WHITEPAPER

Edge-to-Enterprise Capabilities Enabling Smart Teams and Optimized Operations Through Intelligent Systems

Authored By:

-

Melinda Corley,
Product Marketing Manager, AVEVA

Executive Summary:

Traditional barriers to aggregating industrial data from the edge of the system all the way up to enterprise-level are eroding quickly. Now it is possible to go beyond simply collecting data from disparate systems.

This whitepaper focuses on how an Edge-to-Enterprise approach to industrial software can improve efficiency, enable teams to make decisions based on a single source of truth, and utilize flexible subscription licensing options to make the most of a broad, integrated industrial software portfolio that takes you from the Edge-to-Enterprise and everything in between.

Edge-to-Enterprise – A New Approach to Industrial and Infrastructure Monitoring & Control

Intelligence in automation – be it industrial or infrastructure, continuous process or hybrid – is a growing necessity for those businesses who aim to lead and stay competitive in markets using rapidly evolving technology. New tools for intelligent systems like the IIoT (Industrial Internet of Things), cloud computing, big data analytics, and edge computing, have given automated systems more capabilities to gather and make sense of data in real time, analyzing data to predict the future and provide just-in-time preemptive maintenance resources across the entire supply chain.

Historically, there have been challenges to staying ahead of the technology curve, not to mention implementing the full scope of these technologies as, and when, they become commercially viable and production-ready. The interoperability necessary to collect and aggregate data has often made integration of various smart systems difficult. In addition, data from sources like edge devices have proven difficult to bring into visibility of the supply chain.

Another challenge is a lack of purpose-built, "off-the-shelf" solutions, forcing many companies to rely on proprietary software and in-house engineering capabilities to fully incorporate new technologies, perhaps limiting key system benefits to be achieved, like those that cloud capabilities make possible in terms of KPI-level data democratization, enabling production transparency from the shop floor to the top floor.

Each of these barriers is now easier than ever to overcome, thanks to the focus of software companies on providing a complete Edge-to-Enterprise solution architecture for complex industrial and infrastructure monitoring and control, and both a hardware, software, and platform-agnostic approach to interoperability that simplifies connectivity between disparate systems and data silos, making system integration, maintenance, and upgrade, far easier to accomplish.

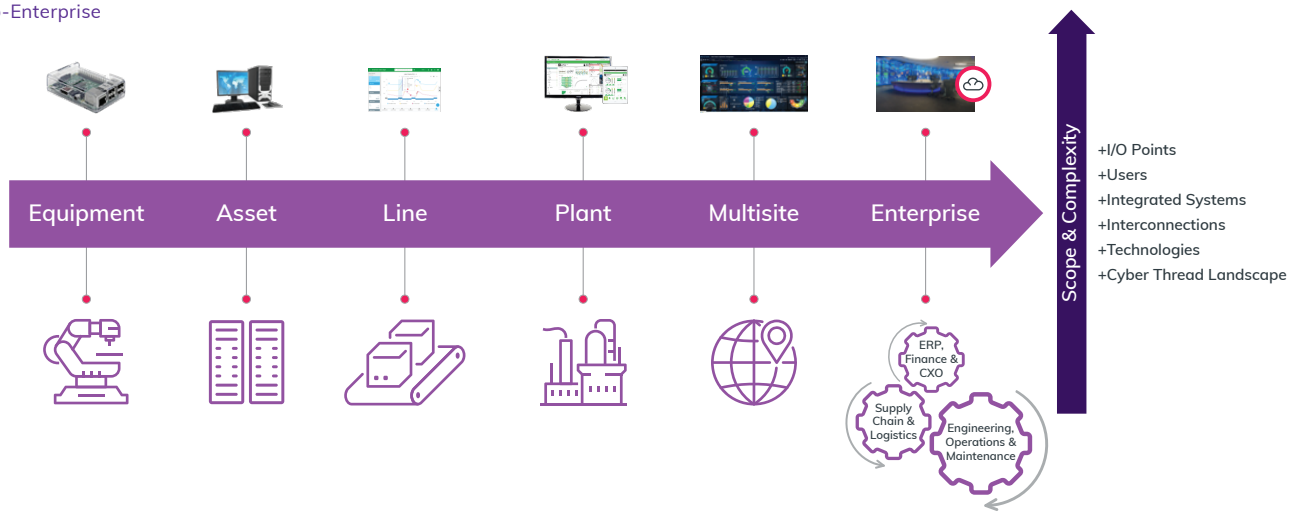
The Breadth of an Edge-to-Enterprise Strategy

It's important to understand that implementing an Edge-to-Enterprise strategy does not necessarily mean incorporating every possible technology solution enabled by a full spectrum of software and hardware. It's about finding the architectures that best fit a business' needs and use case, and leaving room to scale upwards, change strategies, or implement new technologies.

Edge-to-Enterprise strategies represent an infinite range of possibilities, with the ability to tailor solutions to accomplish specific goals. While each component of an Edge-to-Enterprise solution can be an integral part of operations, it is the integration of those parts that creates a holistic solution. This is much easier to accomplish when technology partners prioritize interoperability and create tools that are meant to complement one another across the entire supply chain.

AVEVA Monitor & Control

Edge-to-Enterprise



Elements of an Edge-to-Enterprise strategy may include:

Assets

Manage edge devices from the cloud, aggregate data from previously inaccessible sources, and send critical data to the machine HMI. Execute logic at the source to reduce latency and improve speed.

Equipment

Equipment-level HMI can be used for predictive maintenance or troubleshooting. Send data to the cloud or line-level HMI to improve process efficiency.

Line

Gather data from the entire line on your HMI and send to SCADA, the cloud, or both. Take advantage of remote monitoring and control on smartphones and tablets or OEE tools.

Plant

Get an eagle-eye view of a plant. Aggregate data from the edge, HMIs, and SCADA to optimize your processes and create a sitewide single source of truth either locally or on the cloud.

Multisite

See the performance of multiple sites in a single, easy to understand dashboard that leverages AI and machine learning in the cloud to enable real-time decisions for each site.

Enterprise

Empower a team with a centralized view across the enterprise to help make informed decisions, fast. Bring end-to-end operational visibility across facilities to improve safety, operational efficiency, and profits.

What's New About Edge-to-Enterprise Software Strategies?

Technologies such as edge computing and IIoT architectures are not new. Even capabilities like Artificial Intelligence and Machine Learning are recognized as increasingly essential in today's data analytics landscape. What is new in the Edge-to-Enterprise monitoring and control approach is not individual solutions, but the greater sum of all of the integrated parts – a single line of sight that incorporates various streams of previously siloed and inaccessible data to better understand an entire process, and give at-a-glance understanding of information, enabling next-level real-time decision-making and optimization.

AVEVA is the only industrial automation software solution provider that can provide not only everything from edge computing & analytics, to complete edge device monitoring, control & management at the HMI, SCADA, and Enterprise levels, making it easy to scale production up, or down, as business conditions change, and optimize production capacity as the business grows. The keys to this strategy include:

1. Flexible licensing options that make it easy to add software components as your hardware and process architecture needs change
2. Access to a huge library of both open and native communication protocols to ensure connectivity to devices at every level of the business (including protocols like OPC UA and MQTT for IIoT architectures)
3. Powerful solutions for every stage of your industrial, or infrastructure, operational process monitoring and control
4. A partner that can keep you on top of all technological advancements and can harness the collective knowledge of the World's biggest and best companies and organizations, to help you solve the problems of today, and tomorrow.

How AVEVA Flex Enables an Edge-to-Enterprise Solution

AVEVA Flex offers complete flexibility in the purchasing, design, and implementation of industrial software. Flexible subscription options give businesses complete flexibility in the procurement, design, management and utilization of industrial control systems. Flexible subscription options allow edge to cloud visibility as and when it's needed and empowers the adoption of technology for businesses of any size with architectures of any scale.

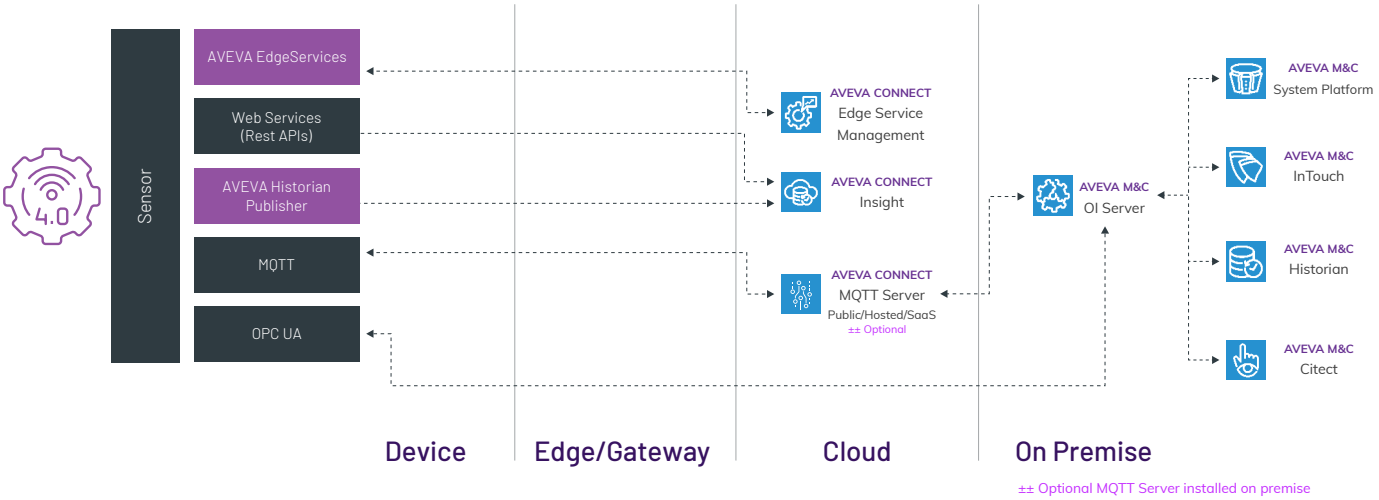
Edge-to-Enterprise solutions are only successful when they meet the goals of the business, and don't overburden users with information that isn't immediately useful. AVEVA Flex – AVEVA's Edge-to-Enterprise subscription program, gives companies the options to implement only what they need, when they need it, including all portions of the Edge-to-Enterprise portfolio they require, with the ease of including more licenses only as and when they're needed. This allows the solution to scale and grow with the business, from a single machine on premise, to cloud solutions layered on top of SCADA integrated with enterprise management solutions.

So, what is Edge-to-Enterprise and what are the Use Cases?

Sample Architectures of an Edge-to-Enterprise Strategy

The true power of an Edge-to-Enterprise monitoring and control technology is the ability to fully customize a solution that includes the technologies that will most empower teams to make impactful decisions, but most importantly, allow that solution to be built in a completely hardware-, software- and platform-agnostic way. This complete flexibility in interoperability will ensure that any stage of your digital transformation – be it proofs of concepts and prototypes, to integration testing, to new approaches to upgrade and system maintenance – is as optimized to deliver quick uptime and even quicker return on investment. Let's look at some of the architectures made possible by an Edge-to-Enterprise approach to digital transformation:

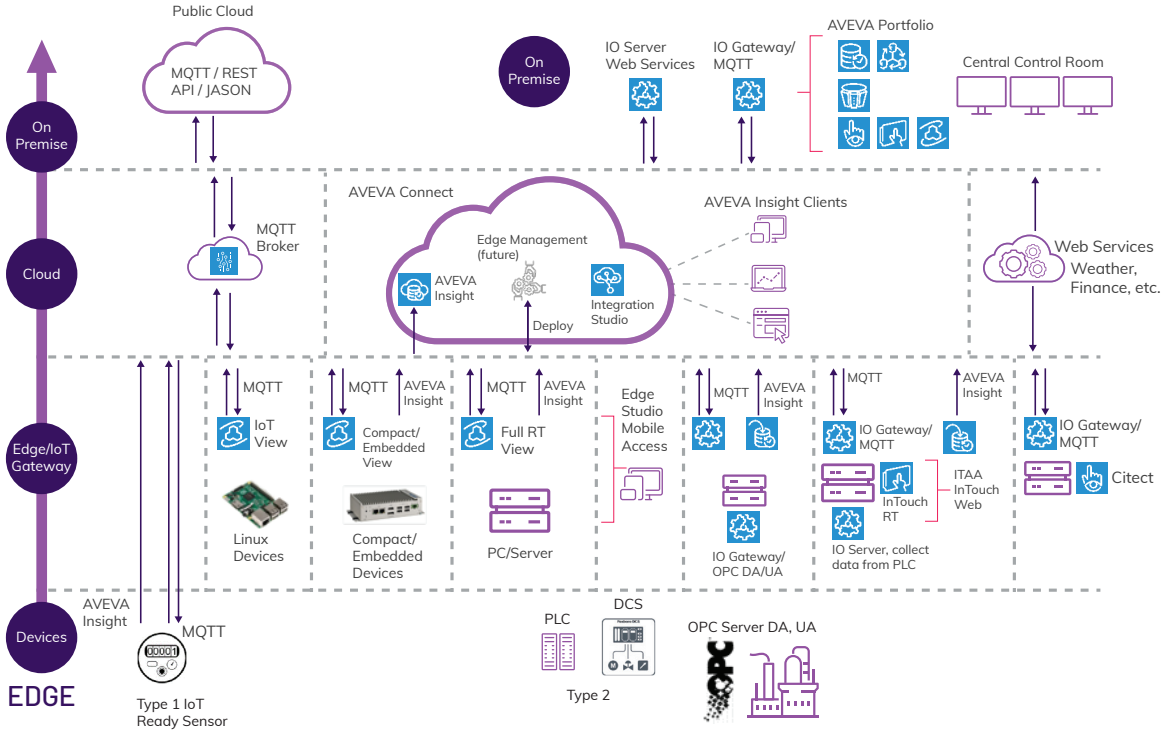
Sample Architecture – IIoT Ready Field Device with IIoT Embedded Capabilities



This architecture begins with an IIoT enabled field device such as a sensor, and can be applied to one device, a few, or hundreds. With the aid of AVEVA software, the field device can have a combination of capabilities, such as AVEVA Connect, a cloud-based SaaS hub for industrial software. The field device can also employ new capabilities to manage device configuration, deployment, and ongoing health via the cloud. Data can be sent from the device to Insight, a secure managed solution for collecting, storing, visualizing, and analyzing industrial data.

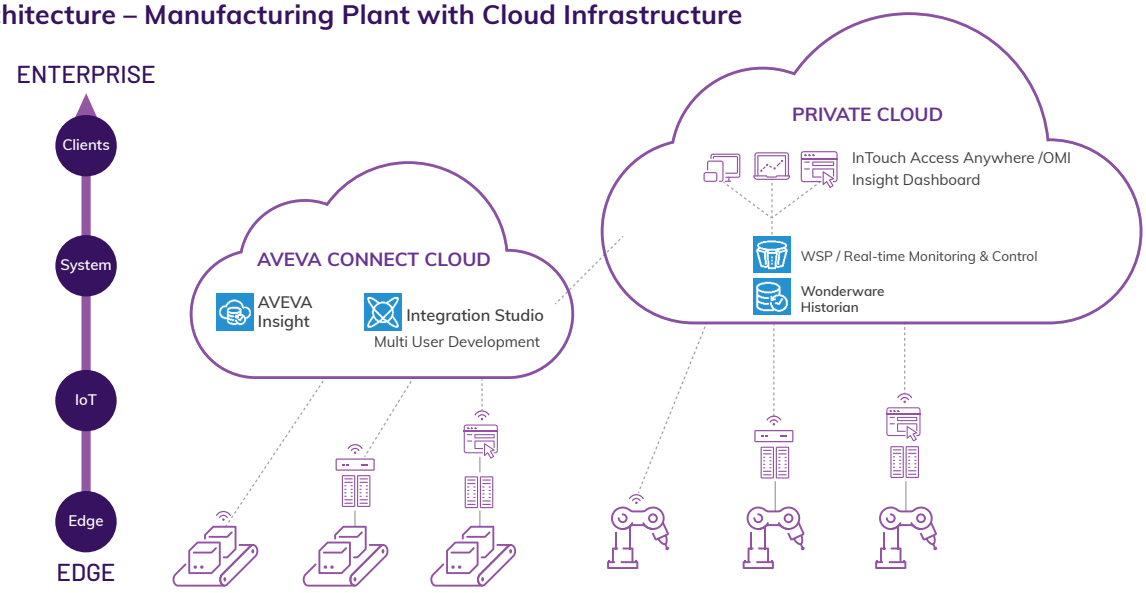
On-premise, the OI Server uses an MQTT broker to send bidirectional information to existing and new systems such as InTouch HMI, Citect SCADA, or System Platform.

Sample Architecture – Single Node with IIoT and Cloud Capabilities



This scenario can include different types of edge devices. IoT ready devices can collect data from their sensor and publish directly to a cloud like AVEVA Insight, MQTT Broker, or a proprietary cloud. The other type might be an intelligent device typically connected to PLC/DCS or any OPC Server. Edge single node devices use native communication wherever possible, speaking to each device in its own language.

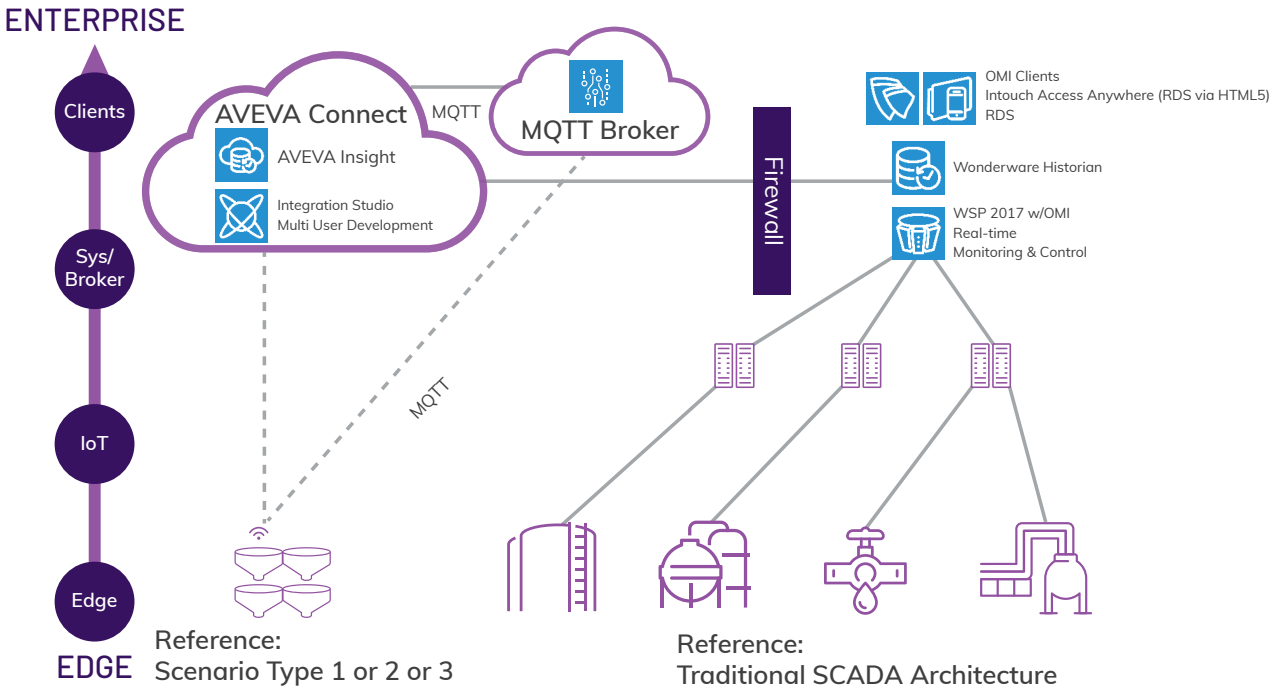
Sample Architecture – Manufacturing Plant with Cloud Infrastructure



This architecture demonstrates a “Cloud First Strategy” which moves the infrastructure to the cloud, both with AVEVA Connect Cloud and virtual hardware residing in a private corporate cloud environment owned and maintained by the IT department. This scenario includes System Platform Running on Integration Studio Server (Development, Runtime Historian) and connected to real I/O via VPN secure connections. IoT sensors are added to existing lines/equipment and talk to the MQTT broker.

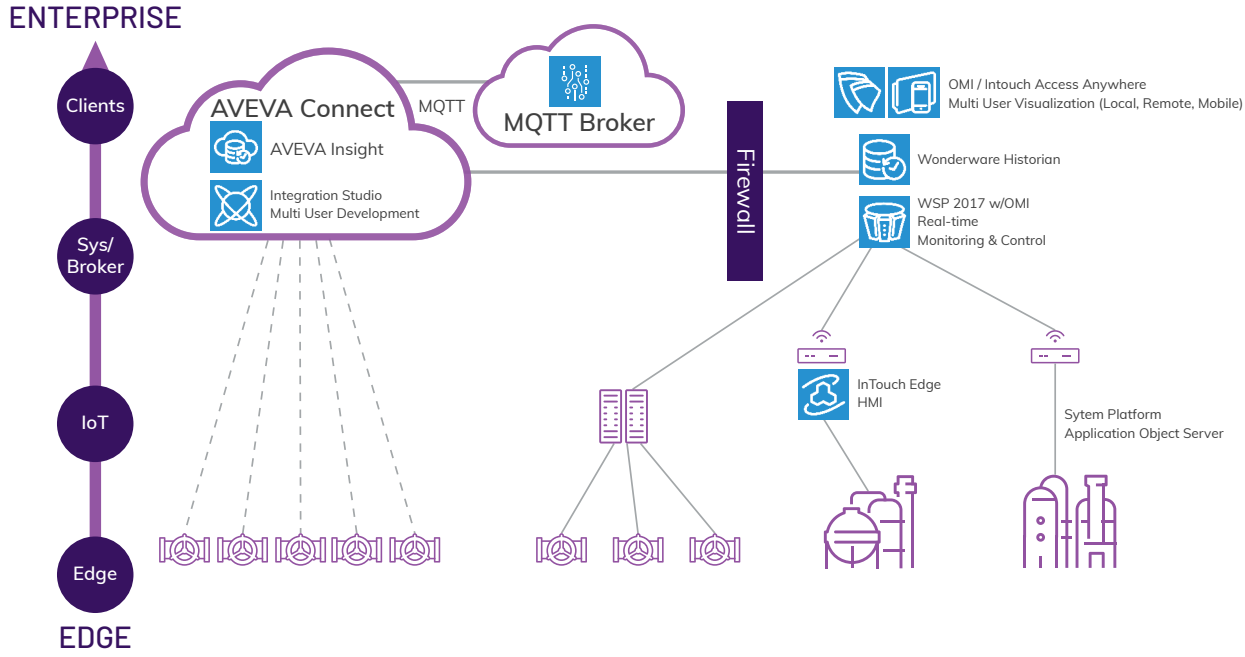
System Platform logs data to Wonderware Historian within Integration Studio or AVEVA Insight. Users can access the system via Insight or VPN to the Operations Management Interface (OMI).

Sample Architecture – Process Plant with Hybrid Cloud Infrastructure



This traditional SCADA architecture utilizes on-premise System Platform & OMI servers. Existing PLCs and new edge sensors are introduced at key processes for monitoring only. Wonderware Historian provides data to AVEVA Insight, and AVEVA Connect / AVEVA Insight combines process plant and new sensor data.

Sample Architecture – Large Distributed Architecture



This example features a Unified Operations Management Center with a Command and Control room. Several distributed sites communicate with MQTT via cell modems. Additional sensors added at large sites communicate via high speed internet, distributing computing power to the edge and reducing latency. System Platform Monitors, Controls, Manages the Edge nodes.

The Breadth of the AVEVA Edge-to-Enterprise Portfolio

AVEVA is the only industrial software supplier on the market capable of offering AVEVA is the only industrial software supplier on the market capable of offering not only software for every stage of digital maturity curve, but the flexibility to mix and match these solutions for a highly customized and scalable system that provides actionable information and the ability for teams to make agile decisions.

The best way to explore the full depth of the AVEVA portfolio is through the AVEVA Digital Exchange. In addition, here are some of the monitoring and control solutions that can best help you achieve a full Edge-to -Enterprise strategy in your business.

InTouch Edge HMI

Edge management, and a full HMI/SCADA software. InTouch Edge HMI runs on small-footprint devices like a Raspberry Pi, all the way up to server level operating systems, and has web thin client options to monitor or control your HMI from the web, tablets, and smartphones.

InTouch HMI

The classic InTouch offers powerful HMI. Used in 1/3 of industrial facilities worldwide, InTouch HMI offers advanced graphics and remote web viewing capabilities.

Citect SCADA

Citect SCADA offers a serious SCADA software solution for data-heavy processes that require thousands or millions of tags. A dedicated out-of-the-box Situational Awareness Workspace that provides flexible, consistent, rich context for operators, as well as a new way to build context-aware SCADA visualization.

OASyS SCADA

OASyS SCADA is a highly secure and scalable Pipeline SCADA platform that is used in the oil and gas industry to manage critical infrastructure around the world. OASyS SCADA tightly integrates with advanced oil and gas distribution operations to bring the sharpest operational awareness to the control room.

System Platform

System Platform is a responsive, scalable solution for supervisory, SCADA, HMI, and IIoT applications that integrates the process with the enterprise. System Platform provides a collaborative, standards-based foundation that unifies people, processes, and assets across all facilities for continuous operational improvement and real-time decision support.

AVEVA Historian

Enhance decision-making and accelerate collaboration across the enterprise. AVEVA Historian captures and store high-fidelity industrial data, bridging the IT-OT gap to improve operational performance.

AVEVA Insight

Empower end-users and solution builders with a secure, managed cloud solution for collecting, storing, and visualizing process and performance data.

About the Author

Melinda Corley is the product marketing manager for InTouch Edge HMI. She has spent nearly ten years in the automation software industry.