YOKOGAWA
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Centralised alarm management solution to improve operability of large scale multi-site network

Introduction

One of the largest oil and gas producer in Southeast Europe, active in many aspects of the energy value chain with a vast network of over 1,500 sites and assets, wanted an enhanced insight into their alarm situation, with the capability to monitor and improve alarm system performance to keep their environment, people and assets safe.

They required a centralized view of all operational assets, with a harmonized view of all the alarm information generated by control systems from multiple vendors deployed throughout their entire hierarchy. Access to this information was required at a corporate level at their centralized headquarters.

Yokogawa provided an integrated and collaborative solution, combining Exaquantum plant historian and its alarm management applications with FAST/TOOLS supervisory control and data acquisition system. Operational data from PLC's and control systems are displayed alongside alarm and events information to monitor all plant assets.

With increased functionality and interoperability between Exaquantum Alarm Reporting and Analysis (ARA), Exaquantum Alarm Master Database (AMD) and FAST/TOOLS, it provided an alarm management solution to analyse and rationalise their alarm systems from one supplier. Delivering a mechanism to better handle alarms in real-time and provide the full ISA-18.2 alarm management cycle, including a master alarm database.

☑ ENHANCED INSIGHT INTO ALARM SITUATION

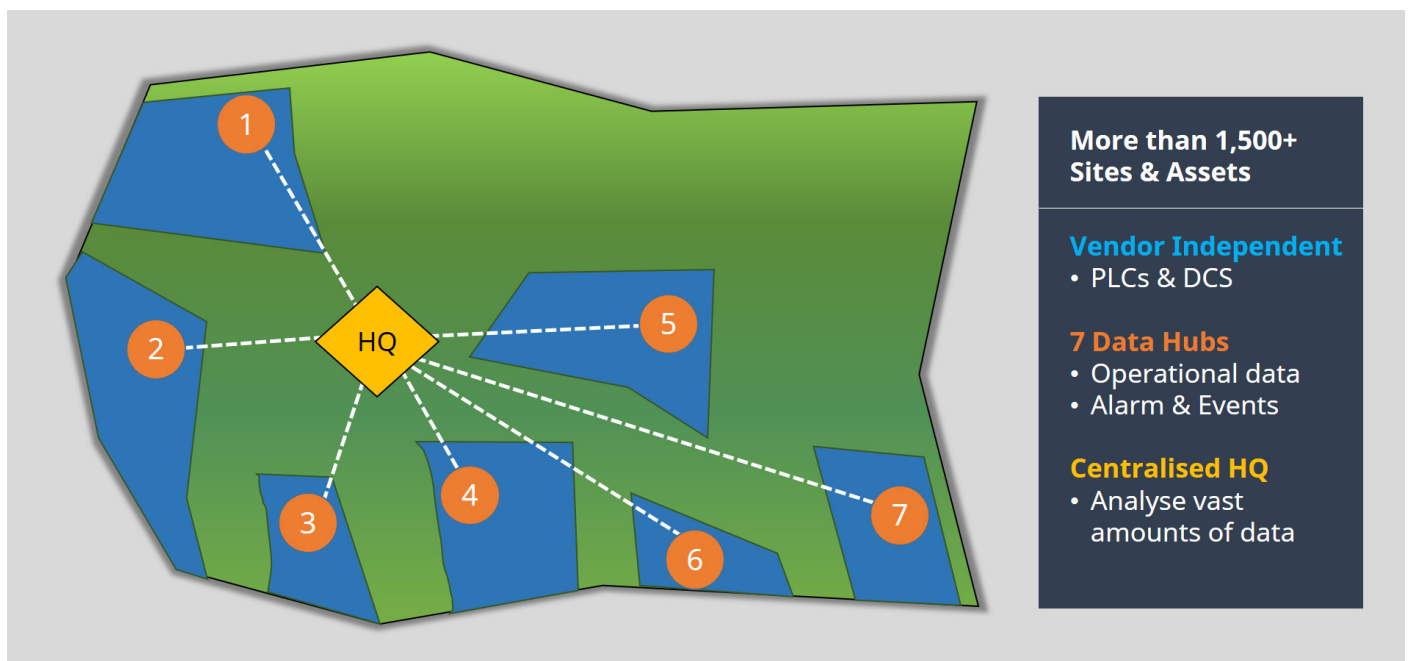☑ CENTRAL VIEW OF OVER 1,500 OPERATIONAL ASSETS

☑ INTEGRATING EXAQUANTUM, ARA, AMD AND FAST/TOOLS

Objectives

One of Europe's largest oil and gas producers wanted a centralized view of all operational assets, with a harmonized view of all the alarm information, available at the enterprise level from their headquarters. They required a versatile solution, enabling them to improve their operability through the optimization of each system across a vast network of more than 1,500 sites and assets.

The objective was to have increased insight into the alarm situation, with enhanced visibility of alarm system performance to compare across every location, site and asset. In line with their alarm philosophy, they wanted the capability to identify problematic alarms, address areas of concern and incorporate alarm rationalization and management of change functionality at the corporate level.

Each site and assets had its own control system, these are predominantly peripheral devices like Programmable Logic Controllers (PLC's) with several Distributed Control Systems (DCS) at larger and more extensive facilities. With a large volume of assets, covering many aspects of the energy value chain, systems have been supplied from multiple vendors. Operational data from PLC's and control systems, alongside alarm and events, are passed into seven separate data hubs. These data hubs are acquiring and collecting huge volumes of data, which needed to be normalised and centralised in the company headquarters. With a single view of all operational assets, combined with alarm data the customer is in a position to monitor and improve alarm system performance to keep their environment, people and assets safe.

More than 1,500+ Sites & Assets

Vendor Independent
• PLCs & DCS

7 Data Hubs
• Operational data
• Alarm & Events

Centralised HQ
• Analyse vast amounts of data

Challenges

Project size and scale

This was an ambitious project, with high expectations to fulfil, combined with the added complexity of connecting data from a huge number of disparate control systems from multiple vendors over a vast geographical area. These extensive requirements were a major obstacle for many prospective suppliers, with only three companies, from the original list of more than ten, that were able to satisfy the customers' requirements.

The project schedule was also challenging, with limited system design specifications from the project outset. Yokogawa contributed its combined SCADA and alarm management expertise to develop the system specifications in collaboration with the customer, to ensure that the project objectives would be accomplished. Yokogawa was the only supplier with the capability to provide an integrated solution from a single vendor that fulfilled all project requirements.

Yokogawa adopted an agile project approach to overcome these challenges and provide additional flexibility. This iterative, flexible and change driven approach allowed adjustments to be made as the project progressed. With these refinements and adjustments made during the project, it was much easier to adapt to the requirements schedule very quickly, alleviating any initial concerns and ensuring buy-in from all project stakeholders.

This rolling wave project gained momentum over time, expanding the requirements and opened up new and additional opportunities that were not in the original scope; including adding additional users, increasing the IO capacity and engineering re-works due to business specific dynamics.

FAST/TOOLS and Exaquantum Integration

This was the first time that the Exaquantum alarm management applications (ARA and AMD) had been implemented with a FAST/TOOLS solution on this scale. Integration of both Yokogawa solutions required enhancements for this project to ensure alarm system deliverables could be realised in these areas:

- Improve coverage of FAST/TOOLS alarm system to bring it closer to the coverage available for CENTUM VP.
- Bidirectional integrated ticketing system functionality (between FAST/TOOLS and Exaquantum ARA & AMD) for rationalization and management purposes was a main requirement in the alarm management system.

In addition, FAST/TOOLS also required some customization of the external database acquisition driver from ODBC sources to ensure data connectivity with the existing proprietary network was achievable.

Executive sponsorship and buy-in

As with the majority of successful projects, all stakeholders needed to buy-in to the solution to reach the desired outcomes. This was challenging at the beginning of the project with a customized solution that was greeted with some apprehension and trepidation by some of those in the project team. However, with Yokogawa's knowledge and experience in SCADA applications with FAST/TOOLS and alarm management implementations with ARA and AMD, any initial uncertainties soon disappeared as the project moved forward through each phase. The customer, bought-in to the solution, becoming more and more cooperative as they saw the benefits that could be reached. They invested more time and energy into the project which made it a hugely successful, remaining in budget throughout.

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Solution

The customer established a clear objective from the start of this project. They wanted an overview of each asset across a huge geographic area with intuitive navigation and accessibility, combined with alarm information and insights to improve their alarm management practices. It was also important to have an archive of historical information available, including trending of each field instrument that could be combined with advanced systems for extensive diagnostics. This information was required for the entire hierarchy (over 1,500 sites and assets) that was to be available from a centralised location. To meet the project requirements, Yokogawa included the following solutions:

Connecting Data

To connect data to vast deployment of distributed PLC's and control systems over a vast geographic region, FAST/TOOLS was selected. With an existing framework, sites were already connected via a proprietary system. FAST/TOOLS is able to reliably collect and normalize the data in a consistent format and made this information available to Exaquantum at a centralised facility at the customer headquarters.

Data Repository

Exaquantum collects, stores and processes alarm and events and process data from all assets and sites via FAST/TOOLS. Historical data is also available, with trending of each instrument in the field which can be combined with advanced systems for extensive diagnostics. This is available throughout the hierarchy, viewed at a granular or asset level, up the sector level, providing enhanced visualization of system performance.

Real-time alarms

FAST/TOOLS provides rich trend visualization capabilities for real-time as well as historical operational data. It presents a unified and normalized view of multiple areas-of-interest across all assets with real-time interactions including, alarm filtering from both current and historical alarm displays, alarm shelving or suppression and alarm eclipsing. With FAST/TOOLS you can specify alarms per user or group alarms per specific area, device or installation, ensuring users only see the alarms that belong to their area, role or responsibilities. In the event of an active alarm, predefined actions help guide operators to take the necessary steps and implement corrective measures.

Alarm Management

With Exaquantum ARA and AMD, Yokogawa's alarm management applications, alarm information is accessible via a web interface. ARA provides an alarm reporting and analysis dashboard for a comprehensive overview of alarm system performance. Problematic alarms are instantly visible for operators, and performance reports highlight overloaded sectors, quickly identifying areas of concern. With AMD, Yokogawa's master alarm database, the alarm champion and subject matter experts at central headquarters are able to assess problematic alarms and initiate reviews of the alarm configuration. Any changes implemented are fully auditable and traceable with documented evidence to keep track of modifications and adjustments to alarm parameters. Operators are able to stay in control of the alarm system and act in time to help keep people, facilities and the environment safe.

Benefits

Enhanced Alarm Visualization

With its vast network of more than 1,500 sites and assets, which were predominantly PLC's without a Human Machine Interface (HMI), they could not see clearly what was happening and had minimal visibility into problem areas. With this Yokogawa solution, detailed alarm visualization has been realised, improving how each and every alarm is now dealt with and handled, with enhanced view of all operational assets in a single location.

Improve Management of Change

With a centralised alarm system, alarm experts at the headquarters are able to access alarm information, with the tools available in AMD to be able to make changes to the alarm philosophy, optimise alarms and rationalise alarms as part of a continuous improvement process. Supporting internationally recognised standards for alarm management best practices including ANSI/ISA-18.2.
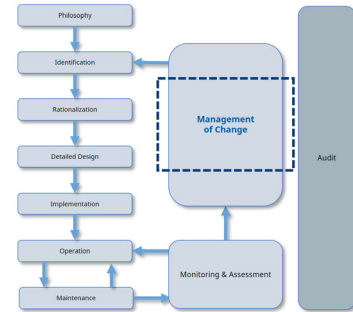
ANSI/ISA-18.2 Alarm Management Life Cycle

Alarm Reduction

With such a large system made up of PLC's and control systems from different vendors, it is now easier to monitor and handle the volume of alarms from a centralised location. Overall there has been a reduction in the number of alarms by targeting problematic areas with enhanced alarm information to make necessary changes. Alarm activities are recorded and stored in the database, which can be easily accessed to compare and review over time.

Increase Value

This solution has proved to be very valuable for the customer, with a more centralised view of their assets available at their headquarters. They have improved operations through the optimization of each system, including enhanced insight into the alarm situation, which was one of the key objectives for this project.

Project Scope

This was an ambitious project from the outset, with high expectations regarding alarm management, for a huge number of devices over a huge geographical area. For some bidders, meeting the expectations from the customer was difficult to achieve, with only three companies from those bidding able to meet the selection criteria. One of the key advantages for Yokogawa, was the capability to provide an integrated solution from a single vendor that fulfilled all project requirements. The other two companies selected, were reliant on additional third party suppliers to meet the project goals.

Like many projects in industrial automation, price was a major driver. With a single vendor solution, Yokogawa were in a unique position, with greater control over costs. It allowed us to remain within budget throughout the project, even when there were adjustments and modifications included, that were outside of the original project scope.

Combining and integrating two different Yokogawa solutions was required to meet the technical specifications. FAST/TOOLS and Exaquantum ARA and AMD required enhancements to ensure the project would be delivered and satisfy the high expectations. This enhanced interoperability provided a fully integrated solution, exceeding the original technical scope to allow alarm parameters, values and guide messages to be considered and implemented into the project.

Information Architecture

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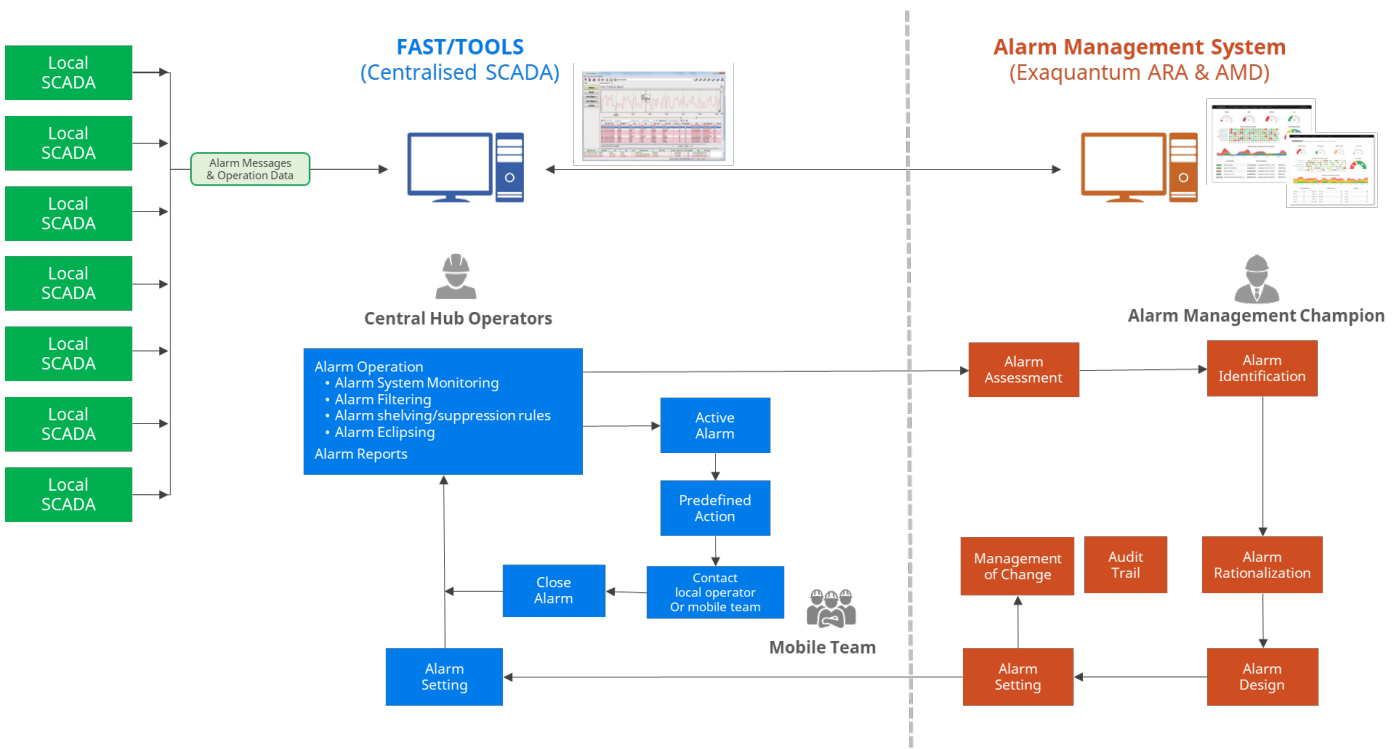
Key Takeaways

Centralised Alarm Management Solution

Yokogawa provided a unified and centralised solution at company headquarters, to handle and monitor alarms in real-time and to implement the best alarm management practices to improve the alarm system throughout its life cycle. This complex and versatile solution improves operations through optimization of each system combined with enhanced insight into the alarm situation throughout the entire hierarchy. Most of the systems consisted of PLC's from multiple vendors and no HMI so they could not see clearly what was happening – now they can. The customer is now able to effectively implement their alarm philosophy, optimise and rationalize alarms to help keep the environment, people and assets safe.

Project Size and Scale

This was a huge application for both the customer and Yokogawa, not only just in terms of the geographic area, but also in terms of the volume and variety of data that needed to be normalized and accessed from company headquarters. This project included more than 1,500 sites and assets dispersed across seven separate data hubs. Data collection was required from each individual asset from the different sites, with each data hub collecting and collating all this data from multiple PLC and control systems. There was vast amount of information being made available in the headquarters providing an overview of each asset with intuitive navigation and drill down into alarm information.

Collaborative FAST/TOOLS and Exaquantum

This project sets the foundations for large scale alarm management projects involving FAST/TOOLS and Exaquantum alarm management applications. Functionality and interoperability between Exaquantum ARA, AMD and FAST/TOOLS have reached new levels, providing an expansive and large scale and fully comprehensive alarm management solution to analyse and rationalise their alarm systems. Enabling the customer to better handle alarms in real-time and provide the full ISA-18.2 alarm management cycle, including a master alarm database to cover all aspects .

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