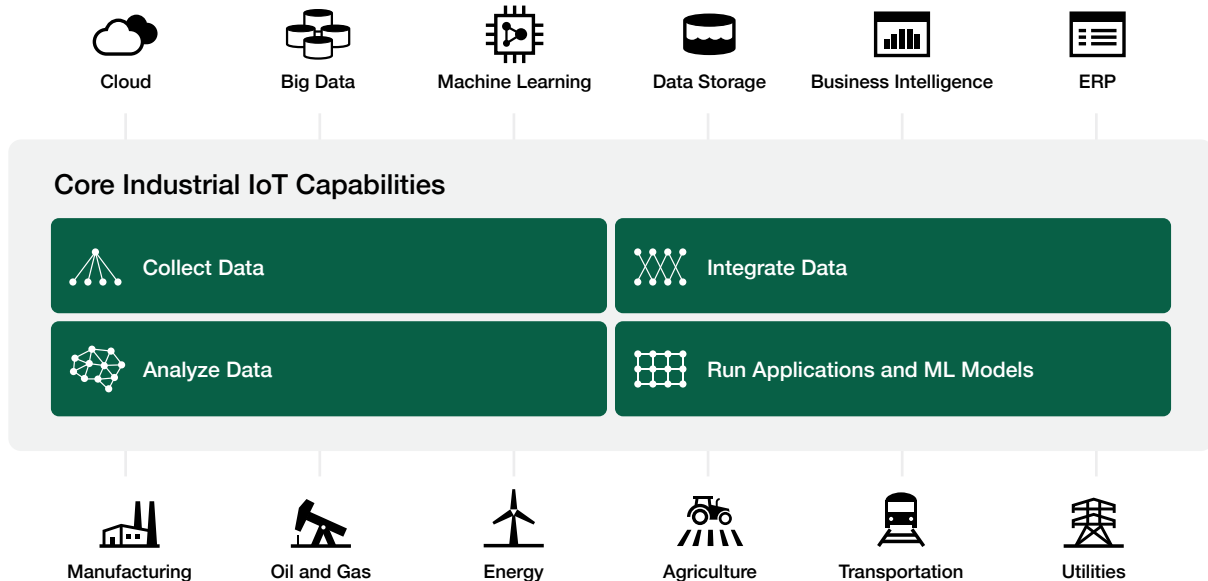
Integrate Data

IIoT platforms include dozens of pre-built integrations with leading cloud and enterprise systems. Instant and secure OT-IT connectivity enables rapid data sharing with applications, data lakes and machine learning systems. Advanced data sharing use cases such as sending select or change-only data can dramatically reduce cloud computing costs.

Run Applications and ML Models

An IIoT platform allows users to host and access public or private applications in a centralized repository, with the ability to deploy and run applications and machine learning models at the edge. IIoT platforms also stream normalized and structured data to any pre-built or custom application and run those applications at the edge.

| Cloud | Big Data | Machine Learning | Data Storage | Business Intelligence | ERP |

Core Industrial IoT Capabilities

| Collect Data | Integrate Data |
| Analyze Data | Run Applications and ML Models |

| Manufacturing | Oil and Gas | Energy | Agriculture | Transportation | Utilities |

Enterprise Scale Capabilities

Enterprise IIoT is IT-led and must go beyond the core capabilities to take those learnings and apply them globally. Once table stakes IIoT has been established successfully in one plant, the dashboards, processes, applications and models must be leveraged and applied across any number of sites for enterprise-wide improvement. Look for an enterprise-grade IIoT platform with the following capabilities to enable scalable, repeatable and secure IIoT deployment.

Manage IIoT Devices

Enterprise-level device management includes the ability to control all IIoT devices across all sites from one centralized location, removing the need for on-site management. The right IIoT platform gives enterprise teams visibility over large-scale deployments and the ability to remotely configure, update and monitor all IIoT devices.

Integrate OT - IT Data Securely

The platform must be purpose-built with a secure architecture to protect operations and share OT data securely with third-party systems. Data security is based on features such as secure built-in protocols including SSL and HTTPS, a hardened Linux-based system, and most importantly a platform that creates a secure bridge between OT and IT systems.

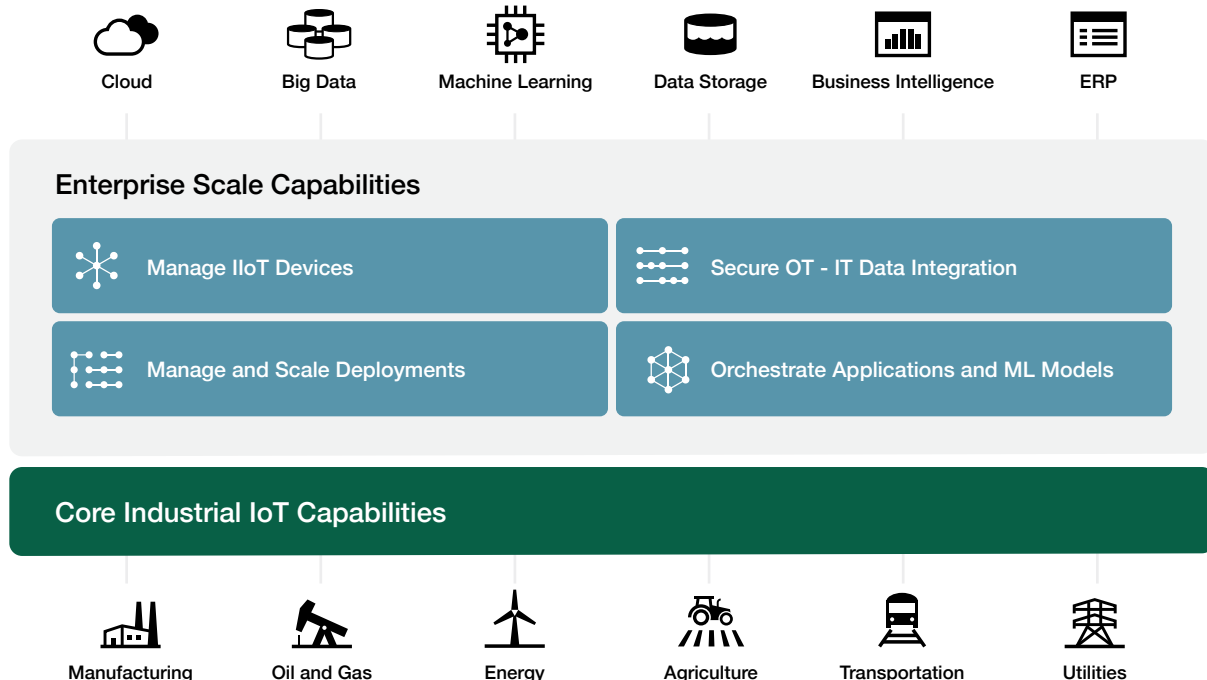## Orchestrate Applications and ML Models

The IIoT platform must provide the ability to centrally deploy, manage, orchestrate and update any application or machine learning model to any number of sites. Container technology allows for easy deployment to one or hundreds of edge devices with one click for rapid improvements across the enterprise based on learnings.
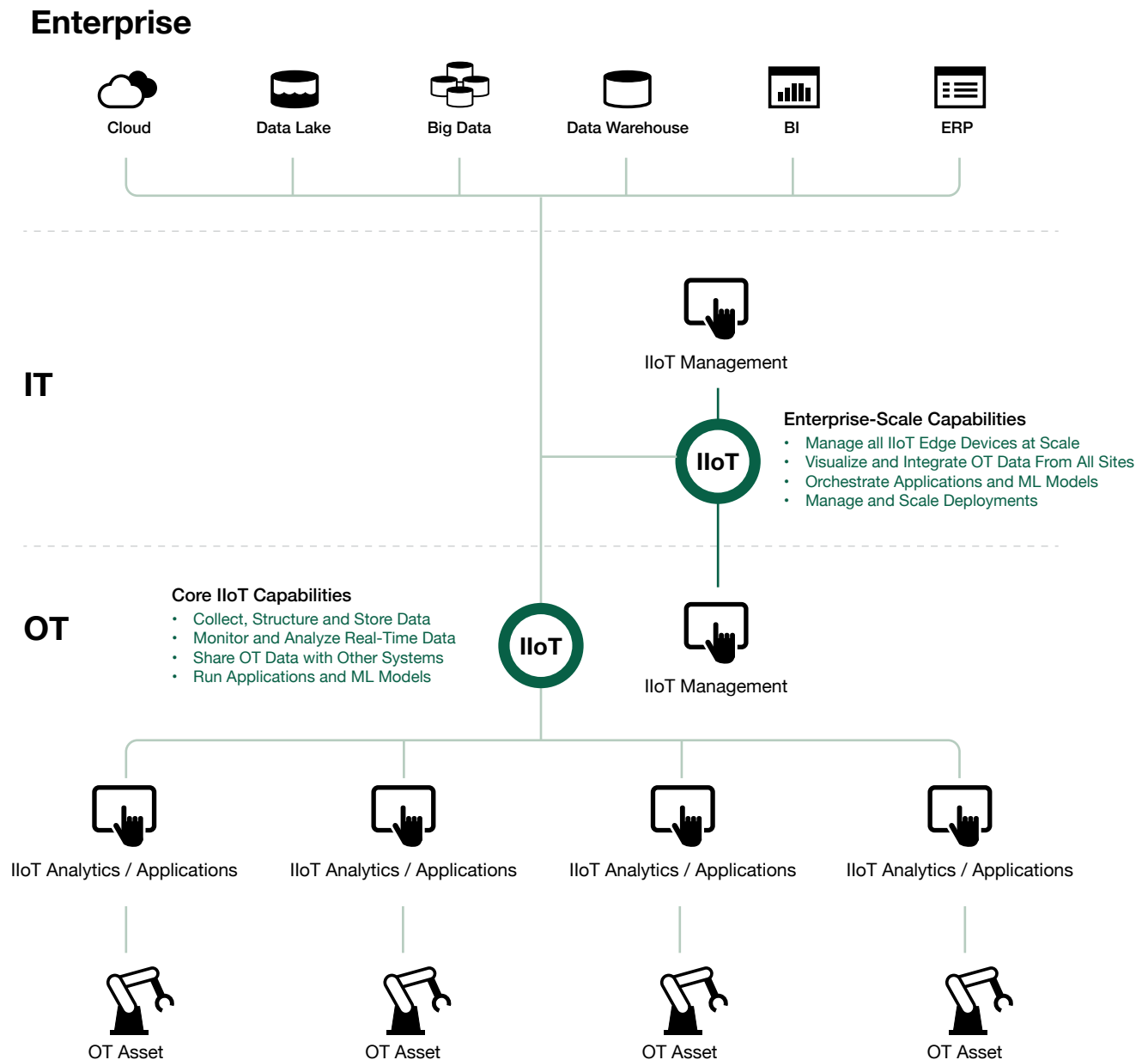
Manage and Scale Deployments

It is critical for enterprise IIoT platforms to reduce the complexities of large-scale deployment with the ability to create the ideal IIoT configuration at one site, then create a template to recreate that success at any number of sites. This kind of repeatable, scalable deployment takes incremental efficiency or quality gains and multiplies them rapidly across the business.

Cloud	Big Data	Machine Learning	Data Storage	Business Intelligence	ERP

Enterprise Scale Capabilities

Manage IIoT Devices	Secure OT - IT Data Integration
Manage and Scale Deployments	Orchestrate Applications and ML Models

Core Industrial IoT Capabilities

Manufacturing	Oil and Gas	Energy	Agriculture	Transportation	Utilities

Enterprise IIoT Deployment

When you think about enterprise IIoT deployment, the key is to consider the entire scalable ecosystem from OT to IT. Enterprise IIoT starts with varied assets at tens or hundreds of sites. A flexible IIoT platform sits on top of those assets, collecting and normalizing that data to send it anywhere to be put to work. Any application or machine learning model can be fueled with data and deployed at the edge to activate unlimited use cases. A centralized management platform provides control over the orchestration of all edge devices, applications and deployments at scale for secure, replicable, data-driven improvement.

Enterprise

Cloud   Data Lake   Big Data   Data Warehouse   BI   ERP

IT

IIoT Management

IIoT

Enterprise-Scale Capabilities
- Manage all IIoT Edge Devices at Scale
- Visualize and Integrate OT Data From All Sites
- Orchestrate Applications and ML Models
- Manage and Scale Deployments

OT

Core IIoT Capabilities
- Collect, Structure and Store Data
- Monitor and Analyze Real-Time Data
- Share OT Data with Other Systems
- Run Applications and ML Models

IIoT

IIoT Management

IIoT Analytics / Applications   IIoT Analytics / Applications   IIoT Analytics / Applications   IIoT Analytics / Applications

OT Asset   OT Asset   OT Asset   OT Asset

Top IIoT Use Cases

An enterprise-grade Industrial IoT platform collects and leverages OT data for outcomes that improve manufacturing such as reducing machine downtime, identifying quality issues or recognizing gaps in production before they happen. Following are some of the specific use cases that can be derived from machine data and scaled to improve efficiency and optimize operations across the business.

Optimize Asset Utilization and Lifespan

Understanding how assets are performing in real-time is often the first use case for Industrial IoT. Collecting data from all assets for machine health KPIs like temperature, pressure, humidity and vibration eliminates manual inspection and allows teams to set the optimal conditions for peak asset performance and extended lifespan.

Reduce Machine Downtime

Companies report losing up to 6% of revenue due to unplanned downtime – one of the costliest challenges in manufacturing. Monitoring assets and utilizing data for predictive analytics allows operators to identify potential breakdowns before they impact production and determine the best time to service equipment, reducing unplanned downtime.

Increase and Optimize Yield

Using OT data to calculate yield optimization helps companies find opportunities to adjust production to increase output. An Industrial IoT platform can ingest data and calculate yield optimization as the number of parts made while minimizing production time, with as little scrap and waste as possible.

Improve Maintenance Schedules

Predictive maintenance, the use of OT data to determine when maintenance should be performed on specific equipment, is one of the top advanced use cases for enterprise Industrial IoT. By understanding the triggers that result in machine failure, companies can anticipate, predict and prescribe action to keep all assets running as planned.

Identify Product Quality Issues

Product quality use cases are becoming more prevalent as computer vision improves, allowing manufacturers to automate quality inspection for fast ROI. Vision and other sensor data are used to detect product quality in real-time during production to ensure goods meet quality standards – reducing scrap, increasing yield, and improving profitability.

Improve Productivity

OEE is a common measure of productivity and a powerful and straightforward Industrial IoT use case. Collecting OEE metrics (availability, performance, and quality) is fast and easy with an Industrial IoT platform in place connected to OT assets and the use case has been shown to scale very easily with companies improving their OEE numbers significantly.

Enterprise IIoT Platform Ecosystem

With so many products on the market that fit somewhere into the IIoT space, choosing the right enterprise IIoT platform can be challenging. The key is to choose a platform with both a strong focus at the edge and strong integrations to the cloud – delivering the data collection, data integration and data intelligence needed to improve operations.

Consider the ecosystem below – both the edge and the cloud are made up of a complex mix of legacy and modern systems. The edge includes industrial automation systems, hardware, and OT applications, while the cloud includes ingestion and storage, machine learning and analytics, and enterprise applications. The right IIoT platform solves OT complexity first and then bridges core edge and cloud investments to provide valuable data intelligence to the people, processes and tools that need it across the enterprise.

Cloud — Enterprise Applications	EPICOR	infor	Microsoft	ORACLE	PLEX	SAP
Machine Learning and Analytics	aws	CLOUDERA	databricks	dataiku	Google Cloud	Microsoft
	SAS	splunk>	+tableau (A Salesforce Company)			
Cloud Ingestion and Storage	aws	CONFLUENT	Google Cloud	HIVEMQ	Microsoft	snowflake
Edge / Cloud — Enterprise Industrial IoT	aws	DELL	Google Cloud	HITACHI	LITMUS	Microsoft
	ptc	SIEMENS	software AG			
Edge — Data Management and OT Applications	AVEVA	FactoryTalk by ROCKWELL AUTOMATION	GE Proficy	TULIP	Ignition by Inductive Automation	OSIsoft
Edge Hardware and Infrastructure	DELL	docker	Hewlett Packard Enterprise	kubernetes	Lanner	vmware
Industrial Automation and Control Systems	ABB	BECKHOFF	FANUC	Honeywell	KUKA	Mazak
	MITSUBISHI ELECTRIC	OMRON	Rockwell Automation	Schneider Electric	SIEMENS	YOKOGAWA

Litmus Industrial IoT Platform

Litmus is the only complete Industrial IoT Edge Platform that unifies data collection, data analytics, application enablement and data integration. Deployed as an OT-first solution at the edge and designed to handle a complex mix of assets, Litmus is ideal for those who want a holistic view of data across the enterprise so they can use that intelligence to improve operations. With extensive centralized management capabilities for devices, data, applications and machine learning models, Litmus is the standard for enterprise-class, large-scale Industrial IoT deployment at the edge.

Device Management

Control, configure, update and monitor IIoT devices across all sites remotely to remove the need for on-site management.

Data Management

Visualize OT data from any site and integrate data to any enterprise system to power advanced analytics and applications.

Application Orchestration

Run containerized applications on any Litmus Edge device with centralized control over how they are hosted, deployed and updated.

ML Model Orchestration

Centrally host and manage machine learning models, deploy them to Litmus Edge devices at any number of sites, and run them using Docker containers.
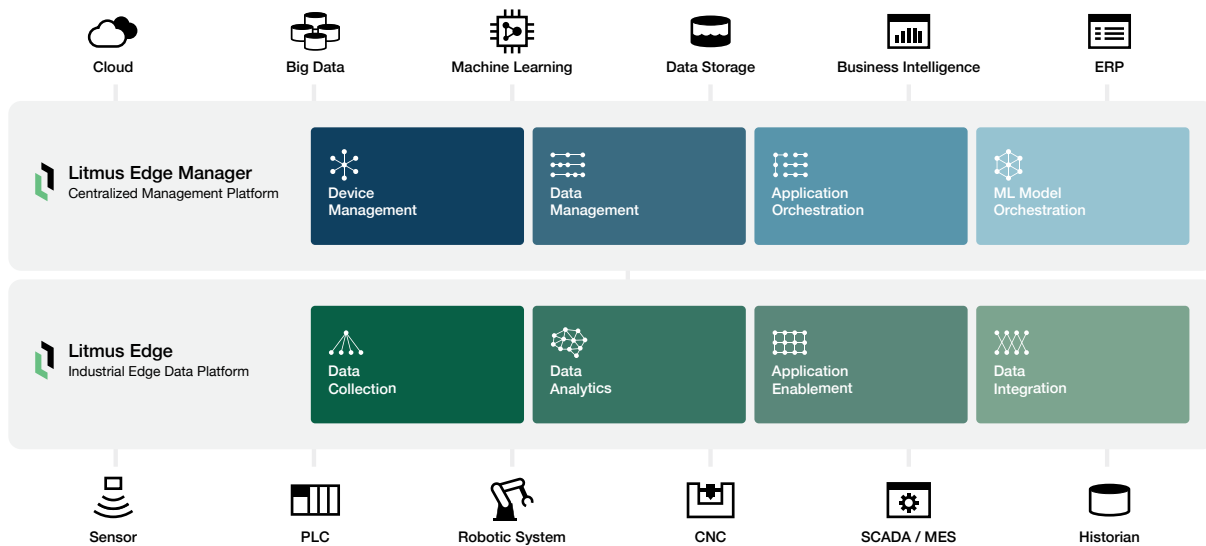
Data Collection

Rapidly collect and normalize data from any modern or legacy OT asset into one standard format ready for use by edge and enterprise applications.

Data Analytics

Access pre-built or custom data visualizations, KPI dashboards, and analytics at the edge to improve OEE, reduce downtime and optimize throughput.

Application Enablement

Host applications in a public or private marketplace, rapidly deploy them using containers at the edge, and run them with complete OT data.

Data Integration

Easily and securely integrate data between OT and IT using pre-built integrations to dozens of cloud and enterprise systems.

Litmus Edge
Industrial Edge Data Platform

Designed for complex OT environments, Litmus Edge is deployed at the edge so OT teams can rapidly collect data and act upon it while keeping production running as planned.

Data Collection

Native Device Drivers
Access 250+ pre-built device drivers – the most in the industry. Our patented technology enables the rapid development of new drivers.

Data Normalization
Collect and structure various OT data types and formats into a standard JSON file ready to be used for analytics and applications

Data Storage
Store normalized data in a scalable and secure time series database with the option to integrate with any enterprise storage platform.

Data Analytics

Data Engineering
Create data workflows, define data actions, debug data, set up alerts and visualize metadata with a drag-and-drop data processing engine.

Pre-Built KPIs
Improve OEE, machine uptime and production quality using pre-built or custom KPIs to track production time, anomaly detection and more.

Data Visualization
Quickly set up data visualizations and dashboards for OT teams to monitor production using Grafana or any other visualization tool.

Application Enablement

Application Marketplace
Access a library of pre-populated applications or add custom applications to a private marketplace to quickly run them at the edge using containers.

Solution Marketplace
Utilize vertical-specific applications for automotive, food & beverage and more to accelerate deployment times and reduce complexity.

Application Runtime
Run any number of applications in a controlled and secure runtime environment using Docker container technology inside the platform.

Data Integration

OT/IT Connectors
Integrate data rapidly with 20+ pre-built OT-IT connectors to Microsoft, AWS, Google, Cloudera and other systems via MQTT, REST API and Kafka.

Data Streaming
Stream complete or select OT data in any format to data teams and systems to support machine learning and other IT initiatives.

ML Runtime
Run any machine learning model trained by any machine learning system at the edge using container technology embedded inside the platform.

Litmus Edge Manager
Centralized Management Platform

Deployed in the cloud or data center, Litmus Edge Manager simplifies scale for IT teams with centralized management over the entire Industrial IoT deployment.

Device Management

Device Configuration
Set up and configure IIoT devices remotely and create templates for rapid deployment to tens or hundreds of sites.

Device Support
Streamline IIoT device support with the ability to manage, configure, troubleshoot and send over-the-air updates.

Data Management

Data Storage
Aggregate data from multiple Litmus Edge deployments in one place and allow other applications to access the data.

Data Visualization
Quickly visualize real-time data across all devices and factories with configurable dashboards and KPI reports.

Application Orchestration

Application Library
Create a global application library, decide which applications should be deployed at which sites, and control who has access.

Application Deployment
Create a containerized application and deploy, manage, and update it to any number of Litmus Edge deployments.

ML Model Orchestration

ML Model Repo
Create a centralized repository of machine learning models that are accessible to any production line or site.

ML Model Deployment
Containerize machine learning models, deploy them to any number of sites, and make updates for continuous learnings.

Flexible Deployment Architecture

Litmus offers flexible, scalable and secure deployment options designed to work in any enterprise manufacturing environment. Deploy via gateway, virtual machine, or container to meet the needs of any existing infrastructure without interrupting current processes.
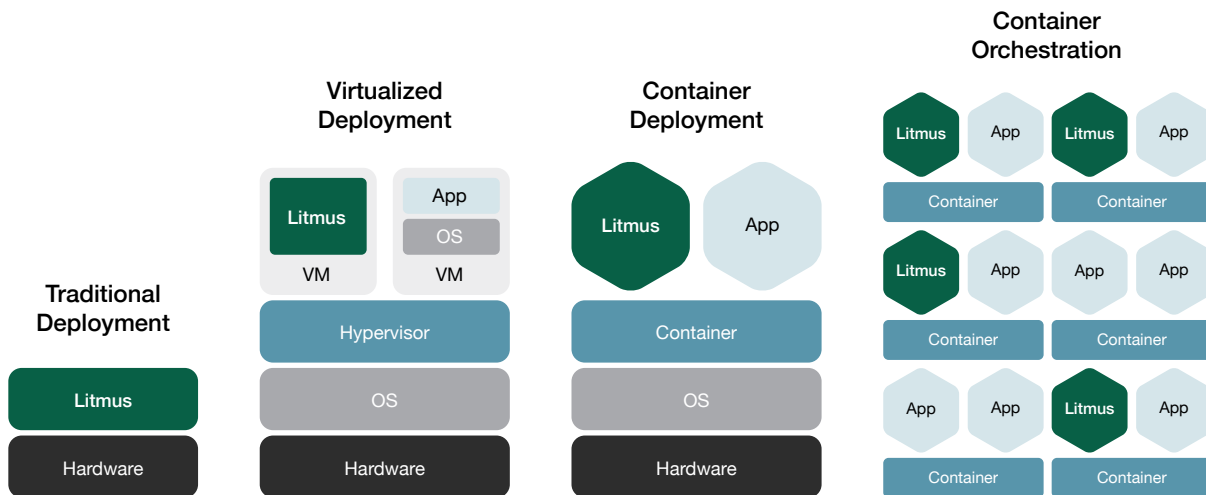
Traditional Deployment

The most common and simple deployment model is to drop Litmus Edge into any industrial setting as software on a gateway or server next to any asset. The gateway model is highly resilient, secure, network independent, and enables advanced use cases that require robust hardware and edge computing.

Virtualized Deployment

Litmus Edge can run on any of the leading virtualization platforms such as VMware or Hyper-V and tie into existing infrastructure with no hardware requirements for rapid deployment. VM deployments are flexible, extremely secure, and offer centralized control and management of all IIoT deployments.

Container Deployment

Containers are extending the modernization of software deployment and Litmus Edge can be deployed as a Docker or other type of container to be run quickly and reliably, isolated from other processes. The primary benefit of running Litmus Edge as a container is IT teams can frequently update, deploy, scale, add storage and manage the project centrally.

Container Orchestration

When multiple containers are running across many hosts, container orchestration is needed. Litmus Edge can run seamlessly as a container next to other workloads on the same server or micro datacenter and works out-of-the-box with container orchestrators like Kubernetes, Docker Compose, K3S or Google Anthos.

Capabilities Checklist

There are certain core functionalities and enterprise-grade capabilities that enable customers to deploy Industrial IoT successfully and realize value from advanced use cases. Use this checklist to compare and validate the enterprise-grade capabilities for an IIoT platform.

	Litmus	Vendor 1	Vendor 2	Vendor 3
Edge-first IIoT platform built to solve the complexity of connecting to all modern and legacy OT assets	✓			
Handles core IIoT capabilities including collecting, analyzing and integrating data plus running applications at the edge	✓			
Works with any enterprise infrastructure for modern deployment including virtual machine and container	✓			
Enables scale with enterprise orchestration and management of devices, data and applications	✓			
Built to support the data needs of broader IT initiatives like MLOps, DataOps and hyperscalers	✓			

Getting Started

Choosing an enterprise-grade Industrial IoT platform comes down to meeting the project needs with a future-proof solution that will grow along with enterprise use cases. Start with the core IIoT platform capabilities, but do not forget the enterprise requirements. If you choose a secure platform that can scale and be deployed and replicated rapidly, the solution will work for many years to come. Too many companies get stuck in pilot purgatory because they try to solve one problem in one factory without considering how the use case will expand. Flexible, enterprise-grade platforms like the Litmus Industrial IoT Edge platform take OT data and put it to work to transform operations at scale and they do it rapidly. Contact us to learn more about the Litmus platform.

Litmus Edge Platform Demo

https://litmus.io/litmus-edge/demo/

Solution Webinar:
The Next Wave of IIoT – Managing Scale

https://litmus.io/resource/industrial-iot-managing-scale

Industrial IoT Playbook:
Connecting OT Assets at Scale

https://litmus.io/resource/industrial-iot-playbook-connecting-ot-assets-at-scale/

LITMUS

The Edge Data Platform for Industry 4.0

Litmus.io