AI-ASSISTED DYNAMIC ALARM PRIORITIZATION & ROOT-CAUSE IDENTIFICATION

FROM ALARM FLOODS TO ACTIONABLE DECISIONS



THE PROBLEM IS NOT TOO FEW ALARMS.
IT IS TOO LITTLE UNDERSTANDING.

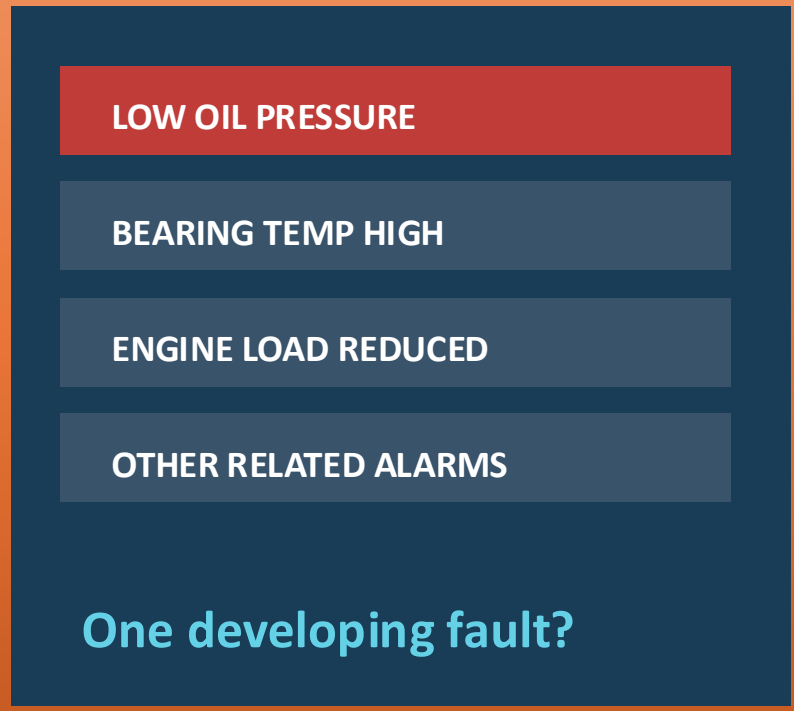
Dr John Kokarakis

GREENER SUMMIT • NOVEMBER 2026

AI assisted alarm prioritization

A clearer picture during an alarm flood

Which alarm needs action first?
What is causing the problem?



Dr John Kokarakis
Greener Summit · November 2026

ONE FAILURE. MANY ALARMS.

A single event can trigger a cascade of alarms across the system.

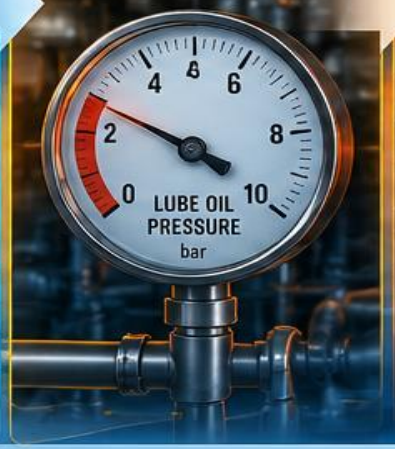
ROOT CAUSE

Lube-oil pump degradation



FIRST DETECTED ABNORMALITY

Low lube-oil pressure



PRIMARY EFFECTS

Bearing temperature ↑



Vibration ↑



SYSTEM CONSEQUENCES

Slowdown
Load reduction
Secondary alarms



ALARM FLOOD

Multiple consequential alarms

- LO PRESS LOW
- BEARING TEMP HIGH
- VIBRATION HIGH
- ENGINE LOAD REDUCTION
- EXH GAS HIGH
- T/C SPEED HIGH
- FO SPEED FO RACK LIMIT
- GENERATOR LOAD TRIP
- MAIN ENGINE SLOWDOWN
- CYL EXH TEMP HIGH
- CONSUMER TRIP
- PMS POWER IMBALANCE
- COOLING WATER TEMP HIGH
- FUEL TEMP HIGH
- START AIR PRESS LOW
- MULTIPLE OTHER ALARMS

1 ROOT CAUSE → **1** FIRST DETECTED ABNORMALITY → **FEW** PRIMARY EFFECTS → **SEVERAL** SYSTEM CONSEQUENCES → **20+** CONSEQUENTIAL ALARMS

THE FIRST ALARM TELLS YOU WHAT HAPPENED.

THE ROOT CAUSE TELLS YOU WHY.

STATIC PRIORITY ≠ OPERATIONAL RISK

SAFER SHIPS
SMARTER DECISIONS
GREENER OCEANS

SAME ALARM
DIFFERENT CONTEXT
DIFFERENT RISK

MAIN ENGINE LOW LUBRICATING OIL PRESSURE ALARM
Configured Priority: **HIGH**

HARBOUR MODE
VESSEL ALONGSIDE BERTH



Engine Load:
20%

Bearing Temperatures
Stable

Vibration
Normal

OPERATIONAL RISK
LOW

MANOEUVRING IN RESTRICTED WATERS
APPROACHING PORT



Engine Load:
95%

Bearing Temperature
Increasing

Vibration
Increasing

OPERATIONAL RISK
CRITICAL

THE AI-ASSISTED DECISION LOOP

From data to actionable insight – in real time

1 SENSE

Sensors • alarms • trends



Temperature · Pressure · Vibration · Flow

2 UNDERSTAND

Operating context



- **Operating mode** — Sea / Port / Load condition
- **Equipment status** — Running / Standby
- **System dependencies** — Cause–effect links
- **Sensor trends** — Real-time and historical

3 PRIORITIZE

Risk right now

AI

- High risk – ACT NOW
- Medium risk – WATCH
- Low risk – MONITOR

4 EXPLAIN

Probable root cause

Lube-oil pump degradation (87% confidence)



Flow ↓

↓

Lube-oil pressure ↓

↓

Lubrication margin ↓

Bearing temperature ↑ | Vibration ↑

5 ACT

Operator decision

ACT NOW
Lube-oil pressure deteriorating

Probable cause
Pump degradation (87% confidence)

Recommended check
- Verify pump operation
- Check standby unit
- Inspect suction strainer





AI DOES NOT REPLACE THE ENGINEER.
IT GIVES THE ENGINEER A BETTER PICTURE, EARLIER.

EARLIER INSIGHT. SAFER OPERATIONS.

The engineer keeps control



AI proposes

- Possible cause
- Supporting evidence
- Uncertainty

Engineer decides

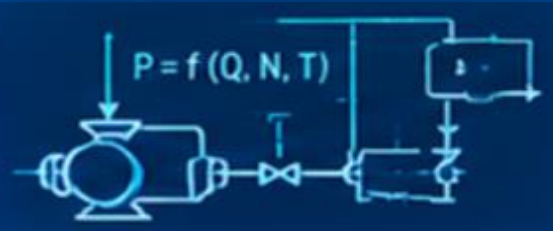
- Check pump status
- Verify pressure
- Assess standby readiness

Urgent protective action must never wait for an AI diagnosis.

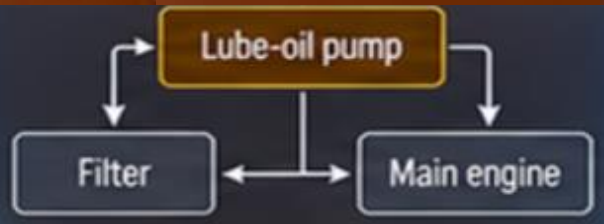
HOW THE AI WORKS

A hybrid approach: physics + system knowledge + data + AI

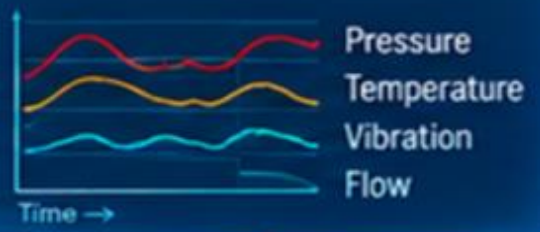
1. PHYSICS



2. SYSTEM KNOWLEDGE



3. DATA



4. AI ANALYTICS



REAL-TIME SENSOR DATA
(Existing instrumentation)

AI INFERENCE ENGINE
Combines physics, system logic, data and AI to identify the most probable causes and assess risk

PROBABLE ROOT CAUSE and RISK ASSESSMENT

- Risk level (now)
- Most probable cause
- Supporting evidence

AI DOES NOT REPLACE ENGINEERING KNOWLEDGE.
IT USES IT - TOGETHER WITH DATA – TO PROVIDE A RISK-BASED EXPLANATION.

A clearer picture gives MORE time to act

Connect related alarms

Explain the likely cause

Keep the engineer in control

TAKE HOME POINTS

From alarms to action – a safer, smarter and more resilient ship







AVOIDED CONSEQUENCES



CONTINUOUS LEARNING



HUMAN OVERSIGHT REMAINS ESSENTIAL

