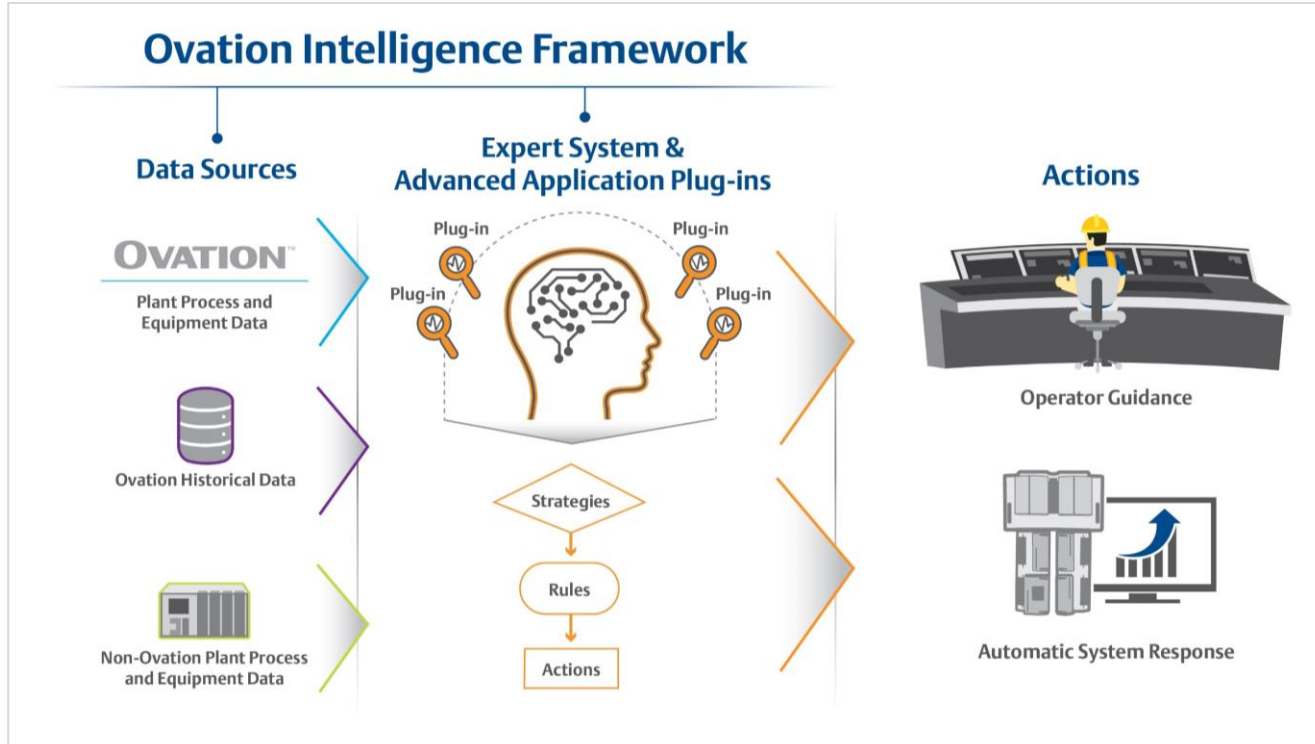




Ovation™ Intelligence Framework

Features

- Enables user-customizable applications that integrate multiple data sources into a single environment
- Provides native access to high-speed, high-resolution data through tight integration with the Ovation control system
- Base functionality can be extended through Ovation application-specific plugins and external libraries
- Provides the foundation for:
 - Minimizing the impact of a retiring workforce by embedding human expertise into the control system
 - Empowering informed decision-making
 - Monitoring plant processes and equipment health for the onset of abnormal conditions or operating scenarios
 - Reducing the risk of unplanned outages due to equipment damage or process upsets
 - Augmenting Monitoring and Diagnostic (M&D) center capabilities by focusing on the remediation of short-term, plant-specific issues
 - Supporting multi-network points
 - Reducing required data communications to M&D centers
 - Enabling consistent operations at the plant and/or fleet level



Introduction

The Ovation Intelligence Framework (OIF) is a high-level software programming environment where multiple, configurable data sources interact with expert system strategies and rules to learn normal versus abnormal process/equipment behavior and take appropriate action if necessary.

A variety of optional Ovation plugin applications extend the base functionality to enable higher-level analysis of plant conditions. Depending on the application, the plugins are developed using a combination of neural networks, model-based control, dynamic prediction, applied intelligence, and other analytic technologies.

Various external libraries from C# and Python are also available for import that allows enhancement of the framework's functionality without having to update the base framework.

In the event of an impending process upset or equipment failure, the framework's expert system, along with any advanced functions provided by Ovation application plugins, alerts and guides operators to take immediate, specific action or interacts directly with the control system to resolve the situation.

While the focus of centralized and remote M&D centers is on analyzing several plant sites using time-lagged data for long-term events and patterns, the Ovation Intelligence Framework can address both short-term events that require immediate response as well as long-term events.

By performing processing functions locally and utilizing native Ovation range-checking and data-quality functions, the framework can significantly reduce communications traffic to get needed data to M&D centers.

Data Sources

Unlike other analytics software packages, the Ovation Intelligence Framework is tightly integrated with the Ovation control system, giving it native access to high-speed, high-resolution data.

The framework takes data from multiple sources available for consumption by the expert system and application plugins. Data sources can include:

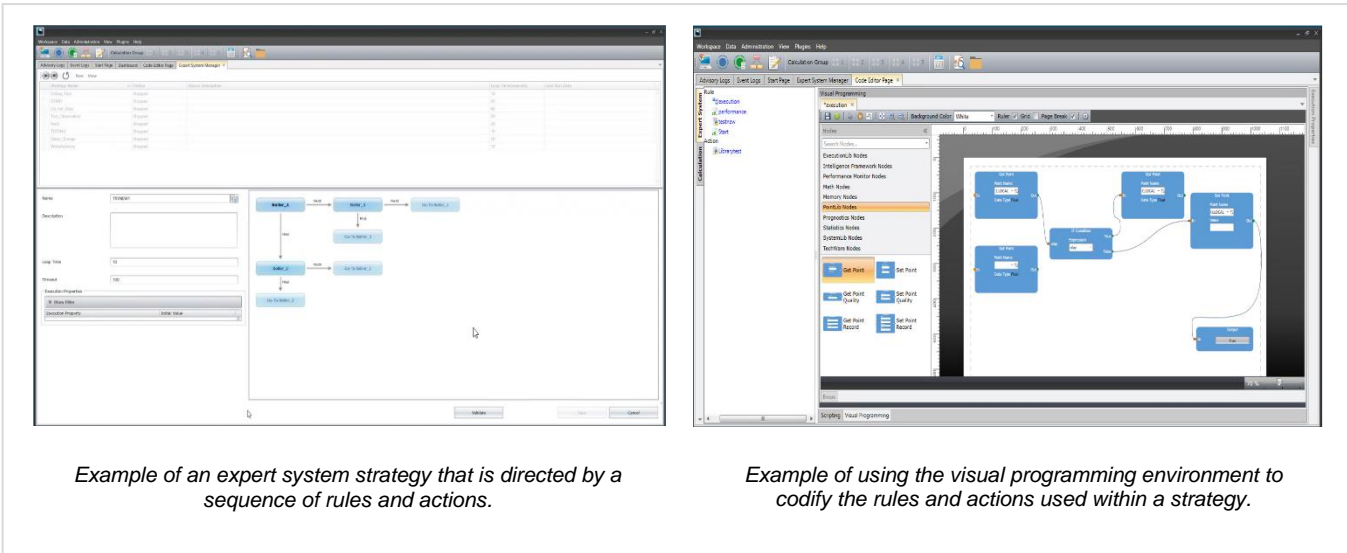
- Real-time Ovation data captured at I/O resolution from Controllers or networks.
- Ovation or non-Ovation historical data.
- Ovation Enterprise Data.
- Third-party equipment or system data using standard communication protocols.

Expert System

The Expert System within the Ovation Intelligence Framework solves complex problems by combining the data sources with a knowledgebase of human expertise codified in strategies, rules, and actions.

The system can be deployed on a single plant running plant-level strategies or on multiple plants and distributed energy resources using either plant or fleet-level strategies. Emerson or the end-user can define the expert system using C# scripting language, Python scripting language, or graphically through the Ovation visual programming environment.

The visual programming language, which is equipped with a library of standard objects, can be extended using C# scripting to create user-defined blocks for enhanced functionality.



Example of an expert system strategy that is directed by a sequence of rules and actions.

Example of using the visual programming environment to codify the rules and actions used within a strategy.

Prognostics Plugin

The Prognostics Plugin uses complex modeling and artificial intelligence based on Advanced Pattern Recognition (APR) and machine learning capabilities while interacting with the Ovation Intelligence Framework. Collectively, they alert and guide operators or the control system to take immediate action and avoid future equipment or process failures.

Machine learning and analytical models can be developed using Ovation Analytics Studio and then used for deployment to the Ovation Intelligence Framework (OIF) Prognostics plugin which allows visualization and analysis of data patterns. Unlike other monitoring or diagnostic solutions, the Prognostics Plugin uses Ovation data captured at I/O resolution from Controllers or networks. Access to richer data streams enables immediate remediation of short-term plant events, augmenting the work performed at a centralized M&D center.

Ovation Pump Performance Monitor Plugin

The Ovation Pump Performance Monitor plugin supports the Pump Performance algorithm. This algorithm calculates efficiencies, deviations, and other performance characteristics of a centrifugal pump. It determines the specific thermodynamic properties of water that are unique to the pumping operation. The performance characteristics are composed of various efficiencies, deviations, and temperature rises. The algorithm measures these performance characteristics over time against indicators of performance, which are determined by manufacturer-supplied design curves.

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