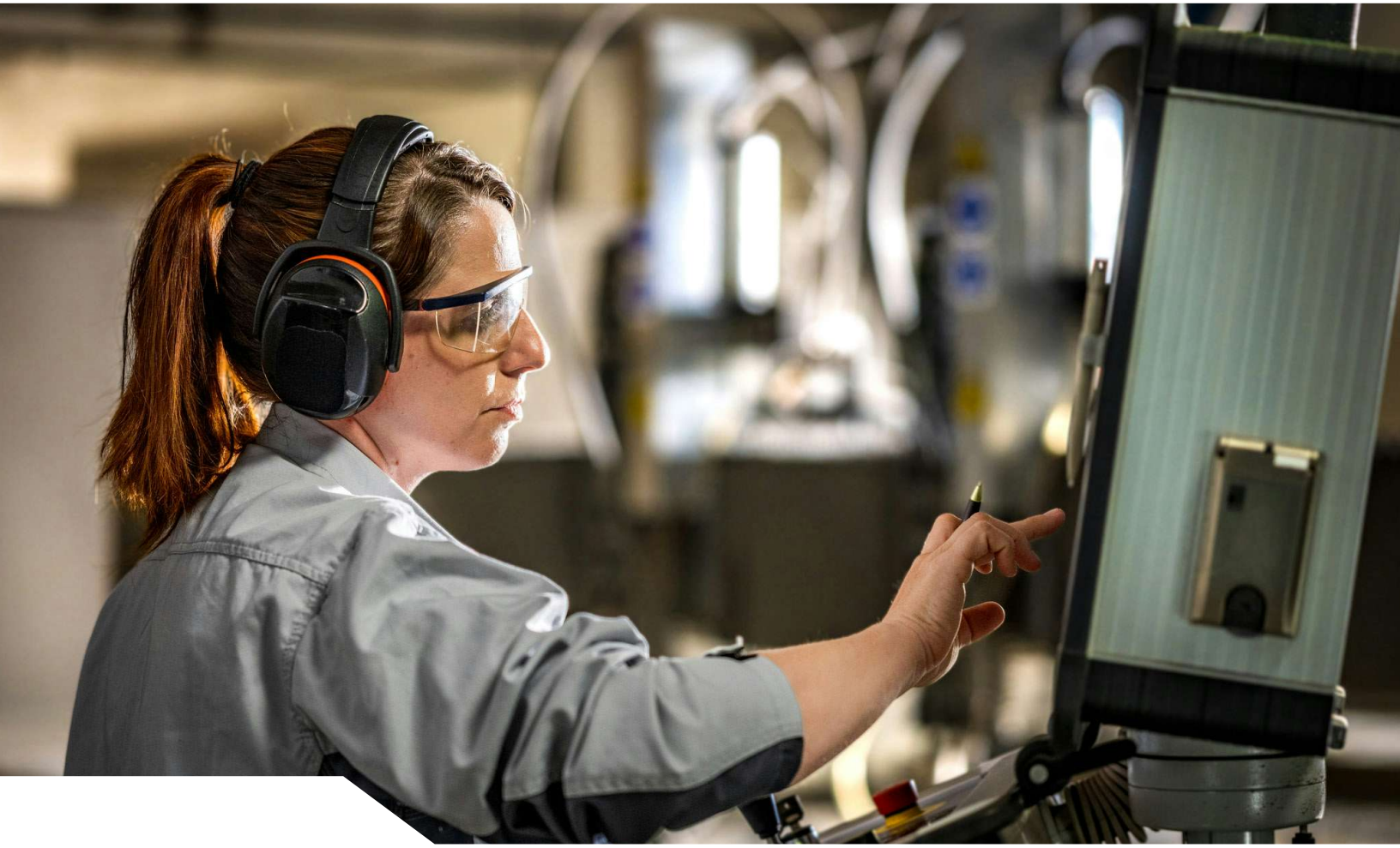
The Role of Connectivity in Industrial Data Ops



Overview

Every digital transformation journey hinges on the ability to transform data into insights, but accessing, contextualizing, and securing the data at scale is difficult. As such, manufacturers are adopting data ops principles from IT to modernize their architectures and make sense of the data, a practice coined 'industrial data ops'. Reliable and standardized connectivity is a foundational element to industrial data ops for accessing data from disparate devices and systems in manufacturing and feeding upstream systems with standardized, normalized data via secure integrations and protocols.

Kepware is the global standard for industrial connectivity, trusted by 75 of the top 100 manufacturers across all verticals. Kepware is uniquely suited to standardized connectivity for the manufacturers, with the most interoperable connectivity solutions on the market—all at scale—that connect and collect data from industrial devices to power industrial data ops and unleash the power of AI and analytics for manufacturers.

Key takeaways

Industrial data ops is built on a foundation of connecting, normalizing, and securing data.

Advances in AI, analytics, and IoT are pushing the manufacturing industry toward more data-driven operations, in which manufacturers leverage technology to drive intelligent decision making for operational resilience and efficiency.

However, data operations for OT comes with significant complications. Legacy architecture tends to be heavily siloed and disconnected, and the data in these siloes typically lacks context, making it difficult and expensive to unlock AI-enriched insights and to scale use cases.

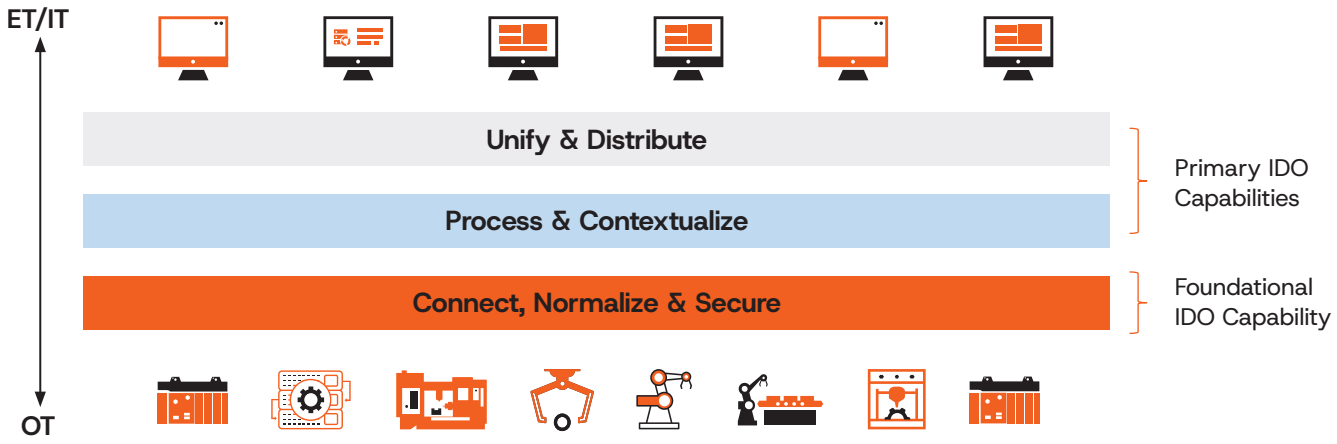
Modernizing OT architecture is necessary to enable industrial data operations (IDO). IDO orchestrates, contextualizes, governs, and delivers OT/industrial data at scale for AI, analytics, cloud, digital twins, and machine learning.

Implementing an edge-first, event-driven architecture enables data to flow flexibly, securely, and efficiently from and between OT assets to enterprise applications, providing the solid data foundation necessary for IDO and smart manufacturing. Modernized architecture also enables the foundational element of any OT-IT integration approach: connectivity.

An industrialized enterprise-grade, managed connectivity layer for connections, normalization, and security of data eliminates the need for point-to-point and custom integrations and insecure protocols, ultimately creating a single source for OT data across the enterprise to unlock smart manufacturing use cases at scale.

By connecting all device types to a standardization layer, enterprises can achieve digital transformation goals much more quickly and securely, with significantly faster time to value, than with disparate connectivity.

Figure 1: Industrial data ops capabilities



> "Connectivity shouldn't be an afterthought.
> It's the first step in industrial data ops, and it's absolutely the critical foundation."
>
> *Emily Griffin, Senior Director of Product – Kepware, Velotic*

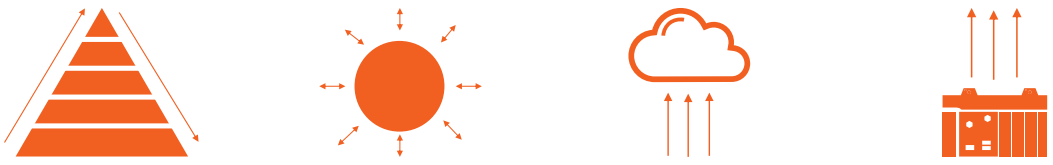
Contextualized data: the cornerstone of industrial data ops

OT-IT architecture has evolved over time, shifting away from the more traditional approach of contextualizing data in consumer end applications and toward a more centralized model. It's not one size fits all—the steps taken toward digital transformation vary by industry, company, and use cases—but at a high level, there are two main approaches to IDO that manufacturers tend to employ:

- **Data contextualization in distribution**, in which data from various sources is collected, normalized, and secured, before being funneled through data pipelines, where a schema is applied to the unstructured (though normalized) data before reaching a central hub for storage. In the central hub, the data is placed according to its relationship to other data to provide simple hierarchical context.
- **Data contextualization in the repository**, which uses data platforms, archives, and/or lakes (commonly known as industrial data management (IDM) solutions) that are typically cloud-deployed. IDM solutions seek to centralize the application of context and enhance the potentially already-contextualized information using metadata catalogs. This approach offers a faster mean time to value, especially for AI and analytics applications.

As IDO continues to evolve, architecture will continue to shift, moving toward data contextualization at the source. This approach is a model-based, schema-aware ecosystem, providing semantic consistency across the enterprise.

Figure 2: Evolution of OT-IT architecture



Traditional	*Current Approaches to IDO*		*Future of IDO*
Contextualize in Consumers	**Contextualize in Distribution**	**Contextualize in Repository**	**Contextualize at Source**

Kepware offers the most interoperable connectivity solutions.

Kepware's numerous interoperable connectivity solutions help manufacturing enterprises standardize connectivity at scale.

Kepware ensures interoperability to virtually any northbound application using standards such as OPC UA, MQTT, HTTP, and database access. Southbound, Kepware connects to virtually any device found in OT and many in IT. And Kepware has validated integrations to Azure and to AWS for both platforms' cloud-hosted ingest points and on-premises edge utilities.

Kepware's standardized connectivity provides a single source of OT data for IDO, as well as supports analytics and data capture routines that standardize on different context models simultaneously in parallel. A standard connectivity layer also enables simple OT-to-OT use cases, facilitating machine-to-machine use cases and industrial automation via a local control network—without leaving the manufacturing floor—to maintain security. Kepware is hardened for these OT applications, including HMI, SCADA, and MES, making it a reliable source of OT data for IT applications as well.

Figure 3: Kepware standardizes connectivity

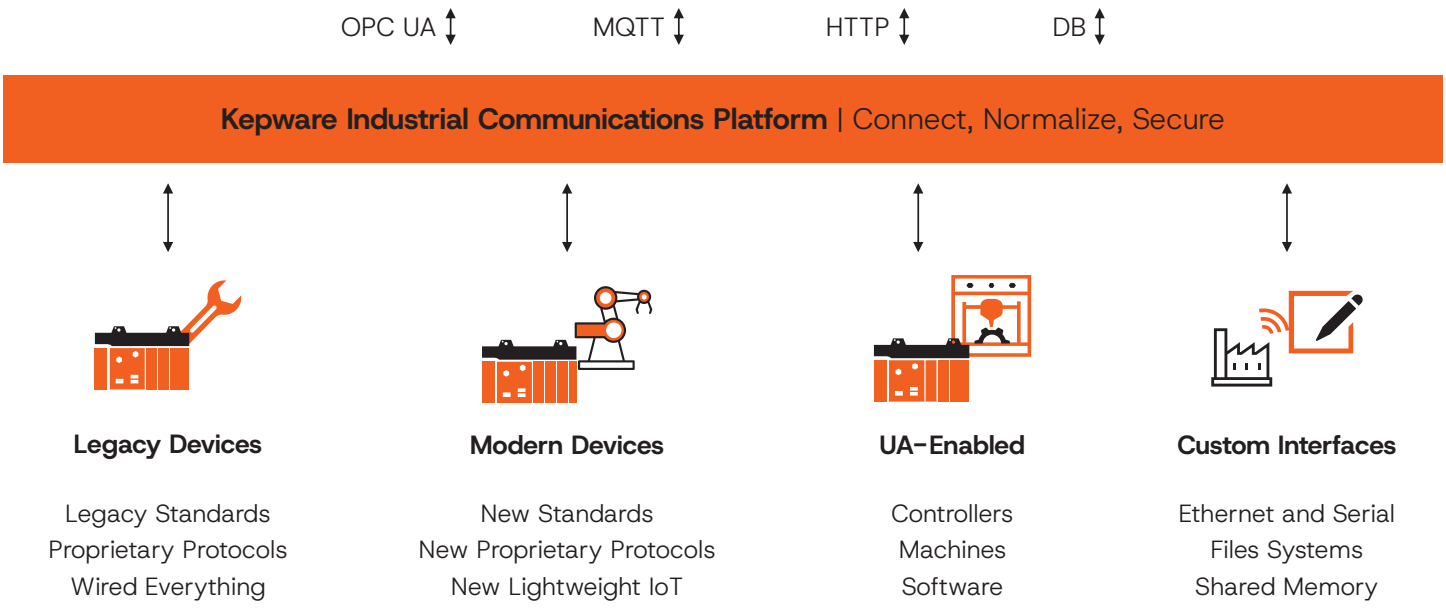
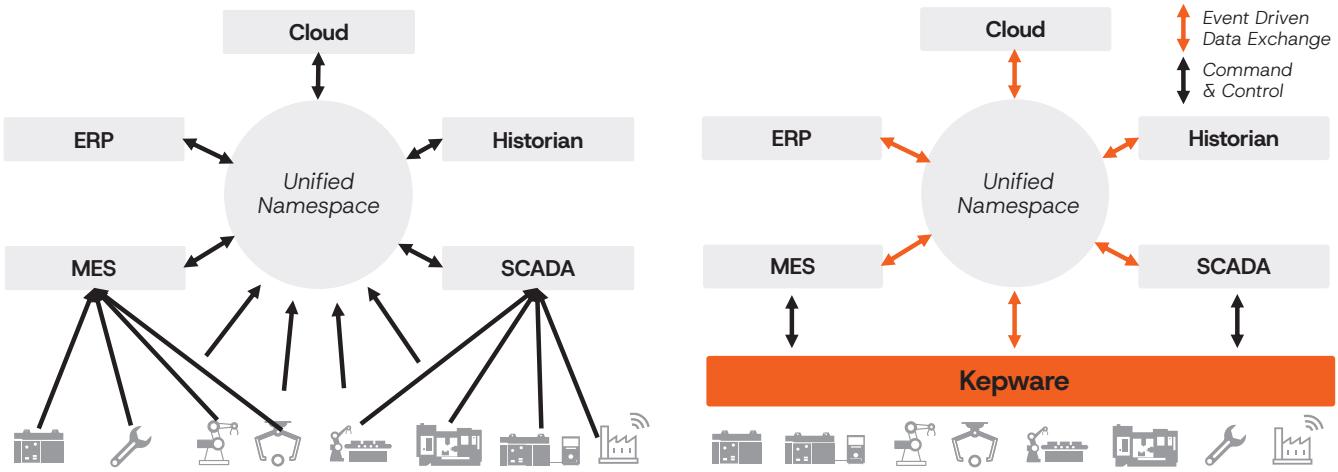


Figure 4: How Kepware supports unified namespaces



Kepware Edge delivers unmatched interoperability to enable digital transformation.

In keeping with its 30-year commitment to innovation, Kepware continues to enhance and improve its solutions. To support modernization and enable the future of IDO, Kepware developed its next-generation solution: Kepware Edge.

Kepware Edge is a Linux-based industrial communications platform deployed in a container with the robust reliability Kepware is known for, and includes an initial set of drivers for Allen-Bradley, Siemens, and Modbus. This unmatched interoperability will be delivered on-premises and in cloud manufacturing applications via OPC UA and MQTT.

Kepware Edge is built on a 64-bit foundation for high performance and security for any workload, to ensure device communications are the easiest and most secure component of manufacturers' modernization efforts.

> "We've been putting a lot of time, effort, and energy into making things simpler—simpler to manage, simpler to deploy, simpler to secure."
>
> *Abby Eon, SVP & GM, Kepware and ThingWorx, Velotic*

Dive into the future of industrial architectures

Prioritize the data capabilities that power scalable, reliable AI outcomes across your organization. **Get the insights**