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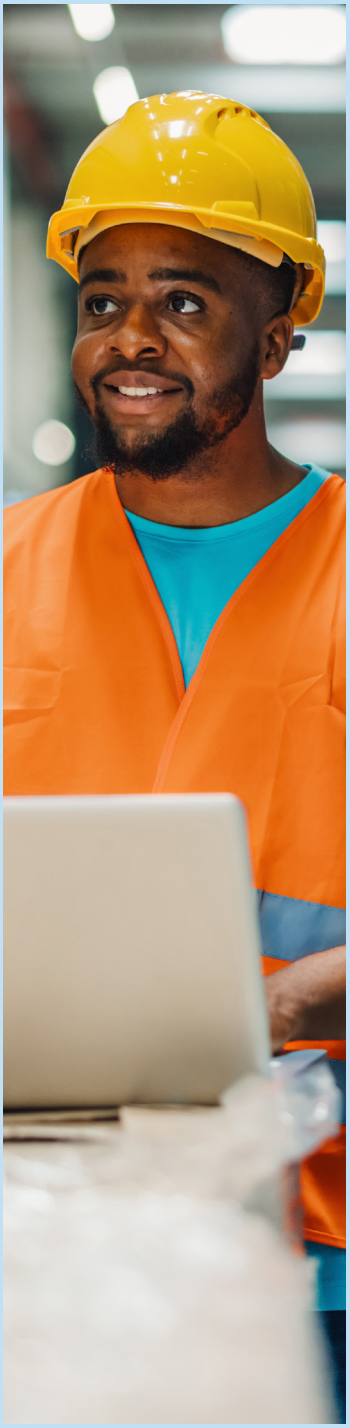

LEVERAGING REAL-TIME DATA FOR PROACTIVE ASSET MANAGEMENT

Abstract

In asset-intensive industries, performance, risk, and resilience are now deeply interconnected, as volatile operating conditions, tighter regulations, and sustainability pressures expose the limits of traditional, schedule-based maintenance. This article explores how proactive asset management, powered by Asset Performance Management (APM) and real-time data, is shifting maintenance from a cost centre to a strategic capability by enabling early failure detection, predictive maintenance, and business-aligned decision-making. It examines the economic value of real-time insights, APM's role as the foundation for proactive operations, and the organisational enablers needed to scale these capabilities—showing how rising risk, resilience, and sustainability priorities are pushing asset performance onto the board agenda as a key driver of long-term value and competitive advantage.

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Across manufacturing, energy, transportation, and infrastructure, asset performance is now a board-level concern. Volatile demands, tighter margins, sustainability commitments, and rising safety expectations mean even minor asset failures can trigger disproportionate financial and reputational damage.

Yet many organisations still operate maintenance models designed for more stable conditions. Unplanned downtime alone costs industrial manufacturers an estimated USD 50 billion annually, largely due to equipment failure.

Real-time data enables proactive asset management by moving organisations beyond reactive fixes. It supports failure prevention, optimised maintenance timing, and asset decisions aligned with business priorities.

From maintenance as a cost centre to asset performance as a value lever

Historically, maintenance has been treated as a necessary operational expense, focused on restoring equipment after failure or following fixed schedules. While preventive maintenance improved reliability compared to reactive approaches, it still relies on averages rather than actual asset behaviour under real operating conditions. As asset complexity and business risk increase, this model is proving insufficient.

APM reframes maintenance as a strategic discipline. It applies data, software, and analytics to maximise asset reliability, availability, and efficiency across the lifecycle. It moves beyond traditional maintenance by predicting failures earlier and reducing unplanned downtime. Rather than asking when an asset should be serviced, organisations focus on what the asset is signalling about future performance and which actions deliver the greatest value.

This shift elevates asset management from an operational task to a strategic capability tied directly to business outcomes. When treated as an integrated discipline, APM brings together engineering insight, analytics, and decision-making, supported by continuous, real-time visibility into asset performance.

Why does real-time data change the economics of maintenance?

The shift from maintenance as a cost centre to asset performance as a value lever is enabled by real-time data. Traditional maintenance models are constrained by latency: inspections are periodic, data is sampled infrequently, and emerging issues are often detected only after risk has escalated. Continuous data streams remove this blind spot by providing timely visibility into actual asset condition.

Sensors embedded in physical assets capture operational signals that indicate degradation well before failure occurs. When analysed in real time, these signals support earlier fault detection and more accurate assessment of asset health, reducing reliance on reactive intervention. Organisations applying real-time analytics to critical assets report 30–50% reductions in unplanned downtime, demonstrating the tangible impact of earlier, condition-based decision-making.

Beyond preventing failures, real-time monitoring expands the maintenance decision window, allowing work to be planned around production priorities rather than being dictated by disruptive shutdowns. This shift enables more deliberate, value-based maintenance decisions, reducing reliance on reactive intervention and improving operational stability as asset conditions evolve.

Asset performance management (APM) as the operating system for proactivity

While sensors generate data, asset performance management systems convert data into decisions. APM platforms integrate real-time telemetry with historical performance records, maintenance logs, failure modes, and operational context.

Mature APM implementations typically deliver:

- Continuous condition monitoring
- Predictive failure forecasting
- Risk-based prioritisation of maintenance actions
- Integration with enterprise asset management (EAM) and Computerised Maintenance Management Systems (CMMS)

This integration is critical. Without it, predictive insights remain disconnected from execution. When APM outputs automatically trigger work orders, recommend spare parts reservations, or adjust operating parameters, insight becomes action.

Organisations with tightly integrated APM and maintenance execution systems achieved an average of 22% reduction in maintenance costs, a 15% increase in equipment uptime, and a 25% improvement in labour productivity, a result rarely achieved through isolated technology deployments.

Achieving these outcomes consistently requires more than integrated systems; it depends on a disciplined, data-driven maintenance strategy that governs how insights are generated, trusted and acted upon.

A data-driven maintenance strategy: turning signals into outcomes

A data-driven maintenance strategy provides the governance framework that ensures real-time insights translate into consistent, repeatable outcomes. It rests on four foundational pillars that connect data, analytics, and execution to measurable business value.

Data quality and contextual integrity

Poor data quality, such as inconsistent timestamps, missing sensor values, and weak asset hierarchies, limits predictive accuracy and trust. Making an early investment in standardised taxonomies, calibration, and data governance is essential for scale.

Advanced analytics and predictive modelling

Machine learning identifies patterns missed by rule-based methods, estimating remaining useful life and anomalies. Hybrid models combining engineering physics and machine learning outperform purely statistical approaches in complex industrial environments.

Operational integration and decision automation

Predictive insight creates value only when embedded into maintenance, inventory, and production workflows, reducing emergency work, minimising last-minute rescheduling, and significantly improving maintenance productivity.

Value-based governance and kpis

Effective strategies measure success in business terms, tracking downtime reduction, MTBF and MTTR improvement, maintenance cost per unit, and avoided capital expenditure to link decisions directly to financial outcomes.

When these metrics are applied consistently, they create a direct line of sight between maintenance decisions and measurable financial outcomes.

Quantifying the business impact of proactive asset management

The financial case for proactive, real-time-driven maintenance is well documented.

Predictive maintenance can reduce maintenance costs by 18% to 25% while increasing equipment uptime.	Asset-intensive organisations adopting advanced analytics typically see 5% to 15% increases in asset availability, translating directly into higher throughput.	Digital strategies contribute meaningfully to sustainability goals by reducing waste, energy inefficiency, and premature asset replacement.

These gains compound over time. As models learn and organisations refine decision processes, the economic returns of proactive asset management increase year over year. Sustaining these gains depends less on technology alone and more on the organisational capabilities that enable analytics to be trusted and acted upon.

Organisational enablers: people, process, and trust

Proactive asset management depends on operating-model change, not technology alone. It requires analytics to be embedded into daily decisions across operations, maintenance, engineering, and data teams.

Organisations sustain value from advanced analytics when they invest in capability building, redesign workflows, and enable cross-functional collaboration. Operators must trust insights enough to adjust operating behaviour, maintenance teams must move from reactive firefighting to planned intervention, and data teams must work closely with engineers who understand physical failure modes.

Explainability also matters. Models that provide interpretable insights, such as highlighting which variables drove a risk score, are far more likely to be adopted at scale.

When these enablers are weak or misaligned, even well-designed initiatives struggle to move beyond isolated successes.

Common failure modes and how leading organisations avoid them

Despite strong potential, many initiatives stall. Common pitfalls include:

Pilot paralysis, where proofs of concept never scale due to a lack of integration	Alert fatigue, driven by poorly tuned models	Data silos that prevent enterprise-wide learning	Change resistance, rooted in mistrust of algorithmic decisions

Successful organisations mitigate these risks by focusing on high-impact assets, defining clear economic objectives, and embedding analytics into existing decision-making processes. This approach also strengthens enterprise risk, resilience, and sustainability outcomes.

Risk, resilience and sustainability: why proactive asset management is now a board priority

Proactive asset management is increasingly driven by enterprise risk, resilience, and sustainability priorities, not just operational efficiency. In asset-intensive industries, failures now extend beyond lost production to safety incidents, regulatory breaches, environmental harm, and reputational damage, pushing asset performance onto board and executive agendas.

Infrastructure failure and operational disruption are consistently ranked among the top global risks. Real-time asset data supports earlier detection of abnormal conditions, such as overheating, vibration anomalies, or pressure deviations, shifting asset management from reactive response to proactive risk prevention.

From a resilience perspective, organisations with mature asset performance management capabilities recover faster from disruptions through improved monitoring, diagnostics, and targeted interventions. Sustainability further reinforces the case: inefficient assets increase energy consumption, waste, and premature replacement. Predictive, condition-based maintenance extends asset life, reduces lifecycle emissions, and provides auditable data to support regulatory compliance.

Leading organisations now treat proactive asset management as a strategic control system for managing risk, sustainability, and long-term value at enterprise scale.

Data architecture and operating model: scaling proactive asset management across the enterprise

Many organisations successfully pilot predictive maintenance on selected assets but struggle to scale proactive asset management across plants, fleets, or regions. The limitation is rarely analytics alone; more often, it is the absence of a data architecture and operating model designed for enterprise adoption.

At scale, proactive asset management depends on a unified yet flexible data foundation. Asset data originates in OT systems, sensors, and control environments, while insights must flow into APM platforms, EAM systems, and maintenance execution tools. Without a defined integration layer, data remains fragmented, constraining predictive accuracy and enterprise-wide learning.

Leading organisations adopt hybrid architectures that combine edge and cloud capabilities. Edge analytics enable rapid local response, while cloud platforms support model training and cross-site benchmarking. Equally important is the operating model, with clear decision rights that align analytics, maintenance, and operations. Treated as a continuous capability, proactive asset management scales from isolated pilots to sustained enterprise performance in asset-intensive environments.

Industry applications: where real-time proactivity delivers the most value

Proactive asset management delivers the greatest impact in asset-intensive industries where real-time condition data directly informs operational decisions. Predictive maintenance across manufacturing, energy, and transportation highlights a consistent pattern: embedding real-time monitoring into operations enables earlier fault detection, more targeted maintenance, and higher asset reliability.

In manufacturing, continuous monitoring of rotating and critical equipment reduces catastrophic failures and stabilises production flow. In energy and utilities, real-time monitoring of transformers, turbines and grid assets enables condition-based maintenance and improves system resilience. In transportation and logistics, telematics-driven maintenance reduces fleet downtime and improves lifecycle cost management.

Across sectors, the evidence is consistent: the greatest value is realised when real-time insights directly inform operational decisions.

From insight to enduring advantage

Real-time data is widely available across asset-intensive operations; the advantage comes from turning it into foresight and action. Proactive asset management, enabled by asset performance management platforms and data-driven maintenance strategies, improves reliability, cost efficiency, resilience, and risk control. Organisations that scale these capabilities deliberately embed real-time intelligence into everyday decisions, transforming asset performance into a sustained source of competitive strength rather than an operational liability in volatile environments.

For more information, contact infosysbpm@infosys.com

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