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White Paper 1: Operational Excellence, Process Safety, and the Human Interface

Learning from Global Incidents to Build Safer, More Reliable Operations

Introduction

Over the course of my career, I have investigated and supported investigations into numerous industrial incidents and accidents across multiple countries and sectors, particularly within chemical manufacturing and complex process industries. While the technical details of these events differ, a consistent pattern emerges: the underlying and root causes are remarkably similar.

Serious incidents are rarely the result of a single equipment failure or isolated human error. Instead, they arise from the interaction between operating culture, site leadership, management systems, and the way people are required to interact with complex process technologies. When these elements are poorly aligned, the consequences extend far beyond safety — affecting reliability, product quality, staff morale, and regulatory confidence.

As control systems, advanced HMIs, and artificial intelligence become increasingly embedded in operations, these risks are growing rather than diminishing. Technology that is intended to improve performance can, if poorly designed or introduced without cultural readiness, actively create new failure modes.

Example: When Alarm Systems Defeat Themselves

One story I often share comes from my time working as a plant manager, newly appointed to an existing facility that had recently undergone a major upgrade to a new distributed control system (DCS).

While spending time in the control room, I became aware of a very faint but persistent beeping sound in the background. I asked the operators what it was. They looked at one another, hesitated, and then said, “We’d better show you.”

They then opened a cupboard in the control room, beneath the control console. Inside was a very large, tightly wound ball of bubble wrap. As they began unwinding it, the beeping sound grew steadily louder — until it finally revealed the source: an alarm siren so loud it was physically unbearable.

During the DCS upgrade, the alarm and associated siren had been installed on virtually every instrument on the plant. Every alarm had been configured with the same priority, the same sound, and there was no volume control. The result was a constant, overwhelming noise whenever the plant deviated even slightly from normal operation. In some cases, an alarm was not even necessary.

From the operators' perspective, wrapping the siren in bubble wrap was not negligence — it was a coping mechanism; a workaround for a system that was badly designed. The alarm system, intended to improve safety, had become unusable. It had trained people to suppress it rather than respond to it.

This is not an isolated example. It is a classic illustration of how poor alarm management, inadequate human–machine interface design, and a lack of operational empathy can quietly undermine both safety and performance.

The Problem We See Repeatedly

Across sites that struggle with safety, reliability, or quality, common themes include:

- Reactive operating cultures
- Production pressure overriding process safety intent
- Weak ownership of operational risk
- Poorly designed or poorly understood HMIs
- Technology implemented faster than organisational capability
- Failure to embed learning from incidents and near misses

These conditions do not just lead to major accidents. They create chronic instability — unplanned downtime, off-spec product, and exhausted operators forced to work around flawed systems.

Our Approach

We support organisations through:

- Incident and Failure Investigation – identifying systemic and cultural contributors
- Process Safety & Operational Risk Reviews – focusing on how decisions are really made
- Alarm, HMI & AI Interface Assessment – ensuring systems support human performance
- Operational Excellence Improvement – stabilising quality and reliability
- Culture & Leadership Development – aligning safety, production, and learning

What Makes This Consultancy Different

This work is grounded in real plants, real incidents, and real consequences — not abstract models. The focus is on practical, implementable change that respects how sites actually operate.

Next Steps

If your organisation recognises these challenges, a confidential discussion can help identify where improvement will deliver the greatest impact on safety, reliability, and operational performance. Contact us at info@rogerstokesriskservices.com.