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Turning data into action: AI's role in anticipating and preventing serious harm

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Despite unprecedented analytical capability, many organisations remain blind to emerging exposure because their data describes what happened rather than what is about to happen. AI can transform heterogeneous data into actionable, prevention-led insight that sharpens priorities and accelerates early intervention. The result is a step-change in operational intelligence: moving from analysing incidents to actively preventing serious harm.

Over the past decade, safety and operational risk leaders have built powerful analytical capabilities. Data pipelines have multiplied, and dashboards have proliferated. Visibility has improved, and reporting is faster than ever. Yet, in many high-hazard industries, serious incidents and high-potential near misses persist.

This reveals a deeper issue: organisations are not lacking data or analytical capability. The real challenge is that most analytics are designed to describe what has already happened, not to change decisions early enough to prevent harm.

The problem isn't the collection or processing of vast amounts of operational data. True insight exists only when analysis changes a decision in time to prevent an event - anything else is simply reporting. The value of true operational intelligence lies in prompting earlier, better decisions that actively reduce exposure.

"Most organisations don't have an information problem. They have a translation problem - turning warning signs into decisions soon enough to matter."

David Pereira
Global Managing Director, Digital, dss+

The paradox: more visibility, less foresight

Many organisations can readily list fatalities, TRIR (Total Recordable Incident Rate), near misses, and corrective action closure rates. These metrics provide baseline visibility, but they do not reveal where serious risk is actively building.

The real risk is not a lack of data, but a false sense of control. As analysis becomes faster and more comprehensive, it can reinforce confidence without improving foresight. Dashboards expand visibility, but they rarely change where leaders focus or how decisions are made. Without integration, context, and a clear line of sight into control effectiveness, analytics might create a comforting narrative while exposure quietly persists. Insight is only valuable if it changes a decision early enough to reduce exposure. If it does not alter priorities or trigger action, it remains reporting, regardless of how advanced the analysis appears.

Where analysis falls short

In practice, three structural gaps prevent organisations from translating data into foresight:

- **Volume masks exposure:** Weak indicators of control degradation are buried within large volumes of routine reporting, making emerging risk indistinguishable from normal operational variation.
- **Context is missing:** Patterns that suggest rising exposure are not linked to the operational conditions required to interpret them, leaving leaders unsure whether to act.
- **Decisions arrive too late:** Even when risk becomes visible, it often reaches the wrong level of the organisation or arrives after the window for effective intervention has passed.

In these conditions, organisations are equipped with analysis but lack foresight. Their data describes what happened yesterday but offers no guidance on how to reduce exposure today.

"The step-change isn't building more complex data models. It's ensuring the right person receives the right signal, armed with the context and authority to act before critical controls degrade."

Shannan Poteran
Senior Manager, Digital, dss+

What effective insight enables

When analysis is intentionally structured to generate decision-relevant insight, it fundamentally changes how organisations perceive and manage risk.

Rather than focusing on activity totals or event frequency, leaders gain clarity on where Serious Injuries and Fatalities potential (SIFp) is genuinely increasing. This distinguishes routine operational bumps from the precise conditions that lead to severe harm, enabling leaders to prioritise resources based on consequence rather than sheer volume.

By identifying subtle indicators of control drift and surfacing them in a clear, contextualised way, organisations can intervene when their options are widest and the potential impact is lowest.

Incident analytics: from KPIs to actionable insights

Traditional safety KPIs - inspection counts, incident types by frequency, and near misses - offer essential visibility but remain fundamentally descriptive. On their own, they cannot explain where serious harm is most likely to occur next, which specific controls are degrading, or why exposure is rising within a specific work group.

A prevention-led approach requires interpreting incidents within their operational context and linking them directly to the safeguards intended to prevent harm.

dss+*360* enables this shift by enriching raw incident data with vital context: asset criticality, task characteristics, contractor involvement, and critical control mapping. Instead of ranking issues by count alone, risks are prioritised by their true SIFp profile.

This produces a picture fundamentally different from a traditional dashboard:

- Leaders see a ranked heatmap of top exposures, with high-potential events clearly highlighted.
- They can pinpoint leading indicators of control degradation - whether that means bypassed interlocks, overdue verifications, or declining permit quality.
- The system translates these signals into actionable next steps, such as verifying specific critical controls or requalifying contractors on high-risk tasks.

Case Study | Energy and utilities sector

When information does not equal insight

The challenge

A global electricity and utilities organisation had extensive safety reporting across its operations, yet leadership lacked confidence in where risk was truly increasing. Inconsistent incident classification across different sites made it impossible to separate routine operational issues from events with genuine SIF potential. The organisation didn't have a data availability problem; it had an absence of trusted, decision-relevant insight.

The approach

By systematically improving data consistency, linking reported events directly to critical control health, and utilising comparative field observations, the organisation transformed its approach.

Impact on the ground

Leadership identified a significant gap between perceived risk and actual exposure, uncovering 18 previously hidden high-potential risk scenarios. By redirecting preventive attention to these specific areas, the organisation reduced overdue critical control verifications by 40% within six months, ensuring leadership focus remained locked on the conditions most likely to lead to serious harm.

Implications for leaders

For safety, risk, and operational leaders, the shift from descriptive analysis to prevention-led intelligence requires a re-examination of how information influences daily choices. The real test is whether your data consistently prompts earlier, more effective action.

To achieve this, leaders must adopt three essential shifts:

1. **Redefine "insight"**
   Treat insight strictly as information that meaningfully changes a decision in time to prevent harm. Make this the standard for all dashboards, analytics reviews, and leadership reporting to ensure data serves a preventive rather than descriptive purpose.
2. **Instrument the controls, not just the counts**
   Anchor your analysis in the performance of critical controls rather than event frequency. Every significant metric should clearly identify the exposure involved, the specific control at risk, and the time window in which intervention is still effective.
3. **Operationalise ownership**
   Tie every high-priority risk signal to a named decision owner, specify the next best action, and define a deadline for completion. Retire metrics that do not drive preventive decisions or meaningful operational change.

How dss⁺ can help

At dss⁺, we work with organisations to strengthen their ability to anticipate and prevent serious harm by transforming how operational intelligence is generated and utilised. Combining deep expertise in high-hazard operations with proven data integration methodologies, we help redesign decision pathways so leaders and frontline teams can act earlier.

dss⁺*360* plays a central role in this shift. Our proprietary platform brings structure and interpretation to diverse operational data, connecting incident information and control performance into a clear, unified picture of exposure. It highlights where risk is accumulating and directs attention to the decisions that matter most.

By moving organisations from analysing what went wrong to anticipating where exposure is building, dss⁺ supports the transition to true prevention-led intelligence - resulting in clearer priorities, earlier intervention, and the effective prevention of serious harm.

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