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REINVENTING PROTECTION

The real challenge of modern safety: understanding how risk develops inside the plant.

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In modern manufacturing, almost every business function has become data-driven. Production continuously monitors OEE (Overall Equipment Effectiveness) to measure equipment availability, performance, and quality. Maintenance relies on MTBF (Mean Time Between Failures), downtime analysis, condition monitoring, and predictive maintenance. Supply chain teams track lead time, OTIF (On Time In Full), forecasting accuracy, and logistics flow stability.

Safety, however, still mainly relies on established indicators such as:

- TRIR (Total Recordable Incident Rate) — measuring the total number of recordable injuries relative to hours worked;
- LTIFR (Lost Time Injury Frequency Rate) — measuring the frequency of injuries resulting in lost work time;
- Near-miss reporting, audits, and behavioral observations;
- Other traditional HSE KPIs.

These are all important and necessary tools for compliance, reporting, and benchmarking. But they share a major structural limitation: in most cases, they observe events that have already happened or depend heavily on human observation and reporting quality.

They measure the final outcome of risk, but often fail to continuously capture how operational risk is actually developing inside the plant.

And this is where one of the major paradoxes of modern industrial safety emerges: **safety is probably one of the few corporate functions that still primarily measures failure events.**

The problem with traditional safety KPIs

The limitations of traditional safety indicators are not about their usefulness — which remains essential — but about their **ability to continuously and dynamically describe real operational risk**.

1. Incidents are lagging events

Incidents are almost always the final result of a long sequence of operational conditions, risk exposures, adaptations, and behaviors that develop long before the actual event occurs.

For this reason, KPIs such as TRIR or LTIFR are fundamental for measuring outcomes, but statistically weak when it comes to interpreting the real-time evolution of operational risk.

Observing only incidents often means analyzing the problem after the system has already revealed a critical weakness.

2. Many indicators depend on subjective observation.

Audits, behavioral observations, checklists, and near-miss reporting are essential tools for building a strong safety culture. However, their effectiveness inevitably depends on people's sensitivity and on how events are classified and reported.

As a result, two plants within the same company may generate very different datasets despite having similar levels of exposure, simply because they adopt different approaches to data collection and interpretation.

This makes it difficult to build truly comparable benchmarks or fully data-driven corporate safety strategies.

3. Aggregated KPIs often fail to describe operational context.

Two facilities may show the same TRIR while operating under completely different conditions.

Recorded events may stem from:

- different operational dynamics;
- different exposure levels;
- non-comparable operational activities;
- risks concentrated in specific plant areas.

The final KPI therefore provides a useful quantitative snapshot, but not always enough insight into how risk is actually developing in day-to-day operations.

And this leads to an increasingly important question for the HSE world:

Why, in an increasingly digitalized industrial environment, are we not making greater use of continuous monitoring technologies, objective data collection, AI, and machine learning to help HSE managers observe what is really happening inside the plant in a more continuous and objective way?

Why not leverage operational data to identify recurring patterns, monitor risk dynamics, and support increasingly data-driven safety strategies?

The real paradigm shift: how do we observe risk before the incident?

Modern manufacturing now generates enormous amounts of operational data.

Yet industrial safety analysis still relies largely on past events, periodic observations, and discontinuous data collection.

But today the real question is no longer: "How can we record incidents better?" The real question is: **"How can we continuously observe and quantify risk before an incident happens?"**

This is where the true paradigm shift in modern industrial safety is emerging. A safety approach that is increasingly continuous, observable, contextualized and focused not only on final incidents, but also on near misses, vehicle-pedestrian interactions, dynamic risk exposure and recurring behavioral patterns.

Because real risk does not suddenly appear at the exact moment of an accident. It develops over time, within normal day-to-day operational dynamics.

It is no coincidence that approaches such as the following have gained momentum in recent years:

- Behavior-Based Safety (BBS);
- Human Factors;
- Human & Organizational Performance (HOP);
- Safety II.

These approaches progressively shift the focus from the final error to the operational context, and from isolated events to aggregated behaviors, moving from incident analysis alone to continuous system observation.

Because very often the issue is not simply "who made the mistake," but rather **which operational conditions are systematically generating risk exposure**.

From reactive safety to Safety Performance Management

At AME, we are working precisely on this evolution through a **Safety Performance Management approach**.

The core idea is simple: **transforming safety from a predominantly retrospective system into a continuous operational risk observability system.**

To achieve this, AME developed the AMESPHERE Platform — a software platform designed to acquire and analyze continuous operational data from both industrial plants and vehicle fleets.

The objective is not to collect more data indiscriminately, but to **transform continuous operational data into actionable insights for HSE managers and operations teams**.

The platform enables organizations to:

- identify recurring patterns;
- understand where risk tends to concentrate;
- detect operational hotspots;
- monitor behavioral evolution over time;
- evaluate the effectiveness of corrective actions.

Through AI and machine learning algorithms, data is processed and contextualized to provide HSE managers with only truly relevant insights through dashboards, advanced KPIs, and operational alerts.

One particularly interesting aspect of this approach is that it does not only highlight risk — it also helps quantify positive safety performance.

In other words, not only: “How much risk exists?”, but also how much operational time is performed under safe conditions and which processes are becoming more stable and controlled.

Because modern safety should not be limited to counting incidents. It should help companies continuously understand how their operational system is truly performing

Conclusion

Modern manufacturing now has access to an enormous amount of operational data. Yet safety is still too often tied to retrospective logic and discontinuous observation methods.

The goal is not to replace HSE managers’ experience or safety culture. On the contrary, the objective is to strengthen the HSE function by providing more continuous, comparable, and objective tools for understanding real operational risk. Because experience, plant knowledge, and interpretation capabilities remain essential. But today, they can be supported by a new generation of data and analytical tools.

This is the direction AME is pursuing: transforming safety from a predominantly reactive function into a continuous system of operational observability and improvement.

Because the strategic question should no longer be: “How many incidents did we have?”, but rather: “How much operational risk are we generating every day?”


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