

# An Alarm Management Infrastructure for Your Rockwell System

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July 2015



How long are you going to avoid implementing alarm management? Sure, a thorough and well-designed alarm & operator response strategy is needed, but what are the costs for the infrastructure going to be? The easiest way to kick a can down the road is to blurt out “So

what’s the ROI?” and then watch the crowd head for the exits. Getting a better operator response from your Rockwell alarm system doesn’t require you risk your life (or career) standing in front of a stampeding herd. Implementing best practice elements and enabling better access to alarm and event data from the RSView® and FactoryTalk® suite alarm system can only take a matter of weeks.

## What does Rockwell provide in the way of alarm management?

Quite a bit of alarm handling, but not everything for alarm management. Rockwell provides state of the art alarm handling capabilities:

**Table 1 Alarm Handling vs Alarm Management**

Alarm Handling Tools	Alarm Management Infrastructure Tools
✓ Roll-up/ Group-Based Suppression	✓ ISA 18.2 performance metrics and reporting
✓ Time Limited Suppression (Shelving)	▪ Annunciated Alarms per day/hour/10 minute time slice
✓ Counter-based suppression.	▪ Peak % metrics
✓ Matrix/State –based Alarming	▪ Alarm Flood
✓ HMI Design Tools	▪ Top 10 bad actor lists
✓ Alarm configuration integrated with libraries	▪ Chattering & fleeting identification
✓ Controller-based alarm configuration	▪ Stale alarm identification
✓ Server-based alarm configuration	▪ Annunciated & Configured priority distribution
✓ Full complement of Run-Time components.	✓ Operational metrics
✓ Alarm Breadcrumbs	▪ Time in Alarm, Time to Acknowledge, Time in a suppressed alarm state
✓ Alarm Banners	▪ Identification of alarm combinations
✓ Status Explorers	▪ Alarm performance by unit operation
✓ Some, Alarm KPIs: Average, Alarm Rate, Max Alarm Rate, % Outside limit	✓ Alarm Philosophy (technical guidance documentation based on best practice standards)
✓ Management of Change, Auditing	✓ Rationalization (optimized alarm design)

***Is Alarm Management a requirement that demands an infrastructure?***

The use of alarm systems is not a hard regulatory requirement. Specific references to alarm systems appear infrequently in regulatory documents but regulations are present. Since International Society of Automation issued the *ANSI/ISA 18.2-2009 Management of Alarm Systems for the Process Industries* in 2009, OSHA audits indicate that questions on the subject came up during inspections of plants. As alarm management questions are frequently coming up in audits, it is obvious that OSHA considers the ISA 18.2 standard to be “recognized and generally accepted good engineering practices” (RAGAGEP).

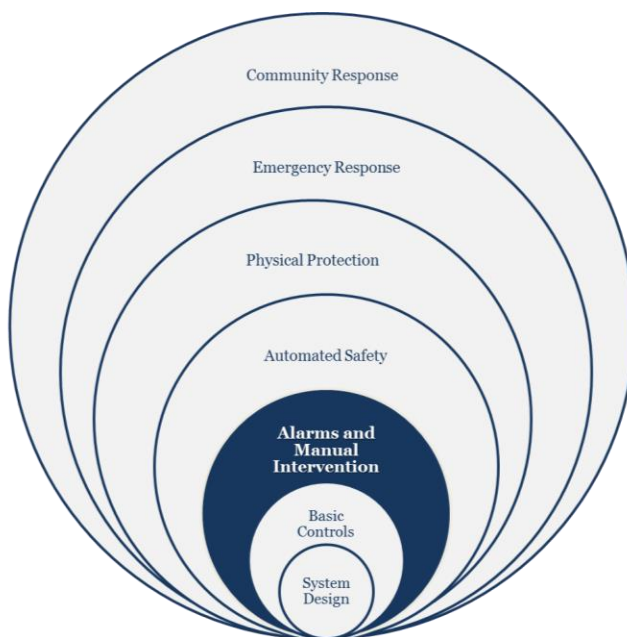
***But I am not a refinery or a chemical plant. Do these regulations apply to me?***

If OSHA applies to you, the answer is probably yes. If alarm systems are used to identify when processes have safety consequences or are exceeding regulatory compliance limits, then those alarm systems are expected to be configured and managed appropriately. Improving a safety layer of protection so close to the core of the process design is good safety practice. Alarm Management Lifecycle tasks, as defined in ISA 18.2 or IEC 62682, are all about configuring and managing alarms properly. Building the infrastructure to support those tasks is a key component to safely optimizing your plant.

With respect to regulated environments, inspectors review product quality related alarms during cGMP audits. In regards to Critical Process Parameters, you are probably already logging them. Systematic rationalization, an alarm management lifecycle task, and permanent documentation of aspects such as responses to alarms, adjustments to alarm limits, and measurement uncertainty are good engineering practice (FDA’s “Guide to Inspection of Computerized Systems in Drug Processing”).

***What if the concept of the alarm management infrastructure for the Rockwell System is viewed as overkill by the team?***

Let’s ignore for a moment that you have an extremely important role helping the company meet its duty to provide employees a workplace free from recognized hazards that can cause death or serious physical harm (OSHA 29 CFR 1910.119). Beyond incident reviews, an audit of alarm records is just good business practice. A better product quality alarm report or a list of inhibited alarms can augment your internal records and save time during internal reviews or responding to inspectors. Notification advisories (texts, emails, etc.) based on alarm activations for equipment without a native event notification system could save big money. The visibility and accountability delivered with regularly disseminated alarm system performance reporting will help stakeholders to follow procedures.



Beyond records archival and access, the lifecycle approach to alarm system technical guidance documentation improves the chances that production and process control procedures will be followed properly. The alarm management infrastructure approach will contribute to ensuring that the alarm system is doing what it is purported to do.

A master alarm database is a major piece of the alarm management structure. There will be a time when changes to a control system’s alarm attributes are considered. An easily accessed master alarm database with a

historic record of the rationale that went into specifying the alarm parameters will save lots of time, and possibly some heartache.

***How do we get the team to agree to make changes and create an alarm management system that reflects best practice?***

First, agree there is a problem, and then calculate the costs. Alarm requirements are typically not considered in detail during early phases of control system implementation. This oversight may have led to sticky issues like excessive nuisance alarms, which in turn can contribute to safety and environmental incidents, product quality deviations, and productivity losses. You may have decided that it is just the cost of business. Below are typical symptoms of an alarm system in need of attention.

**Table 2** *Symptoms of an Alarm System in Need of Help*

Technical Guidance Documentation Gaps	Alarm Activation Problems
✓ There is no plant wide alarm philosophy or design; No written procedures or policies on alarms. Alarm documentation is out of date.	✓ Significant operating upsets produce an unmanageable number of alarm activations.
✓ No clear guidelines for when to add an alarm and how to design it; i.e., anyone can create an alarm or change the limits on their own authority.	✓ Incidents or near-incidents where operators missed key data provided (or not) by the alarm system.
✓ There are no controls for removing existing alarms.	✓ Alarms going off and on regularly or intermittently (chattering or fleeting).
✓ Operating procedures are not tied to alarm activations.	✓ When alarms activate, the operator is not always sure what to do about them.
✓ No records or lost records of where alarm set points were placed; no history of modification.	✓ Seemingly routine operations produce an unmanageable number of alarm activations.
✓ Operators don't know the correct response of particular alarms or that there may be inappropriate alarms.	✓ Alarms are suppressed for excessive periods or for unwarranted reasons.
	✓ Some alarms remain active for long periods of time.
	✓ Many alarms during upset situations.
	✓ Alarm activations occur without need for operator action.
	✓ When nothing is wrong, there are active alarms.
	✓ A large number of high priority alarms are generated.

That’s quite a list. So what kinds of costs are generated from the problems above? Let’s consider some example assessments that could be applied to each symptom:

- A maintenance task whose cost is considered the price of doing business; Six Sigma “hidden factory”, activities which consume useful, positive energy that could be directed towards more profitable pursuits. Hourly rate multiplied by typical hours to perform task.
- A corrective procedure or process change whose cost is considered the price of doing business; “hidden factory”.

- An instrument or equipment impacted and the estimated cost of repair or replacement.
- A specific unplanned outage and the estimated cost of production (hours multiplied by average revenue per hour).

For each occurrence, investigate the cost surrounding the activity and you'll soon begin to see the financial gain of practicing alarm management.

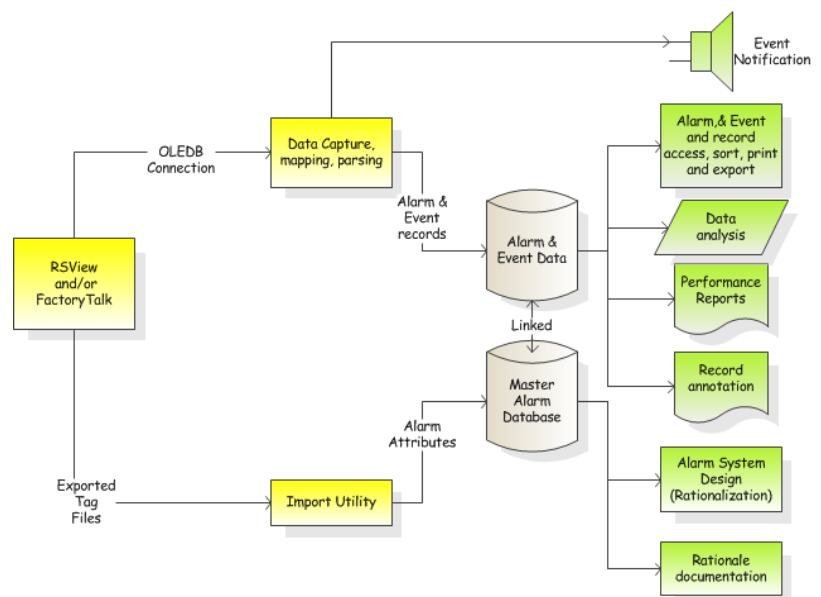
### ***How long will it take for me to implement Alarm Management into my system?***

- Alarm Management basic training - 2 days
- Developing the data to create a technical guidance document for the alarm system that meets best practices for both safety and quality alarms - 3 days.
  - Writing the first draft – A couple of weeks
  - Getting it approved ... You know your processes
- Implementing a centralized database of alarm and event records to enable performance metrics and/or better access for investigations - 2-3 days
- Creating a master alarm database of alarm configuration attributes - 1 day
- Training an alarm design (rationalization) team or a facilitator – one or two weeks of hands-on activity
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### ***How do we gather data from the Rockwell HMI?***

Fortunately Rockwell provided an easy foundation to collect alarm and event information. In the past few years, both RSView and the FactoryTalk Suite include an easily accessible alarm and event database. The database is stored in SQL Server and can be accessed in real time by third party applications such as the TiPS LogMate AMS Suite. Connection to the Rockwell alarm and event data is simply defining a read-only database connection string to access the specific alarm table. In addition the Rockwell system diagnostic events and operator changes can also be collected and analyzed.

To initially create your master alarm database, you would first export your existing tag (and alarm) configuration using the Tag Export Wizard. The wizard will generate multiple files based on the point type in your Rockwell system. LogMate provides an alarm import utility that read this exported tag files natively and extract information specific to your alarm system design. As changes are made to your Rockwell alarm system, the same export process will be used to show the changes in the alarm system and verify those changes are consistent to your overall alarm system design.



**Another third party application? What about cyber security?**

The LogMate product architecture has been designed to be flexible in any secured production environment. The production data is usually in a firewalled or disconnected environment from the business network. The LogMate data collection modules “push” the control system events and configuration to secure databases that are accessible by browser based technology requiring near zero administration on user client workstations.

As you consider an alarm management solution, some factors are applicable for all processes:

- Changes to your alarm system are going to happen in the lifetime of a control system.
- Not all control systems provide the analytic tools you desire for your operations.
- Operators are not always comfortable with change.
- Managers will always claim poverty and demand an ROI.



In a relatively short amount of time for a considerably low cost compared to an incident, outage, or “hidden factory” that is bleeding you steadily, you can implement alarm management. You can quickly improve access to the valuable data to support investigations and improved operations. If you would like more information or a demonstration on software to support your alarm management infrastructure using your own company’s data, click [here](#). If you would like consulting support for alarm rationalization integration and discuss developing technical guidance documentation which conforms to best practice standards click [here](#).

**Table 3 Definitions**

Definitions	
Alarm Flood	A condition during which the alarm rate is greater than the operator can effectively manage.
Alarm Philosophy	A document that establishes the basic definitions, principles, and processes to design, implement, and maintain an alarm system.
Chattering alarms	An alarm that repeatedly transitions between the alarm state and the normal state in a short period of time.
Nuisance Alarm (also called Bad Actor)	An alarm that annunciates excessively, unnecessarily, or does not return to normal after the correct response is taken.
Rationalization	The process to review potential alarms using the principle of the alarm philosophy, to select alarms for design, and to document the rationale for each alarm.
Stale alarm	An alarm that remains in the alarm state for an external period of time.