

IoT Factory Automation:

5 Keys for Future-Proofing your Operations

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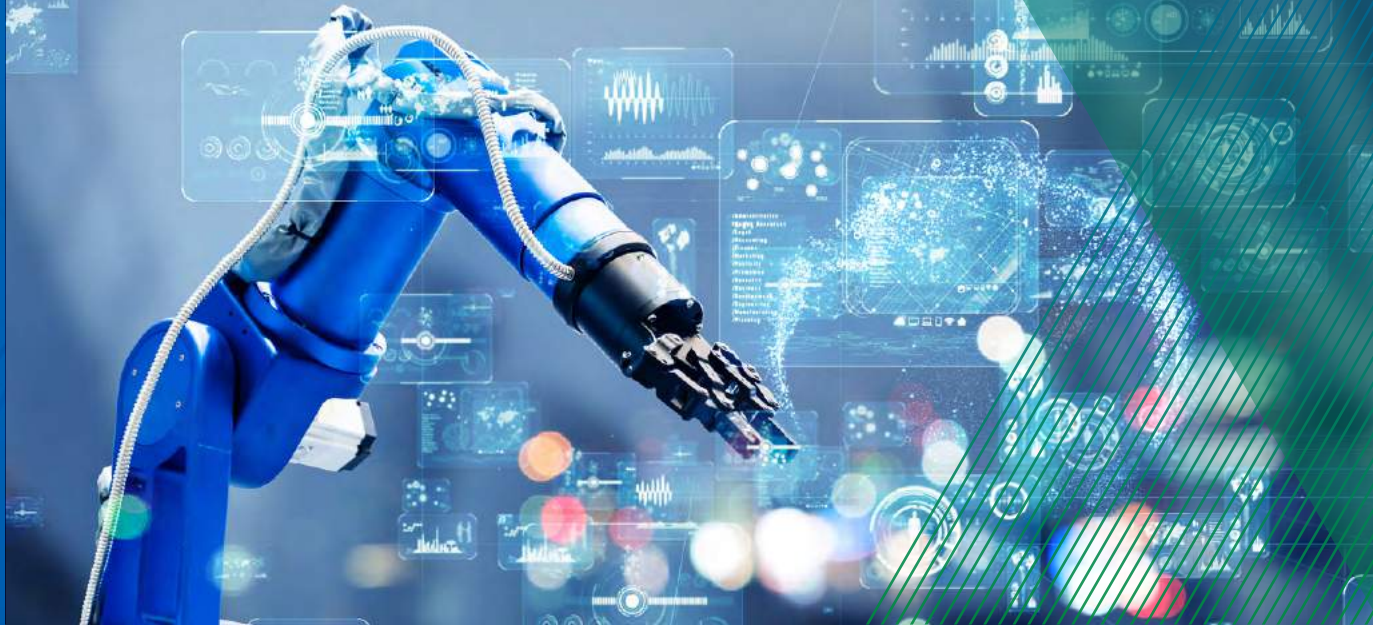


kepware®

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Digital
transformation
is a continuous
process and a way
of thinking.



Introduction	3
The Business Imperative of Future-Proofing Factory Automation	5
1 - Device-Agnostic	
Connect everything, no matter the maker or age	8
2 - Destination Agnostic	
Send data anywhere	9
3 - Enabling Scalability	
Add flexibility to meet changing conditions	10
4 – One Data Hub	
Launching next generation use cases	11
5 - Mastering Protocols	
Ensuring precise communication	12
The PTC Kepware Approach to Future-Proofing Your Business	13
Conclusion	15
About the Author	16

Introduction

Manufacturers are at a critical juncture – competition is continually increasing and the need to embrace digital transformation is ever present. It's important to remember that digital transformation is a continuous process and a way of thinking. You are never officially “digitally transformed,” instead it is a way of thinking, planning and embracing new technology and processes into your existing business.

Over the last decade, most factories have begun to instrument devices and pull data from various parts of the factory floor to enable discrete data-driven use cases. However, the proliferation of disparate, disconnected devices in factories provides a significant challenge, and is the reason why businesses are further investing in new approaches to connecting all of their factory components. One of the major challenges is that many of the unconnected pieces of your factory floor were produced before vendors ever thought that every part of a factory floor could be integrated.

Why is connecting these devices so crucial? Fundamentally it is about empowering leadership teams to make better informed decisions, reducing the risk when they make transformational decisions, and overall increasing factory profitability. In essence, you cannot begin a digital transformation effort without connecting your devices and being able to predictably transfer their data. These fundamental capabilities enable next generation use cases that utilize advanced analytics, predictive maintenance, AI, and more. These data-driven use cases require accurate, consistent data. Without normalizing heterogeneous data from various devices, the very foundation of these digital efforts becomes flawed.



The process of connecting disparate devices and standardizing data isn't just a technological challenge; it's a strategic undertaking that underpins the future success of manufacturing businesses. Businesses must look for data connection and transport platforms that can connect legacy machinery, future investments, along with on-site, cloud and third-party applications and data warehouses. In addition, you need to keep in mind you need a platform that can grow and adapt so that your business can embrace emerging technologies.

In this paper we will pinpoint five essential keys to future-proofing your operations. These principles are not just steps, but can serve as a strategy to enable a new era of manufacturing, where data-driven decision-making becomes a differentiator. This paper is intended to help you form your strategy for future-proofing your factory operations, and give you a guide for important features that should be present in any automation platform that you are assessing. In addition, we will highlight how PTC Kepware's approach to helping clients future-proof their operations.



The Business Imperative of Future-Proofing Factory Automation

Although the term “future-proofing” has been around for a long time, what does it truly mean in the context of factory automation? At its core, it involves adapting your current manufacturing systems to seamlessly integrate with technological advances, changes in operational demands, and emerging market trends. At the same time, future-proofing efforts cannot abandon previous investments. For example, a future-proofing project might require you to instrument a milling machine that was purchased 30 years ago and integrate that machine into processes that were never imagined in the 1990s.

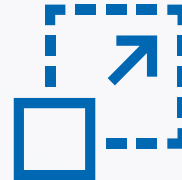
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As you think about future-proofing,
your team must consider:



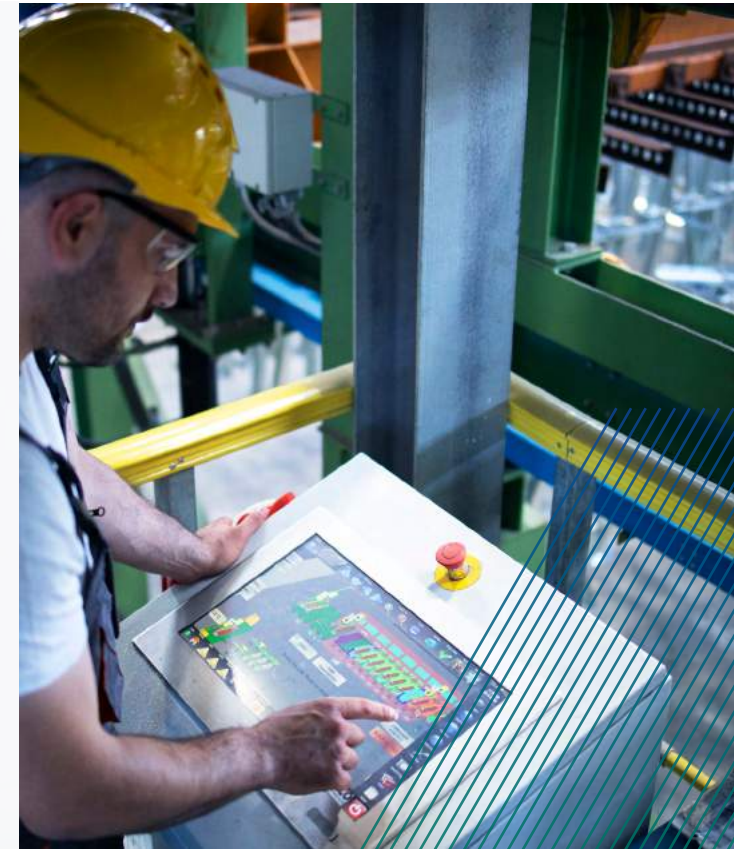
Adapting to Technological Innovations

Factories are facing the promises of Industry 4.0, with enterprise grade artificial intelligence, real-time data analytics, generative AI and other emerging technologies that are becoming industrialized. You must not only think about the adoption of new technologies but also the integration with existing infrastructures.



Ensuring Scalability

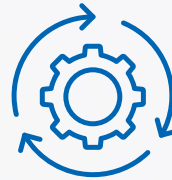
Future growth should be a key consideration as you plan. You may foresee the need to support new types of customers and production processes or a larger global footprint. Factory data platforms should be affordable yet scalable, allowing for both scaling up and down in response to production needs, market demands, or new opportunities.





Flexibility and Interoperability

As industrial automation technologies evolve, there's an increasing requirement that systems work together with different devices, platforms, and data formats. Interoperability ensures a more seamless flow of information and smoother operations, no matter what the future brings in terms of technology choices.



Proactive Maintenance & Upgrades

Beyond initial system implementations, you must consider the ongoing maintenance, upgrades, and proactive identification of potential issues to ensure systems remain current, secure, and efficient.



Preparing for Unpredictable Challenges

From supply chain disruptions, as seen during global events like the COVID-19 pandemic, to sudden shifts in consumer behavior or regulatory requirements, factories need a data platform that can adapt rapidly. This flexibility ensures resilience in the face of unforeseen challenges. Agility can be the key to succeeding as your competitors struggle.

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In the next section we will identify the five keys for future-proofing your factory automation as you think about a data connectivity and data transport platform.

1 Device-Agnostic: Connect everything, no matter the maker or age

When you walk a factory floor, you will typically see a mixture of both cutting edge equipment along with decades old machinery – along with unsupported software that is often running critical operations. Manufacturers don't just have a mix of new and old equipment, there are also devices made from a variety of vendors. Some of these vendors are likely no longer in business, and others may have built proprietary data systems in an attempt to keep manufacturing customers within their ecosystem of devices. The capability to effectively communicate across this huge spectrum is not just nice to have, it has become a necessity.

A device-agnostic approach isn't just about compatibility, it also enables business agility – operators can integrate new machinery without complex reconfigurations.



You need a platform that can ensure that all of your devices speak the same language and can work together, even if they were never intended to. This is no small task.

By integrating legacy systems with modern equipment, factories can avoid expensive overhauls and replacements. A device-agnostic approach isn't just about compatibility, it also enables business agility – operators can integrate new machinery without complex reconfigurations. Furthermore, by connecting all of your devices, leadership teams can get a unified view of operations within a single dashboard without needing to rely on specialized interfaces.

2 Destination Agnostic: Send data anywhere

An agnostic factory data platform isn't just about connecting any device. You must also think about where data is being sent. Traditionally equipment data remained on site, but that approach has been evolving as businesses explore cloud-based data warehouses and analytics platforms. In addition, some equipment manufacturers offer proprietary cloud-based data repositories that support specific devices. It's important to keep in mind that each of these destinations has its own protocols and requirements for importing and exporting data.

In addition, businesses often want to have the ability to pivot between platforms based on changing needs and objectives. To enable agility along teams are looking for a data transport layer that can empower teams to try new, emerging data and analytics platforms. A rigid system that only allows you to move data to a fixed repository will not support your future needs. For example, you may have a team that wants to ingest data into a private generative AI platform so that internal groups can interrogate data and find new efficiencies and approaches to operating the factory in a more cost effective manner.

The mandate is clear: factories require a data connectivity solution that can send data wherever it's needed in a predictable manner. Whether it's an on-prem system or the latest cloud analytics tool, the data should flow seamlessly. Enabling this capability is not easy. The system needs to know the granular configuration requirements of each data system to ensure high data quality. Think about the complexity of ingesting time-series data from multiple sources. If the data goes into a system in the wrong way, the resulting data is useless to analysts and data science teams because it will no longer have the context of time.

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3 Enabling Scalability: Add flexibility to meet changing conditions

The ability to quickly scale up or down to support customer needs is a critical priority for factories. As operations grow, expand, or evolve, your data connectivity and transport infrastructure must be able to adapt. Factories have dozens if not hundreds of devices each churning out massive quantities of data, however; the true challenge isn't just collecting this data, it's ensuring the underlying data system can handle the complexity and quantity of data.

You must look towards the future and business growth. Will your data connectivity and transport platform support expansion? How easy is it to instrument new factory sites or additional parts of the factory floor? Do you need to engage with a vendor on a lengthy consulting engagement to enable greater connectivity, or are you relying on a modular system that can easily grow?

Keep in mind, scalability isn't just about expansion, it's about flexibility. Consider the varying data destinations we previously discussed. As businesses experiment with new analytics platforms or onboard new machinery, the system's scalability must accommodate these changing requirements. If you want to integrate a new AI-driven analytics tool, it's important that your data collection and transport layer can scale to support that need.

In essence, a truly scalable data connectivity system doesn't just grow – it evolves. It adapts to the shifting demands, ensuring data connectivity remains consistent, reliable, and efficient, regardless of the scale. It's not merely about handling more data, but about ensuring that, as your operations evolve and expand, your data connectivity remains dependable.

4 One Data Hub: Launching next generation use cases

As factories move into the digital era, the ability to experiment with and implement various digital transformation use cases is becoming crucial. However, a lack of centralized data is often a fundamental challenge that blocks successful digital transformation efforts.

We've discussed that the factory floor is full of machines from varied eras, each producing streams of data. While this data is rich in insights, it is often trapped in silos, limiting its potential. It is not uncommon for a factory to have multiple, unconnected data repositories. In many cases a large portion of this data is never analyzed and the potential insights from the data are never used.

To enable a centralized data hub, you need a data connectivity platform that both connects your devices and can transport data to a centralized depository.

Why is this a critical step to unleashing digital transformation? It allows your data and AI teams to begin to implement next generation use cases. For example, a centralized data platform can allow teams to implement accurate predictive maintenance programs that will reduce downtime and avoid costly malfunctions. Likewise your operations team can use emerging AI techniques like causal AI to uncover why a problem is occurring and how to prevent it in the future. Without a full view of all of your data, the benefits of these efforts are limited because of a lack of data.



5 Mastering Protocols

Ensuring precise communication

Seamless operations require a data collection and transport layer that understands the protocols that create the communication between diverse devices, systems, and platforms. A deep understanding of protocols comes from solutions that have years of experience in a variety of factory scenarios, teams who have subject matter expertise, and a flexible platform to allow for new protocols.

Although understanding protocols may seem like table stakes for data connectivity platforms, a deep understanding can be an important differentiator. Being able to finely tune data as it flows across devices and destinations is key to being able to trust data and the resulting insights. Below are the top reasons why manufacturers are looking towards platforms that allow a granular control over device and destination protocols:

✓ Quality:

A nuanced understanding of protocols guarantees that data is captured with precision – it's not just about collecting data, it's about making sure all of your data retains its features that make it valuable.

✓ Customization:

Every device and destination has its unique requirements – data must flow across devices and to destinations based on your organization's business requirements.

✓ Insights when needed:

Decisions can't wait on poor data procedures or disparate data – finely tuning protocols ensures timely, real-time data extraction, allowing for fast, informed decisions that can be automated.

✓ Data Security:

Protocols play a crucial role in ensuring data security, allowing manufacturers to retain safeguards on data no matter where it is in transit, while also enabling data movement and analysis.

The bottom line is that data integrity and predictability is reliant on a platform's ability to understand the protocols of your environment's devices and data destinations. Although understanding protocols at a deep technical level is complex, it is a strategic part of any data connectivity decision.

The PTC Kepware Approach to Future-Proofing Your Business

PTC Kepware has been working with clients and partners to help manufacturers instrument every element of their factory floors. Central to Kepware's approach is Thingworx Kepware Server. The platform provides pre-tested drivers that are designed to facilitate communication across a variety of legacy and emerging industrial technology. The ability to connect factory elements in a way that doesn't depend on device hardware or software allows manufacturers to gain flexibility in how they use operations data.

In addition to abstracting the complexities of connecting disparate devices, Thingworx Kepware Server is a data transport layer that can send flows of industrial sensor data to any destination. Clients can send data to multiple repositories including traditional on-prem databases, cloud platforms, industrial applications, and cloud or local data warehouses designed for AI and analytics. The platform also connects to the broader PTC Thingworx industrial Internet of Things (IIoT) platform.



Kepware's approach to helping clients achieve scalability is through a modular design. This architecture allows business to grow – whether it's an increase in device numbers, additional facilities or expanding data flow requirements. By using adaptable connection models and efficient data management practices, Kepware is designed to handle increased data volume without decreasing system performance.

Although Kepware client's have traditionally wanted an on premises offering, the company's latest offering, Kepware+ allows organizations to centralize and remotely configure factory activities in a Software-as-a-Service (SaaS) environment. The cloud offering allows data and operations teams to bypass some of the limitations associated with on premises management approaches. This cloud functionality allows organizations to push rules and functionality across locations and gain operations insight across an entire business.

Finally, Kepware's platform has codified the protocols of a wide variety of industrial devices and data repositories. The platform combines a wide variety of device drivers to enable granular control over the flow of data to disparate data repositories. As the Kepware team works with new clients they are continuously integrating new drivers into the platform.



Conclusion

As manufacturer leadership plans for the future, they need an adaptable data connectivity platform that can support change. The ability to automate factory operations and create data and AI-driven use cases is reliant on high quality and trustworthy data. Successful organizations are looking for platforms that can connect any device, no matter the age or maker, and send the data to any repository. Furthermore, scalability and the ability to create a single hub of trustworthy data gives data teams the ability to experiment, while giving organizational leadership insights across all operations. Keeping the integrity of data high and ensuring security also requires a platform that allows finely tuning device and destination protocols. The need for robust connectivity isn't driven by deep technical teams, instead business and technology leaders are driving projects because of the business implications.

About RTInsights Research

RTInsights Research is the definitive voice in the evolving landscape of real-time insights and its transformative business impact of better decision making. We stand as a cornerstone for CxOs, operations leaders, and forward-thinking data and IT professionals, providing them with on-the-pulse industry trend analysis of emerging technologies that are leading towards business disruption.

The RTInsights Research Team has deep expertise across the real-time ecosystem, and how leading companies are implementing emerging technologies to create value. Our team has published reports and delivered webinars that inform business and technology strategy in areas such as Edge computing and IoT, Real-Time and Advanced Analytics, and the deployment of AI and Generative AI in enterprises. In addition, the RTInsights Research team has deep expertise on the supporting infrastructure that enables real-time insights, including Cloud and Hybrid Cloud Data Management, Machine Learning, DataOps and AIOps.

RTInsights Research provides business and technology leaders with actionable insights, helping to drive growth through emerging technologies.



About the Author

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DAN KIRSCH, principal analyst of RTInsights is a consultant, IT industry analyst and thought leader focused on how emerging technologies such as AI, machine learning and advanced analytics are impacting businesses. Dan is focused on how businesses use these emerging technologies to alter their approaches to information security, governance, risk and ethics. Dan provides advisory services directly to leadership at technology vendors that design and deliver security solutions to the market. Dan previously co-founded Techstrong Research, an industry analyst and consulting company, and was the managing director of Hurwitz & Associated. Dan is a co-author of *Causal Artificial Intelligence: The Next Step in Effective Business AI* (John Wiley & Sons 2023), *Augmented Intelligence: The Business Power of Human-Machine Collaboration* (CRC Press, 2020), *Cloud for Dummies* (John Wiley & Sons 2020) and *Hybrid Cloud for Dummies* (John Wiley & Sons, 2012).

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