Key Engineering Solutions

OUR BREAD & BUTTER PROJECTS

Alarm Rationalisation Project

In modern control systems, alarms are generally software-driven and are essentially "very easy" to create for existing process variables. Little incentive to limit their creation has led to a lazy attitude toward alarms. A new alarm can be configured at the blink of an eye, and there has been a lot of eye-blinking lately.

THINK IMPROVEMENT, THINK KEY

What is the Challenge?

Alarm growth is a natural outcome of the increased information load and abstraction of the modern control system. However, if alarms are not dealt with in a disciplined manner, uncontrolled alarm growth can result, which can lead to out-of-control alarm systems. For us at Key, we tend to identify that an alarm system is out-of-control when:

- Nuisance alarms, often quite repetitive, flood the alarm system, taking away the visibility of genuine alarms. In these scenarios, an abnormal situation cannot be noticed and could lead to plant stoppages.

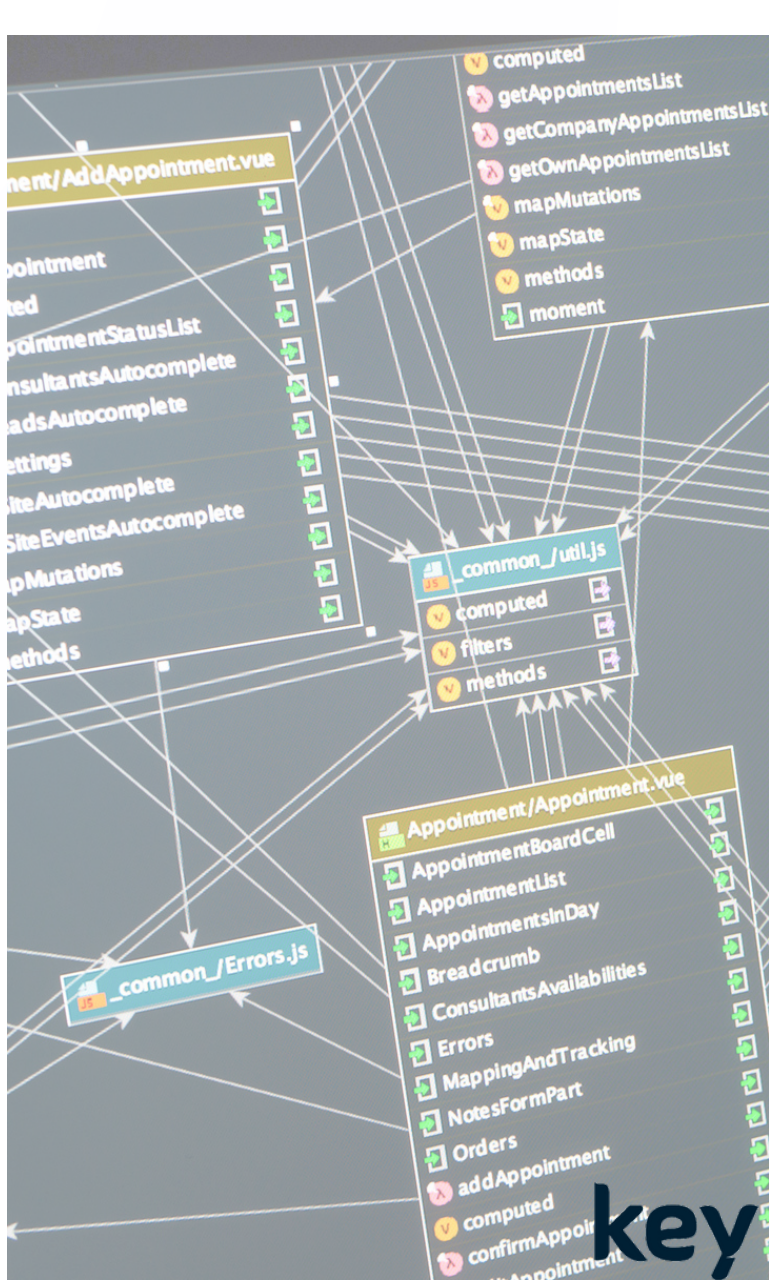
- A genuine alarm condition occurs but rather than triggering once, repeatedly resets and retriggers over a period of time.

- The alarm system is used just as a historical log of events. The cause of alarms is determined after the event is over, if at all.

- Most of the time, this alarm flooding leads to the whole system being ignored.

- There is a lot of repetitive and unnecessary alarms (i.e., alarms for low flow in a line that is offline, not required to run).

- No procedure or policy on alarm creation exists, i.e., anyone can create an alarm or change the limits on their own authority.



What good looks like?

At Key, we understand that the goal of increasing throughput, reducing cost and maintaining inventory levels in a productive environment is paramount. Every action we take is focused on achieving the overall goal of the organisation. With this in mind, a successful alarm system that provides real value within an operations environment should:

- Identify only issues that require a remediating action
- Convey the right information to enable an operator to act safely
- Improve Operator effectiveness
- Protect the plant equipment and process
- Reduce losses and downtime
- Enable better understanding of plant condition and how it is operated

The system itself must be sustainable in time therefore, it will be necessary to:

- Collect data and benchmark the alarm system
- Construct alarm management documentation
- Implement alarm management processes including:
  - Alarm rationalisation process
  - Alarm auditing
  - Real time alarm performance monitoring

Our Approach

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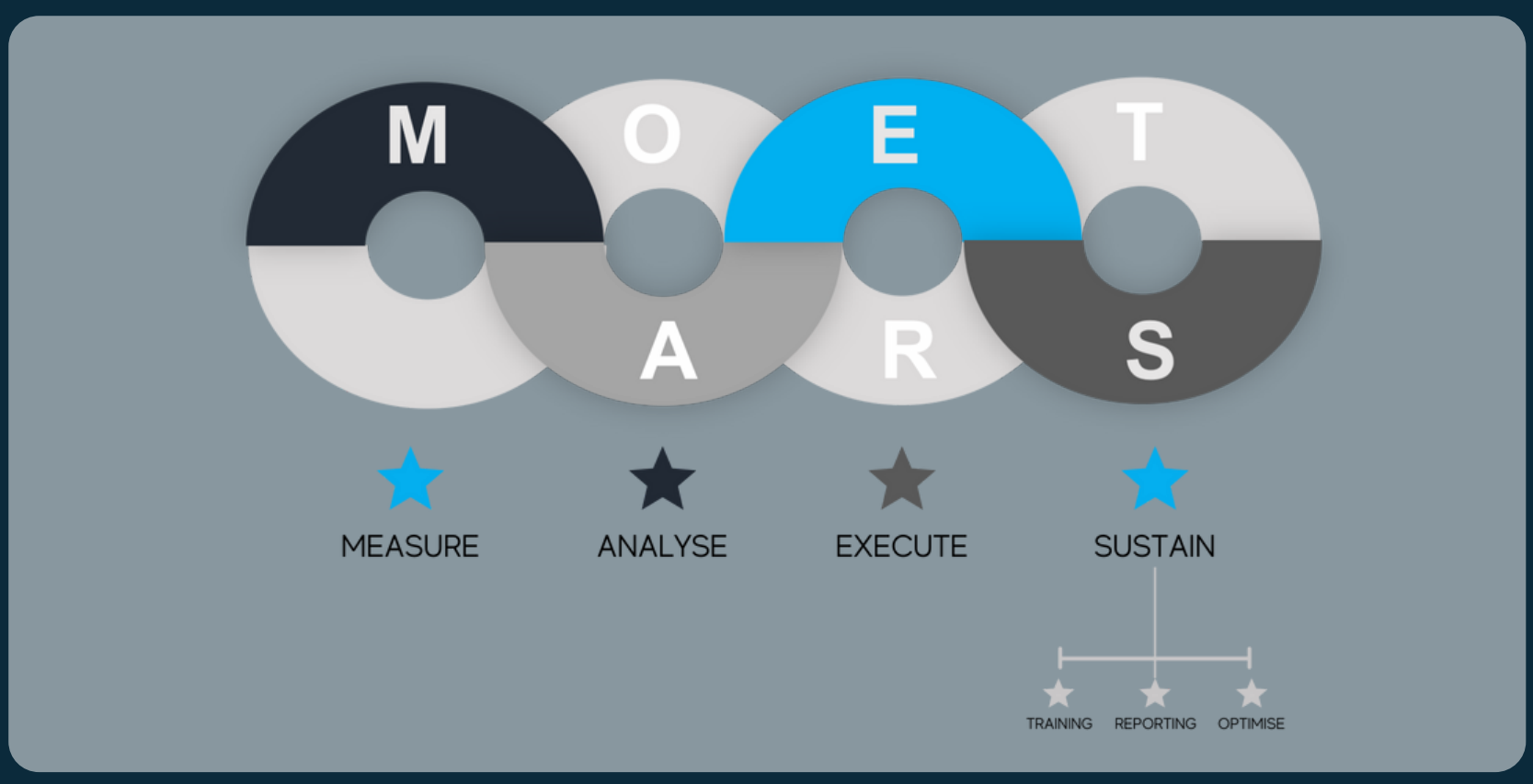
Alarm rationalisation is the systematic process of optimising the alarm programming and database for the safe and efficient operation of the facility. This process normally results in a reduction of the total number of alarms, the prioritisation of alarms, the validation of alarm parameters, the evaluation of alarm organisation and presentation, the evaluation of alarm functionality, etc.

At Key, we follow a holistic and pragmatic approach to alarm rationalisation known as the Maestro Approach. Whilst this approach will vary from company to company and plant to plant, the methodology generally consists of four basic steps. These steps are presented serially but in fact, can overlap or run in parallel in some cases.



Our Approach

1. Measure:

Develop Alarm System Metrics and Alarm procedure/philosophy

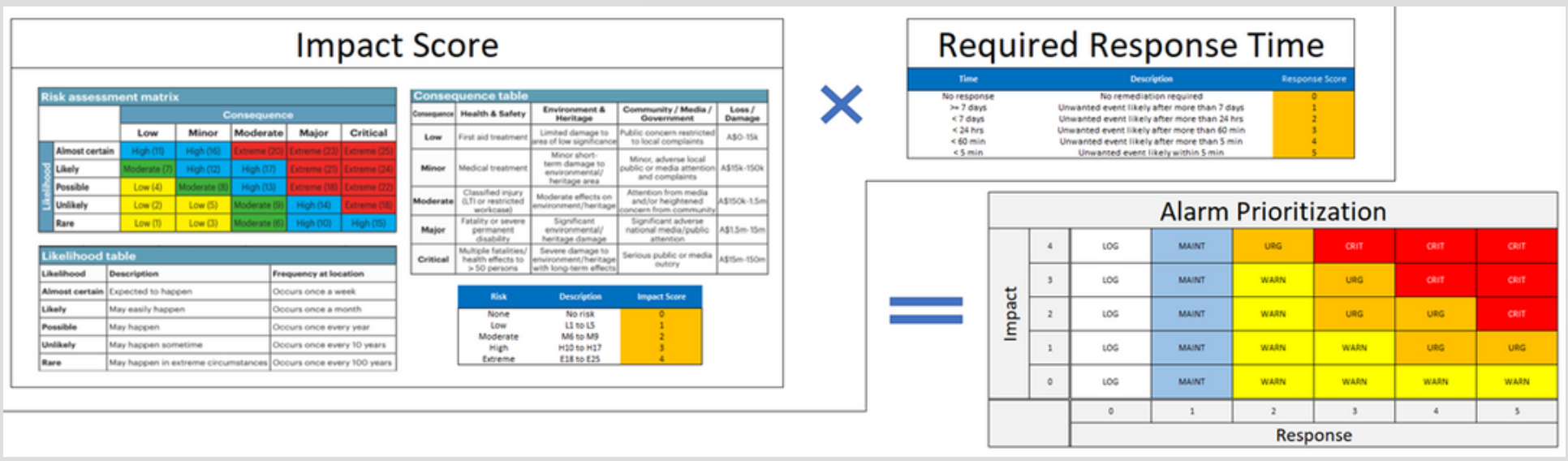
In this stage, we suggest defining what the true measure of success is for the overall performance of the alarm system. The average alarm rate is the most common alarm system performance metric and the ISA-18.2 standard suggest 6-12 alarms/hr/operator screen.

To measure the progress of alarm rationalisation, you need to develop alarm system metrics for your system. Typical metrics can be total number of alarms, alarms per operator, alarms per hour, alarms per identified abnormal situation, fraction of unacknowledged alarms, average time for an alarm to return to normal, average number of active acknowledged alarms, number of chattering alarms, number of standing alarms, number of nuisance alarms, number of disabled or shelved alarms, etc.

Additionally, consistent yet simple alarm management procedure/philosophy is necessary before beginning alarm rationalisation.

> Key Insight:
>
> Simplify and eliminate subjectivity of alarm definition.

The procedure typically contains a plant alarm philosophy, alarm type identification methodology (operational, safety, environmental, etc.), risk identification methodology and method of prioritisation of alarms, alarm functionality requirements (presentation, organisation, pre-alarms, operational time requirements, etc.), alarm filtering or suppression methods, identification of undesirable alarm types and how to handle them, methods of setpoint determination, testing requirements, alarm sequences, acceptable alarm metrics, documentation requirements, etc.



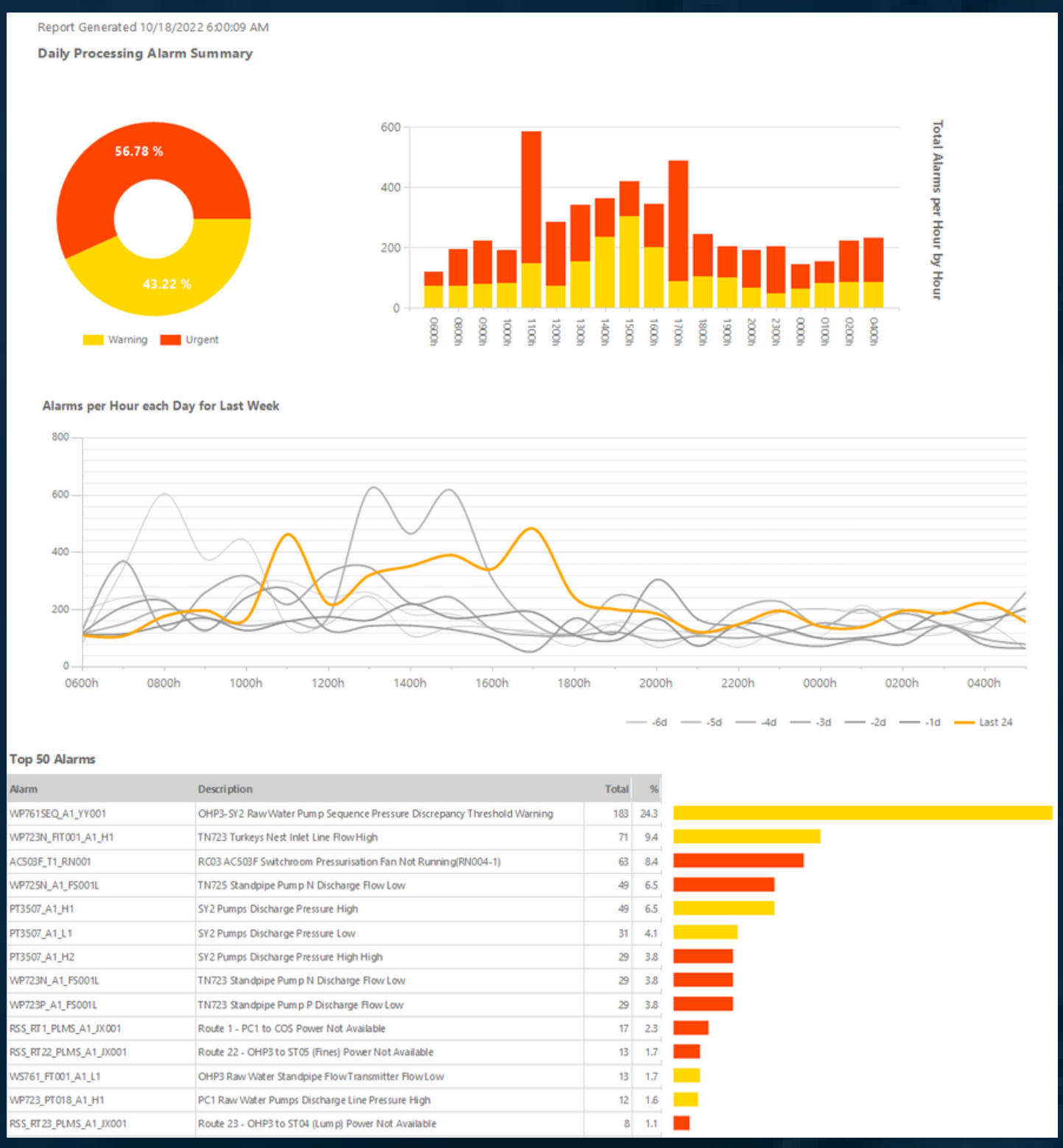
Our Approach

2. Analyse

Understand current benchmark and the potential improvement opportunities

If you don't measure, you don't improve. It is hard to measure your progress if you don't know where you start and where you end up.

In this stage, we will then measure against the success metrics we have identified and set in the previous stage.



Top 50 Alarms

Alarm	Description	Total	%
WP761SEQ_A1_YY001	OHP3-SY2 Raw Water Pump Sequence Pressure Discrepancy Threshold Warning	183	24.3
WP723N_FIT001_A1_H1	TN723 Turkeys Nest Inlet Line Flow High	71	9.4
AC503F_T1_RN001	RC03 AC503F Switchroom Pressurisation Fan Not Running(RN004-1)	63	8.4
WP725N_A1_FS001L	TN725 Standpipe Pump N Discharge Flow Low	49	6.5
PT3507_A1_H1	SY2 Pumps Discharge Pressure High	49	6.5
PT3507_A1_L1	SY2 Pumps Discharge Pressure Low	31	4.1
PT3507_A1_H2	SY2 Pumps Discharge Pressure High High	29	3.8
WP723N_A1_FS001L	TN723 Standpipe Pump N Discharge Flow Low	29	3.8
WP723P_A1_FS001L	TN723 Standpipe Pump P Discharge Flow Low	29	3.8
RSS_RT1_PLMS_A1_JX001	Route 1 - PC1 to COS Power Not Available	17	2.3
RSS_RT22_PLMS_A1_JX001	Route 22 - OHP3 to ST05 (Fines) Power Not Available	13	1.7
WS761_FT001_A1_L1	OHP3 Raw Water Standpipe Flow Transmitter Flow Low	13	1.7
WP723_PT018_A1_H1	PC1 Raw Water Pumps Discharge Line Pressure High	12	1.6
RSS_RT23_PLMS_A1_JX001	Route 23 - OHP3 to ST04 (Lump) Power Not Available	8	1.1

Key Insight: Create a dashboard with easily identifiable and actionable KPIs.

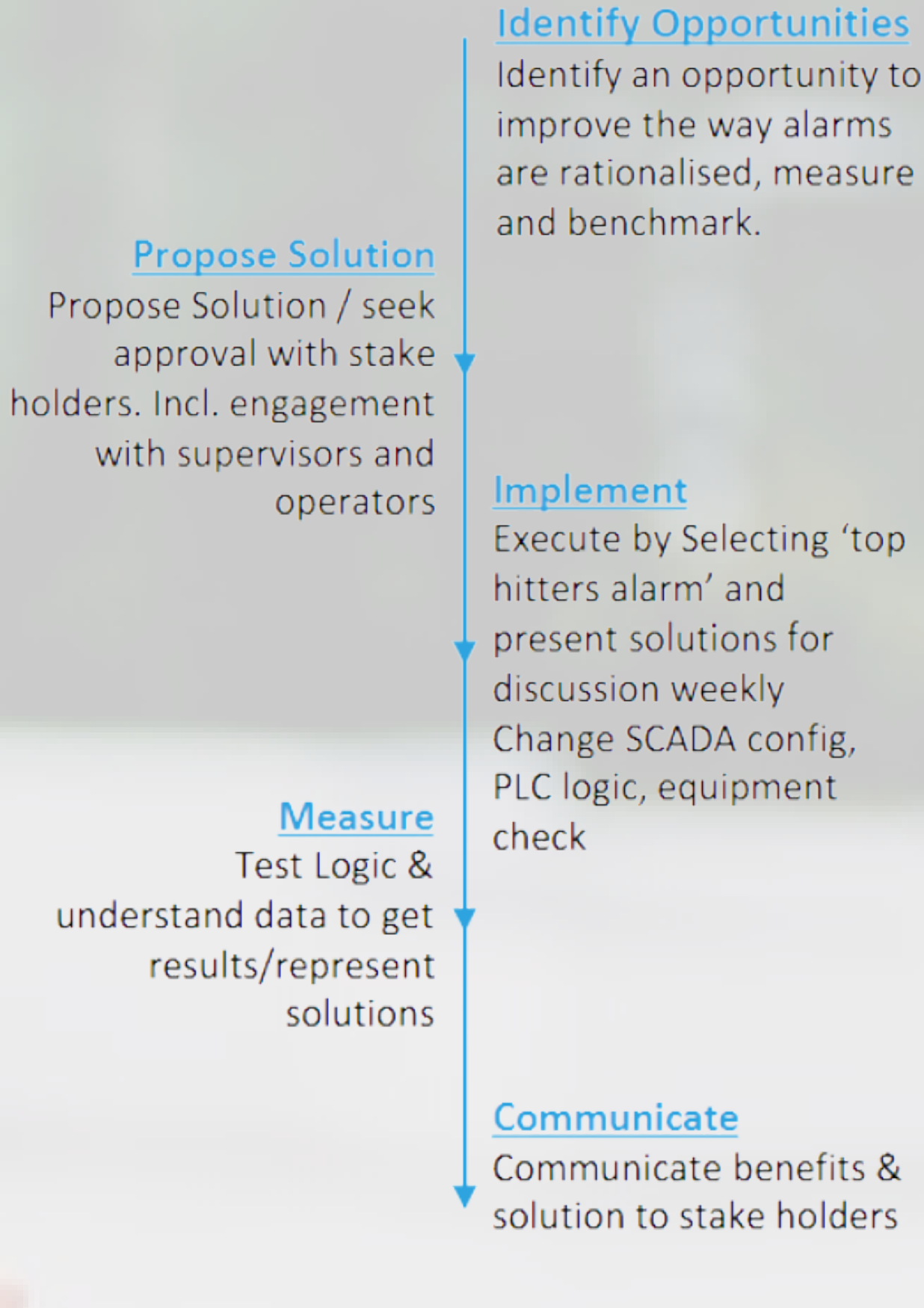
Our Approach

3. Execute

Implement the rationalisation

This is where the alarm rationalisation is implemented on the control system. While one might assume this is a simple step of modifying the control system as the result of the previous steps, it is not that simple. Since the rationalisation may add or remove alarms; change presentation, organisation, or setpoints; add or modify procedures; modify or add training; etc.; it is necessary to have an implementation plan that involves the operators and operating staff and other appropriate personnel.

Also, third-party software products for some control systems can enhance your alarm capabilities, but poor application can give you a worse system than you started with.



Key Insight:

In here a Holistic and systemic approach is required: It not only involves program changes on PLC and Configuration changes on SCADA, but also requires engagement and input from all stakeholders

Our Approach

4. Sustain by

Training, Reporting & further Optimising

A good audit process is necessary to ensure your alarm system stays manageable and in control.

- Benchmark the New Alarm System: Once the alarm rationalisation is implemented, benchmark the final product to determine the success of the rationalisation effort. (It also makes management happy to see the results of a successful project--they like numbers.) Do this by determining the alarm system benchmark metrics identified in step 2 (Analyse).
- Train maintainers and Operators: Don't forget the operators and operating staff interviews. These people will know about improvements that the mathematical benchmarking will not tell you.

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Alarm Rationalisation Project

Benefits to you

As mentioned before, a proper alarm system rationalisation exercise should result in three primary benefits: improved productivity, increased plant safety, and improved regulatory compliance.

Improved Productivity – Poor alarm system performance negatively affects operators and operations. It's one of the leading causes of unplanned downtime. Operators waste time dealing with the confusion caused by too many alarms and the unreliable information from nuisance alarms. Effective alarm management helps eliminate waste, improve processing quality, and increase productivity.

Increased Plant Safety – Alarm flooding impairs plant safety because of possible confusion when dealing with multiple nuisance alarms in short periods of time. Operators are uncertain about which alarms require priority response. Proper alarms meant to prevent plant incidents become ineffective in a flood of alarms. The 18.2 standard helps provide a blueprint for effective alarm management and increased plant safety.

Improved Regulatory and Best Practices Compliance – Implementing an alarm system that complies with the ISA 18.2 standard helps ensure a comprehensive and effective alarm management program to support and assist process system operators with ANSI/ISA best practices.

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Ready to get started?

We are ready to help

INFO@KEYENGINEERING.COM.AU