YOKOGAWA ◆

Co-innovating tomorrow ™

OpreX™ Control and Safety System

Alarm Management

To Enable Higher Stability and Safer Plant Operations

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Yokogawa provides alarm management to help increase the stability and safety of plant operations through well managed alarm systems.

Is a lack of alarm management causing problems in your plant?

- Your operational staff is often overwhelmed with alarms during abnormal conditions and they cannot correctly diagnose problems and perform corrective actions.

- Critical alarms often are overlooked and ignored.

- You cannot cope with the increase in the number and types of alarms as plant operations become more sophisticated and complex.

Reasons for difficulties to perform alarm management

- Alarm system design cannot be standardized and unified.

- The human-machine interface (HMI) of alarm systems does not allow you to find the necessary alarm quickly. Operators have difficulty to quickly understand the correct action to resolve the situation. The operator has no choice but to manually deal with multiple different operational states.

- Inability to evaluate alarm systems continuously prevents the establishment of an improvement cycle.

- Inability to manage alarm system changes results in missing changes and change errors. Lack of technical resources to implement an alarm management strategy.
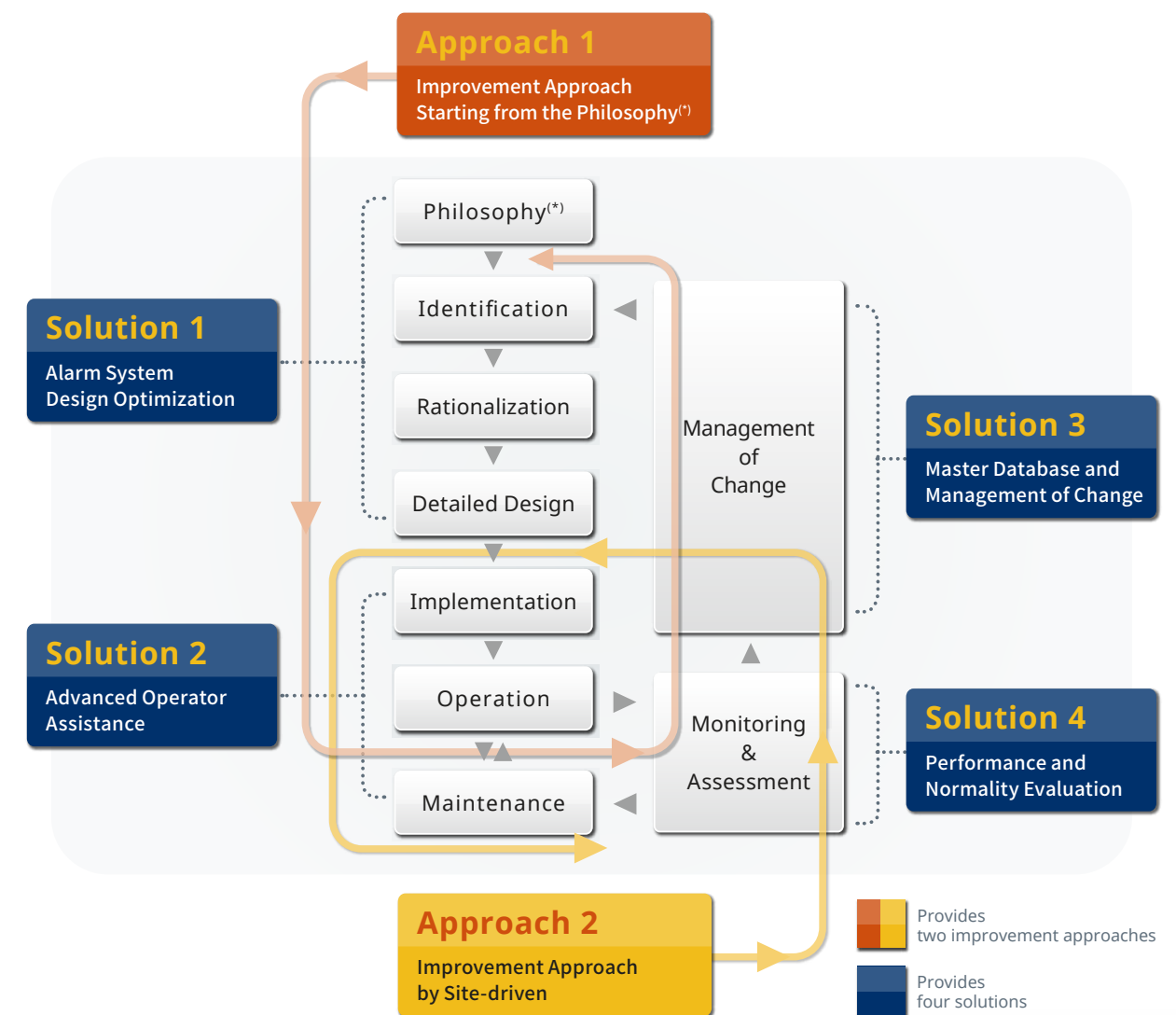
Yokogawa provides four solutions and two flexible improvement approaches to achieve well managed alarm system for end users.

- These solutions and approaches must be effective to improve the stability and safety for customers' plant operation.

- Yokogawa alarm solutions comply with the ISA18.2, the IEC 62682, and the EEMUA#191.
  — ISA18.2 : Management of Alarm Systems for the Process Industries
  — IEC 62682 : Management of Alarm Systems for the Process Industries
  — EEMUA#191 : Alarm Systems : A Guide to Design, Management and Procurement

Alarm Management is the continuous management, the standardization and unification of alarm-assisted operational management and techniques.

Alarm System is a human interface that constantly monitors processes and if abnormalities (abnormal conditions and failures) are found, notifies the operator with alarms to prompt for action.

Alarms notify the operator about plant abnormalities quickly to prompt for action, which is essential for the stability and safety of plant operations.

Approach 1 — Improvement Approach Starting from the Philosophy(*)

Solution 1 — Alarm System Design Optimization

Solution 3 — Master Database and Management of Change

Solution 2 — Advanced Operator Assistance

Solution 4 — Performance and Normality Evaluation

Approach 2 — Improvement Approach by Site-driven

Philosophy(*) → Identification → Rationalization → Detailed Design → Implementation → Operation → Maintenance

Management of Change

Monitoring & Assessment

Provides two improvement approaches

Provides four solutions

*) The Philosophy that establishes the basic definitions, principles, and processes to design, implement, and maintain an alarm system.

Case study of an accident caused by ignoring alarms

In a large petrochemical plant a trip occurred on a compressor. Two days' production was lost before the plant was put back on-line (cost around £1M). Also, components in the plant were damaged by the trip, and some months later the plant had to be taken off-line for an unscheduled outage to repair this damage. This outage cost about £12M, but other work was done during this outage, so not all the costs can be attributed to the trip. Six weeks prior to the compressor trip there had been an alarm for high axial displacement which the operators accepted but did not investigate. Three days prior to the trip there was a second similar alarm which also was not investigated. Subsequent to this incident a major drive to improve the alarm systems has been initiated at the plant.
Source: HSE Contract Research Report - The Management of Alarm Systems (1998)

Four Solutions

Yokogawa provides the best alarm management solution to
fit the needs of the customer using its knowledge, experience and tools.

Solution 1 — Alarm System Design Optimization

▶ **Alarm design optimization by utilizing Yokogawa collaborative consulting experience assisting organaizations to improve their alarm performance, technically and culturally; resulting in improved operations performance.**

▶ **Provision of seamless engineering to incorporate the alarm design into the production control system reducing the work load and time of the customer.**

• **Fundamental Nuisance Alarm Reduction Service**

A cross-functional team is formed with the customer to identify the root causes for the existing nuisance alarms and figures out the optimal solution for reduction.

• **ISA18.2/IEC 62682/EEMUA#191-based Alarm System Design Service**

Yokogawa designs alarm systems based on the hazard and operability (HAZOP) study (a process safety evaluation technique) and on the alarm system design standards, and builds production control systems based on the design.

<< Before rationalization >>   << After rationalization >>

Solution 2 — Advanced Operator Assistance

▶ **Standardization of all alarms enables the operation and monitoring of alarms in a single view, thus reducing the load on the operator.**

▶ **The visibility of important alarms can be increased and the efficiency of operation and monitoring can be enhanced.**

• **Integrated Alarm Monitoring Function**

The alarm sorting, filtering, shelving, and eclipsing functions facilitate reading the indicated alarms and events.

• **Operational State-based Alarm Management Service**

This service allows you to design optimized alarm thresholds and alarm suppression based on different operational states such as startup and brand switching and set them dynamically.
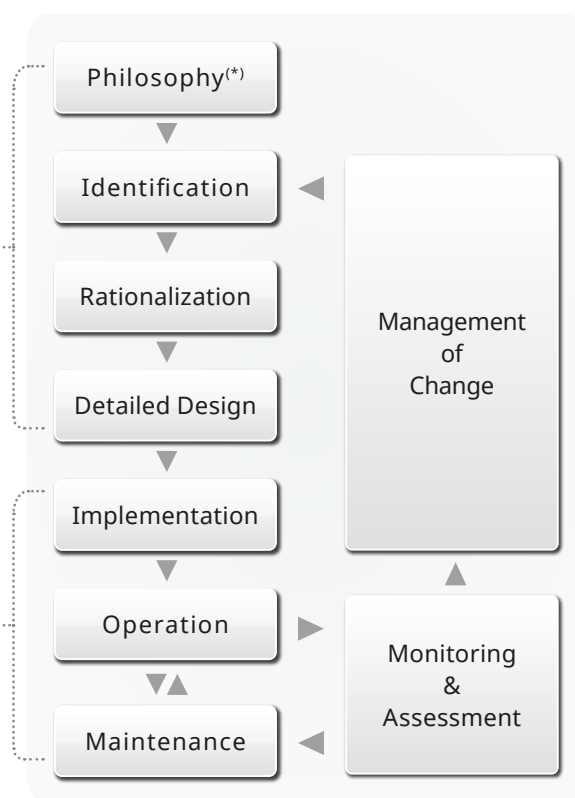
Solution 3 — Master Database and Management of Change

▶ **A large amount of information is managed in a single alarm master database to facilitate continuous alarm improvement.**

• **Management of Change Function**

This function keeps the history of changes and approvals and provides information for various plant functions on status of alarm improvement.

• **Alarm Change Management Service**

This service allows you to design the method to change the parameters and definition information as well as the privileges of change and approval.
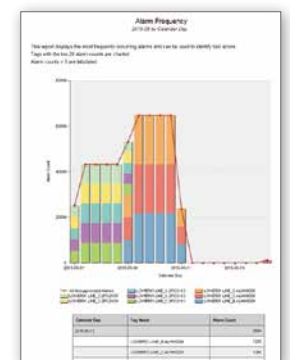
<< Engineering >>   << Operating >>

Evaluation
Recognition

Solution 4 — Performance and Normality Evaluation

▶ **A reporting and analytics environment that allows you to evaluate the alarm performance and soundness objectively and clarify target areas of improvement.**

▶ **E-mail reports are sent to you at constant intervals to support continuous alarm improvement.**

▶ **According to ISA18.2, IEC 62682, and EEMUA#191.**

• **Alarm Analysis and Report Function**

This function makes possible the standard alarm performance reports of various KPIs, such as Management, Operation, and Maintenance.

• **Alarm Performance Monitoring Service**

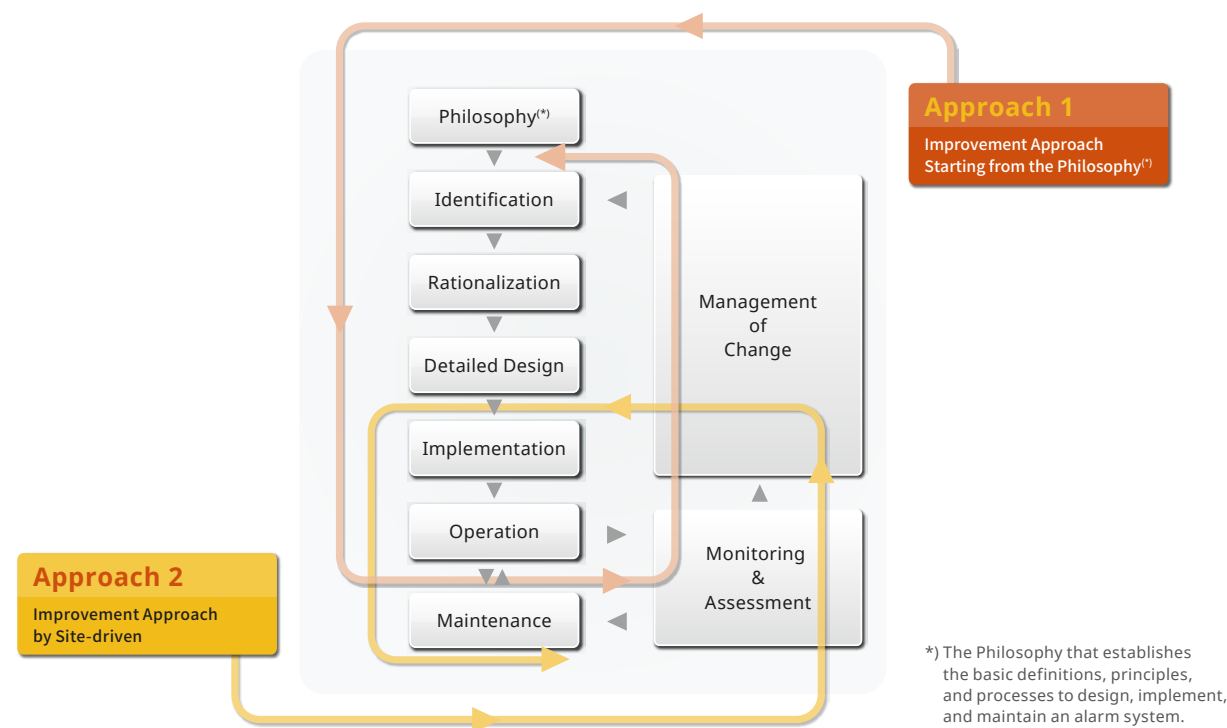In addition to the above function, you can design user custom-made reports and applying to system.

Philosophy(*)

Identification

Rationalization

Detailed Design

Implementation

Operation

Maintenance

Management of Change

Monitoring & Assessment

*) The Philosophy that establishes the basic definitions, principles, and processes to design, implement, and maintain an alarm system.

Two Improvement Approaches

Approach 1

Improvement Approach Starting from the Philosophy

▶ Yokogawa provides an improvement approach starting from the alarm design phase using a wide range of product and facility operations knowledge gained through many years of experience.

▶ This enables alarm system design to be implemented taking advantage of the results of the HAZOP study and performance analysis.

▶ In addition, use of Yokogawa's integrated solutions minimizes the costs for linking data between products and engineering, thus helping the customer to generate further profits.

Philosophy(*)

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Implementation

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Approach 1
Improvement Approach Starting from the Philosophy[*]

Approach 2
Improvement Approach by Site-driven

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Approach 2

Improvement Approach by Site-driven

▶ Yokogawa provides an improvement approach starting from the operation phase by utilizing a large amount of data gained through plant operations for the performance and soundness evaluation.

▶ Ability to identify alarm system problems more clearly compared to the operation and monitoring function alone makes it easier for the customer to carry out improvement activities.

Improvement Example : 01

Reduced 93% of alarms in 4 months for ethylene vinyl alcohol copolymer resin plant (5,000 I/O & 1,900 PID control loops)

Solution provided

- Fundamental Nuisance Alarm Reduction Service
- ISA18.2-based Alarm System Design Service
- Operational State-based Alarm Management Service

Results

- Reduced 93% of alarms in 4 months; from 19,241 alarms/day to 1,312 alarms/day
- Don't have to deal with nuisance alarms saving resources both monetary and personnel
- The problem of important alarms being turned off has been alleviated reducing potential risk
- Operators now have more time to attend to true process concerns

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Improvement Example : 02

Benefits of using alarm philosophy

Greenfield process — LNG plant that used corporate alarm philosophy document at early stages in the design

- Reduced alarm rationalization process time
- Reduced alarm rates during commissioning
- Complied with best practices recommended KPI's
- Overall improved safe operations in the plant

Brownfield process — Chemical plant that used Yokogawa's site customized alarm philosophy document

- Simplified and expedited alarm rationalization process
- Reduction in Plant downtime
- Improved alarm responsiveness and handling methods
- Overall improvement of safe operations in the plant

OpreX™

Through the comprehensive OpreX portfolio of products, services, and solutions, Yokogawa enables operational excellence across the enterprise.

Visit our website at:
https://www.yokogawa.com/solutions/products-and-services/
lifecycle-services/operation-and-maintenance-improvement/
alarm-rationalization/

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