WHITE PAPER

An Edge to Enterprise Approach to Industrial Data Management

A unified, organized, contextualized approach to data management and control provides new levels of clarity and efficiency for industry and infrastructure.

Executive Summary:

Industrial automation has dramatically streamlined operations, increased efficiency, and cut costs. Through the Industrial Internet of Things (IIoT), vast amounts of data relevant to all levels of business are becoming available in real time. Yet without a holistic strategy that unifies and contextualizes such volumes of data, it can be challenging to extract relevant insight and coordinate rapid action. An edge to enterprise approach to industrial data management provides the needed framework for unified command and control at all levels of an organization.

Introduction

Digitally mature companies use an edge-to-enterprise approach to unify data and tools throughout all levels of their organization— unifying operational live feeds of asset conditions and processes (edge) with management of personnel and/or financial and business goals (enterprise) information. A unified, organized, contextualized approach to industrial data management and control provides teams with new levels of clarity and efficiency to make faster, more informed decisions and drive improved productivity and increased revenue.

The Power of Organized Data

In a turbulent, competitive market, industrial companies must continuously improve operations, increase efficiency, and raise productivity. Even a 1% improvement in efficiency can have a significant impact on operations and revenue streams. Yet, with globalized business models and supply chains, unifying data in real-time is challenging. Old methods of communication and collaboration do not drive growth and indeed often hamper it.

An approach is needed that incorporates digital transformation throughout industrial processes and enterprise-wide systems to create tight, secure connections between subsystems at each layer of business.

Achieving successful transformation is not a straightforward process. Unifying diverse data streams such as alarms, power management, maintenance schedules, work schedules, production data, financing data, revenue, expenses, inventory information silos, supply chain, engineering information, and more takes time and domain expertise. Without a comprehensive solution for extracting relevant information in an organized manner, the sheer magnitude of uncontextualized data becomes an obstacle, making it difficult to organize teams to make the kind of agile decisions needed to maintain productivity, especially in dynamic circumstances.

Edge computing provides logic at the source, making machine data available in real time. HMI/SCADA software gives operators and managers visualization and control of operations on or off premise, while cloud and on-prem historians provide a means to unify and analyze multiple data streams at once. An operations management interface (OMI) that provides a flexible and extensible toolset and is completely hardware and software agnostic can combine these disparate data streams together with enterprise level data such as market conditions and business KPIs to provide a rich, concise and actionable set of insights that is contextualized for people at all levels of an organization, to enable them to make better decisions.

Edge to Enterprise Approach

Edge-to-enterprise is an operational paradigm that transforms industrial and enterprise operations by tightly integrating business systems from top to bottom. Traditional businesses operate in different layers, and the functional data collected is not always available between layers at the right time or in the right context. For example, legacy HMI and SCADA systems cannot always provide volume data in the context needed for making longer term decisions. Outdated systems require operators to sift through large chunks of siloed data and manually aggregate and perform calculations to extract relevant information. Without the ability to holistically analyze trends between systems and sites in real-time, it becomes difficult to proactively identify and address potential issues. Plant managers are often forced into a reactive mode, unable to properly plan or make strategic decisions that could benefit the longer term health and productivity of their operations.

A comprehensive digital approach that spans beyond edge device management and HMI/SCADA can help solve this challenge and support more agile operations. A unified approach to system design makes it possible for teams to leverage data collected at all operational levels into a rich resource of concise, actionable information, contextualized for people's different roles within an organization. Key performance indicators and data sets from all parts of an organization can be tracked in real-time and made available in easy-to-access dashboards that dynamically serve up relevant data based on user role regardless of location or device.
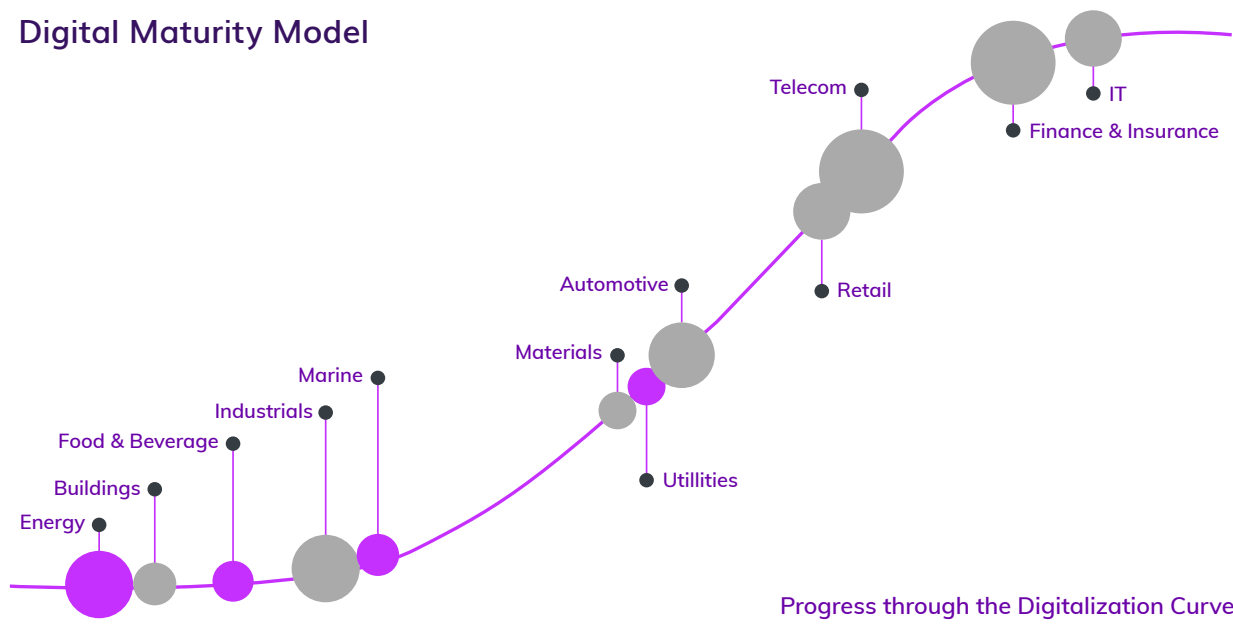
Whether the user is an engineer managing process operations at a plant, or a business leader looking for opportunities for increased efficiency and growth, it is critical to have a technology partner that incorporates the breadth of tools and services needed to support the entire organization.

Hard-wiring for business continuity

Whether simple or complex, industries are only just beginning to accelerate along the digital transformation curve. It doesn't matter whether gathering and analyzing data involves connecting to ERP or a maintenance system, the process must be simple and secure. Ultimately, it should provide context from both OT and IT perspectives to every member of the team.

With an edge-to-enterprise strategy for system design, data aggregation, and processing, you can connect to PLCs, RTUs, or almost any other data source to improve efficiency and create a single source of truth for your operations.

Digital Maturity Model

Telecom
IT
Finance & Insurance
Automotive
Retail
Materials
Marine
Industrials
Food & Beverage
Utillities
Buildings
Energy

Progress through the Digitalization Curve

Source: AVEVA Market Insights

Building a low-code foundation

To avoid long-term integration challenges, it's helpful to avoid over-customization of process modules. A templatized approach to large-scale systems makes them much easier to maintain and adapt over 10, 20, or 30 years. System integrators frequently utilize templated system components to create solutions that are highly specialized but require very little code customization to develop and scale. Code customization can be impractical too, especially when it comes to evolving and growing services and operations.

Most big projects require hierarchical data analysis – the ability to take a complete view at a facility, city, regional, interstate, country, or even a global perspective. As an example, it's possible to create one view, a "single pane of glass," to compare efficiencies of 350 data centers on different continents. In this scenario, it is impractical to manage a multitude of different objects that represent similar data.

Best practice therefore is to build a single object that can be used in different contexts, where data points from many sites can be compared simply and alarming and historical process graphs are uniform. It is critically important to choose a platform that allows an application to be designed in this way.

An enterprise-level solution should provide access and visualization of data from a variety of proprietary hardware systems through a single, common interface. Again, the right solution must be both hardware and software agnostic to equally leverage all data, so that physical assets and processes can be modeled in a repeatable manner. This makes it easier to build a solution that scales well and simplifies your teams' management and interpretation of operational data.

To achieve scale, it helps to be able to easily templatize smaller system elements and then duplicate across sites. Command and control applications like those involving smart infrastructure need to be able to serve up data dynamically and in context, and to provide information to a large set of users in real time. Accomplishing this requires a system platform that can cleanly aggregate data from various applications and subsystems.

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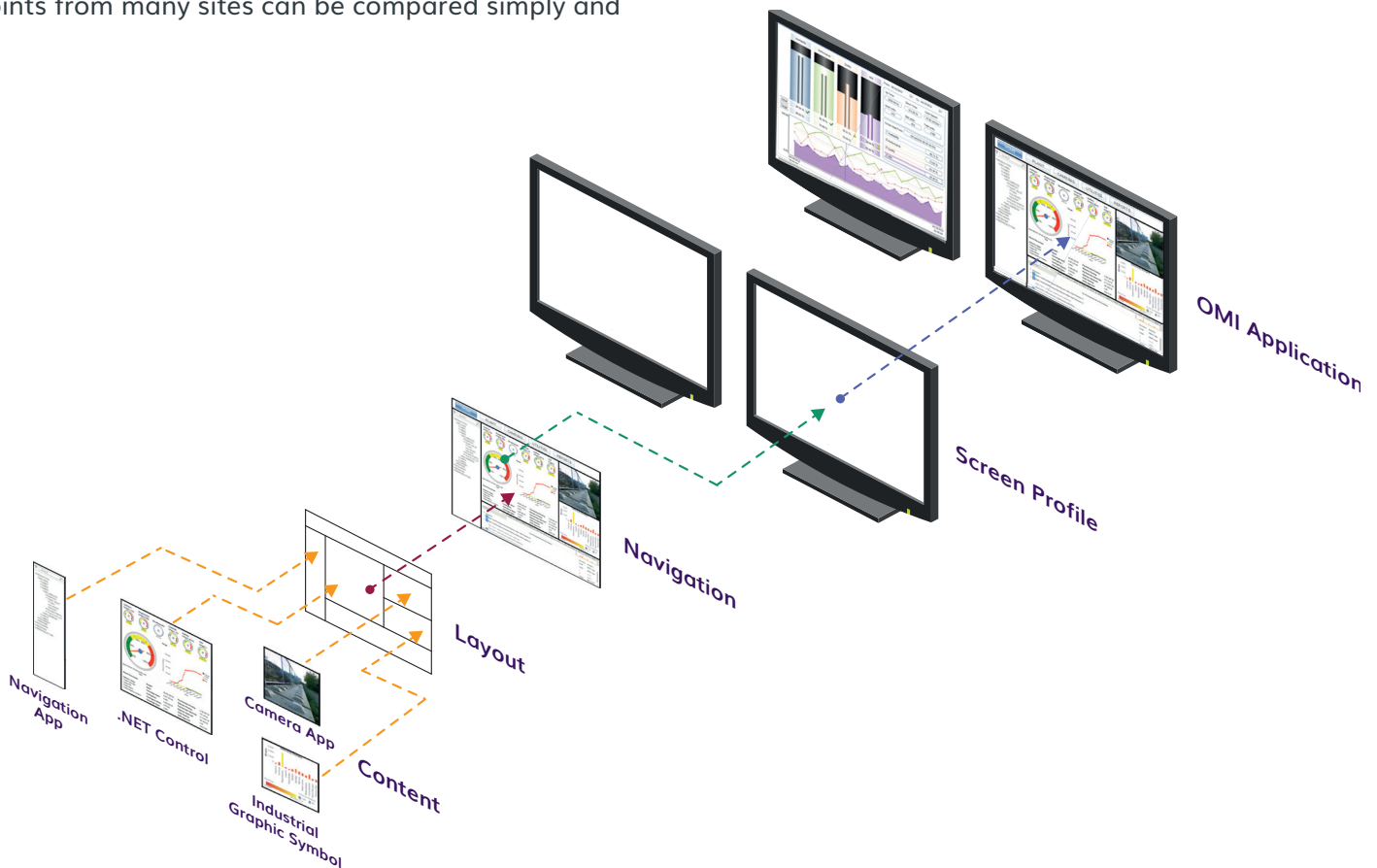
Data-driven development and iterative deployment

Numerous considerations must be made in the design of a unified command and control center. It is common to see the evolution of a system from a single plant to a broad multisite operation with diverse applications. Effective deployment of such a system can be accomplished using an application framework that centrally manages machine control, KPIs, workflow, standard operating procedures, and situational awareness. All machines in a system connect with this centralized application to provide data in a single view.

To be efficient, all alarms and notifications must be properly acknowledged across systems. It's all too common for individual notifications to drop off the radar, with risky consequences. An intelligent data system incorporates context and alarm analytics alongside of workflow maintenance and ERP connections.

Truly interoperable software solutions provide unique deployment capabilities. Every application can be designed, built, and deployed with object structures that not only make it considerably easier to design, but also to adapt and maintain. This strategy also underlies the concept of a digital twin, where a data driven representation of a fleet of assets is connected to real-time process output to provide a consolidated perspective for visualizing maintenance data, operational data, and other asset information to run analytics and predict and prevent equipment failure or negative trends. It is possible to have hundreds of these templates that combine to create a logical hierarchy of objects for asset modeling and centralizing operational decisions. AVEVA's System Platform works with hundreds of drivers and can connect with virtually any data source.

A holistic approach to system design which incorporates all facets of enterprise can lay the foundation for business growth from the outset. An object framework that is centrally designed and maintained can act as a living resource throughout the system lifecycle and provide a single source of truth for operational data throughout the evolution of your organization. This strategy also adds significant long-term value for subsequent site deployments.

A broader view of data and information in context informs operational decisions that help to continually drive efficiencies such as energy savings and productivity improvements. This type of scalable, smart infrastructure is the backbone of some of the largest industrial systems in the world.

Conclusion

Advances in computing and industrial automation technology are increasingly providing industrial companies with the opportunity to collect large amounts of real-time data and transform it into actionable insights that enable the business to operate much more efficiently and productively. Broad, flexible solutions are needed for true edge-to-enterprise continuity:

1. Data-and hardware-agnostic system framework

2. Flexibility and secure network capability to scale across assets, sites and geographies

3. Expert industry knowledge to design systems and processes that meet your exact requirements

4. Agile framework to deliver the right information to the right people at the right time

5. Scale to connect every layer of the organization into an efficient, collaborative, and productive environment.

Establishing a foundation for integrating real-time data across an enterprise can drive a wider digital transformation throughout your industrial operations, including engineering, planning, scheduling optimization, and asset performance management. Iterative development, a templatized approach, and data-driven system development form the critical foundation for the development and deployment of an edge-to-enterprise system that drives value across the entire asset and operations lifecycle.