Alarm Management – Next Level

“

Wouter van der Waa

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- Material & Corrosion R&D
- Refinery/Chemicals Operations
- Global alarm management implementation
- Operational Excellence Advisor
- Operations Assurance

Alarm Management – next level

Where do we come from (in alarm management)

How does the “next level” look like?

What could possibly go wrong?

Where do we come from?

In the old days; operators “walking the panel” keeping an eye on trends, a limited number of configured alarms. Adding alarms was costly (hardware changes).

Where did we go to?

DCS and SCADA systems; operators lost the “touch” with the process; graphical presentation of the early generation systems was limited.
Operators preferably used group presentations of process parameters.
Adding alarms was easy by a simple software change. This led to a more reactive operational mode and higher alarm rates.

Where are we now?

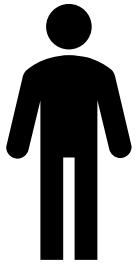
The EEMUA 191 philosophy (and other standards at later stage) brought a new perspective: alarms were prioritized to potential consequence and time to consequence. This provided the operator better information to take decisions and actions.
In addition, the “proactive monitoring” concept was introduced displaying sets of key process parameters with their limits.

In other words; less configured alarms, operators more in touch with the process

Alarm Management – Next Level
there is no single “silver bullet”

All aspects of good alarm management must be in place!

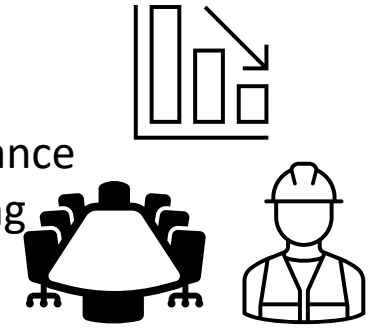
LEADERSHIP



Leadership/
Ownership
Goal setting

MEASURE & IMPROVE

Alarm KPIs
Bad Actor Process
Fast Track Maintenance
Proactive monitoring

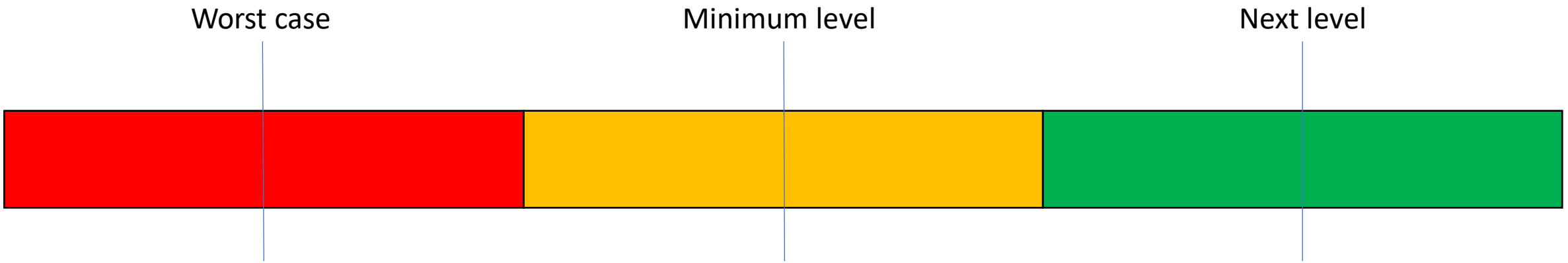


FUNDAMENTALS

Master Alarm Database
Operator actions etc.
Alignment with DCS
Overrides
Shelving

Alarm Management – Next Level

The performance spectrum – where are you now?



15,000 alarms/hour
>1000 standing alarms
audible alarms
silenced

6 alarms/hour
1 page standing
alarms

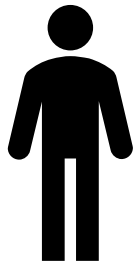
<1 alarm/hour
no standing
alarms

Row Labels	Count of descr
11PDIA-051B/ Clean Strainer	1363
12ALARMSDB NEW_ALM New Arm/SD Pre B NR	800
12ALARMSDA NEW_ALM New Arm/SD Pre A ALM	800
12ALARMSDA NEW_ALM New Arm/SD Pre A NR	799
12ALARMSDC NEW_ALM New Arm/SD Pre C ALM	799
12ALARMSDC NEW_ALM New Arm/SD Pre C NR	799
12ALARMSDB NEW_ALM New Arm/SD Pre B ALM	799
%AN0424S021001 25QZA-023 Prewarning NR	537
%AN0424S021001 25QZA-023 Prewarning ALM	536
%AN0425S021001 25QZA-001 Beam Block NR	164

What brings us to the next level

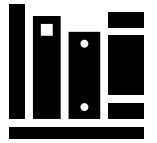
LEADERSHIP

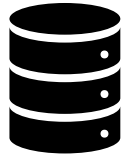
- Ownership: “What interests my boss fascinates me”;
- Process Safety Policy: Our assets are safe and we know it instead “we believe so”
- Target setting;
- Mindset change (alarms are not “normal”);
- Release staff (and budget) to engage;
- Resolve structural problems;
- Patience, after quick wins it will take time and effort.



THE FUNDAMENTALS

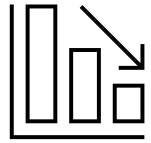
- One single Master Alarm Database, Operator actions linked to DCS alarms;
- Alarms are prioritised on potential consequence and time to consequence;
- Active alignment of DCS and Database (deviation reports / enforcement);
- Strict rules on overrides and shelving;
- A structured shift handover process;
- Well managed project /plant change handovers.

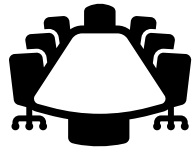




What brings us to the next level

MEASURE AND IMPROVE





- Alarm analysis software providing easy access to statistics;
- Well defined KPIs;
- Control on waterbed effects (alarm rate versus overrides);
- An active Bad Actor process;
- Fast track maintenance to resolve small problems;
- The “sterile cockpit” → the control room as an area without unnecessary distractions;
- Proactive monitoring (trends with limits);
- Optimised Human Machine Interfaces (HMI);
- Promote to have all controllers on “AUTO”, “CASCADE” etc.;
- Instrument tuning;
- Alarm suppression (e.g. standby equipment).

What will prevent us reaching the next level?

- Lack of ownership;
- No dedicated resources;
- Modern instrumentation can potentially generate more alarms than ever;
- Unfinished projects which are pushed to be accepted by operations;
- Lack of maintenance on systems and instrumentations;
- General distractions in the control room (other activities, coffee corner etc.);
- WhatsApp, Facebook, Instagram, TikTok, Netflix, or smartphones in general;
- Unlimited (& eternal) shelving;
- Lack of handover of information from shift to shift;
- Misconception that software will resolve all problems (it doesn't);
- Running on manual, safeguarding overrides;
- Pushing production records "whatever it takes" (forcing operators to run in alarm);

Concluding remarks

- Ownership, ownership and more ownership;
- Short term small improvements are relatively easy to achieve but those will not last. To maintain a sustainable high performance is a challenge, you will have to change the fundamentals of the way of working;
- If you are offered a software tool which will resolve all problems; be prepared to be disappointed, all three alarm management aspects need to be in place;
- Invest in time and people to drive the change. Maintain a dedicated effort to sustain the performance.

ANY QUESTIONS?

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Back-up slides

Not just in the energy sector (1)

Alarm load in Intensive Care Units is a serious problem. In one case the IC nurse tuned the sound off and did note observe emergency alarms which resulted in the death of a patient.

‘The boy who cried wolf’, how can we solve alarm fatigue on ICU?

In Intensive Care environments, alarms function as 'attention redirection systems'; they let a nurse or doctor know that a patient might be in need of urgent or additional care. In practice, however, there are simply too much alarms. That is when ‘the boy who cried wolf’-effect comes into action: alarms are not taken as seriously as they should.

> “ In a NICU you will sometimes hear hundreds of alarms every hour. That's a lot of noise, and it's impossible to react to them all.
>
> **Rohan Joshi**
> Scientist

Source: Philips ,September 2020

Not just in the energy sector (2)

In July 2013 a train driver, in a (private) call on his cell phone, ignored speed limits (driving 190 km/hr, limit was 80 km/hr). Consequently, the high-speed train de-railed in a bend near Santiago de Compostela. This resulted in 79 fatalities and 130 wounded passengers.

Source: OVPro.nl

Not just in the energy sector (3)

Top 10 – main causes of car accidents

1. **Smart Phones**
2. Car audio
3. Eating/drinking
4. Distractions (e.g. accident sites)
5. Alcohol
6. Drugs / medication
7. Distracting activities (searching items, shaving, make-up etc.)
8. Exceeding speed limits
9. Reckless driving
10. Poor road quality

Source: Dutch Insurance statistics 2010

GENERAL BACKGROUND (1)

Events which contributed in the development of a new approach in alarm management:

- Milford Haven Incident (1994); operators lost overview during a process upset partly due to an overload of alarms (see next slide).

- EEMUA - Alarm Systems, A Guide to Design, Management and Procurement - PUBLICATION No 191 (1999)
  This document puts the operator in a key position. Alarms should:
  - be relevant to the operator's role at the time;
  - indicate clearly what response is required;
  - be presented at a rate that the operator can deal with;
  - be easy to understand.

GENERAL BACKGROUND (2) Milford Haven ‘94

- Due to a very high alarm load operators did not notice an important valve was blocked in the closed position;
- Repeated attempts to restart the plant led to accumulation of liquids in the flare system which mechanically failed;
- The release of a large volume of hydrocarbons resulted in a large fire.