SAPinsider

BENCHMARK REPORT

by Mark Vigoroso August 2023

ELEVATING ENTERPRISE ASSET MANAGEMENT (EAM) IN THE DIGITAL AGE

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Insider Perspective

"Asset management is a concern for the C-level, but in some cases, it is viewed through the narrow lens of expenditure and risk management, which might not show the value-adding aspects. In such situations, providing context and illustrating how the asset management objectives support and align with the corporate goals can be an effective strategy."

— ANTHONY COOK, ASSET MANAGEMENT STRATEGIST, ENERVEN

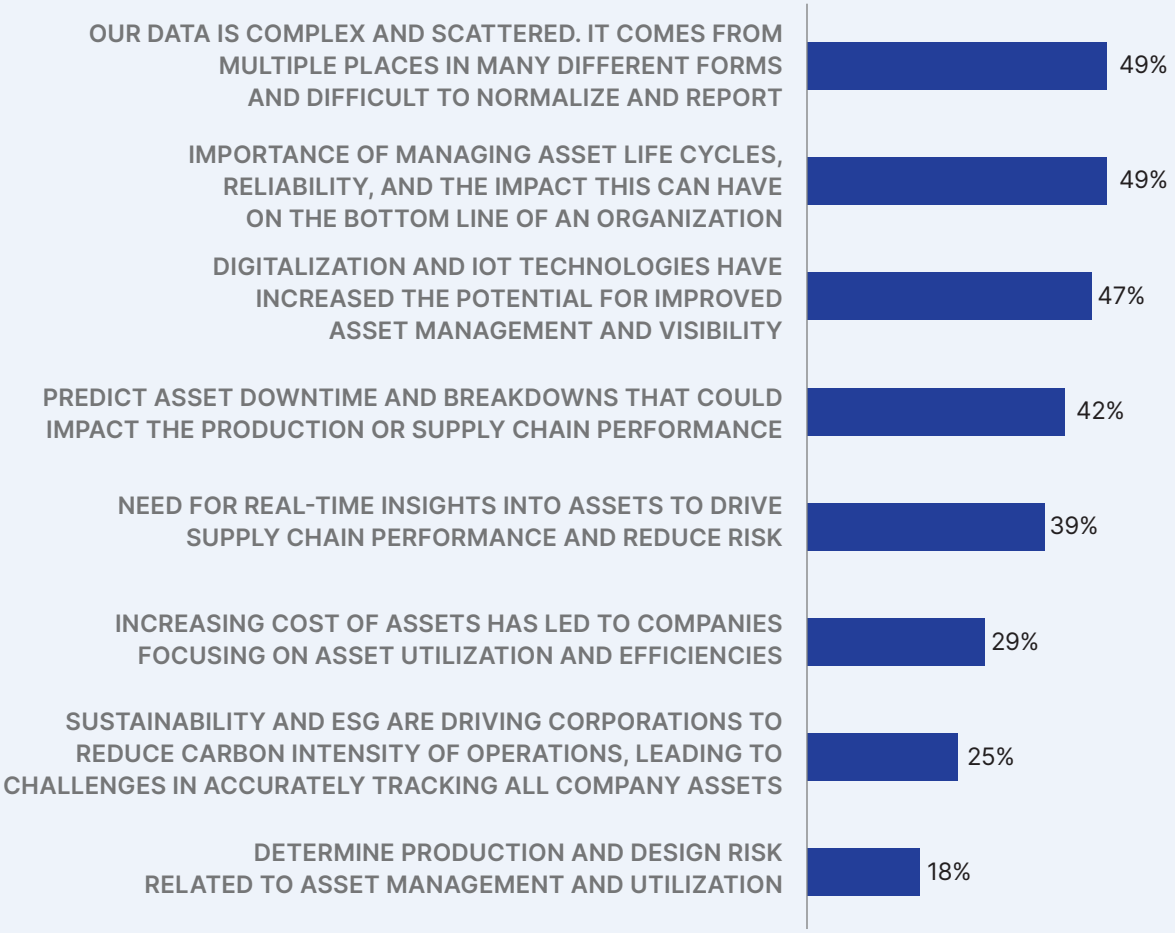
FOR ASSET-INTENSIVE industries such as utilities, oil and gas, transportation, and discrete and process manufacturing, Enterprise Asset Management (EAM) has been a crucial necessity. It includes the management, support, and maintenance of a company's physical assets throughout their complete lifecycle. This lifecycle encompasses capital planning, procurement, installation, performance, maintenance, repair, regulatory compliance, risk management, and asset decommissioning and disposal. Systems to help manage asset data, personnel, and processes have been traditionally deployed on-premise often separately by asset type. However, this often results in data and process silos and restricts companies from operating with a unified view of their asset base.

Today, leaders in asset maintenance, reliability and performance are breaking down these silos by tying asset performance to corporate financial performance and leveraging emerging technologies to consolidate asset data, drive productivity, and elevate the strategic importance of EAM.

SAPinsider surveyed 159 members of its community between May and July 2023 to generate insights on how leaders are elevating enterprise asset management in the digital age. The survey questioned the respondents on the factors most responsible for driving their organizations' EAM strategies. And it is not surprising, given the historical data silos plaguing companies, that one of the factors impacting EAM strategies the most is complex and scattered data from multiple sources, in many different forms and making it difficult to rationalize and report **(Figure 1).**

Managing asset life cycles and reliability, and the impact this has on an organization's bottom line is another key factor affecting EAM strategy. This clearly indicates how leading companies have made EAM strategy a strategic priority and moved on from considering it as a back-office operation.

Figure 1: Drivers Impacting Decisions Related to Exploring the Future of Enterprise Asset Management

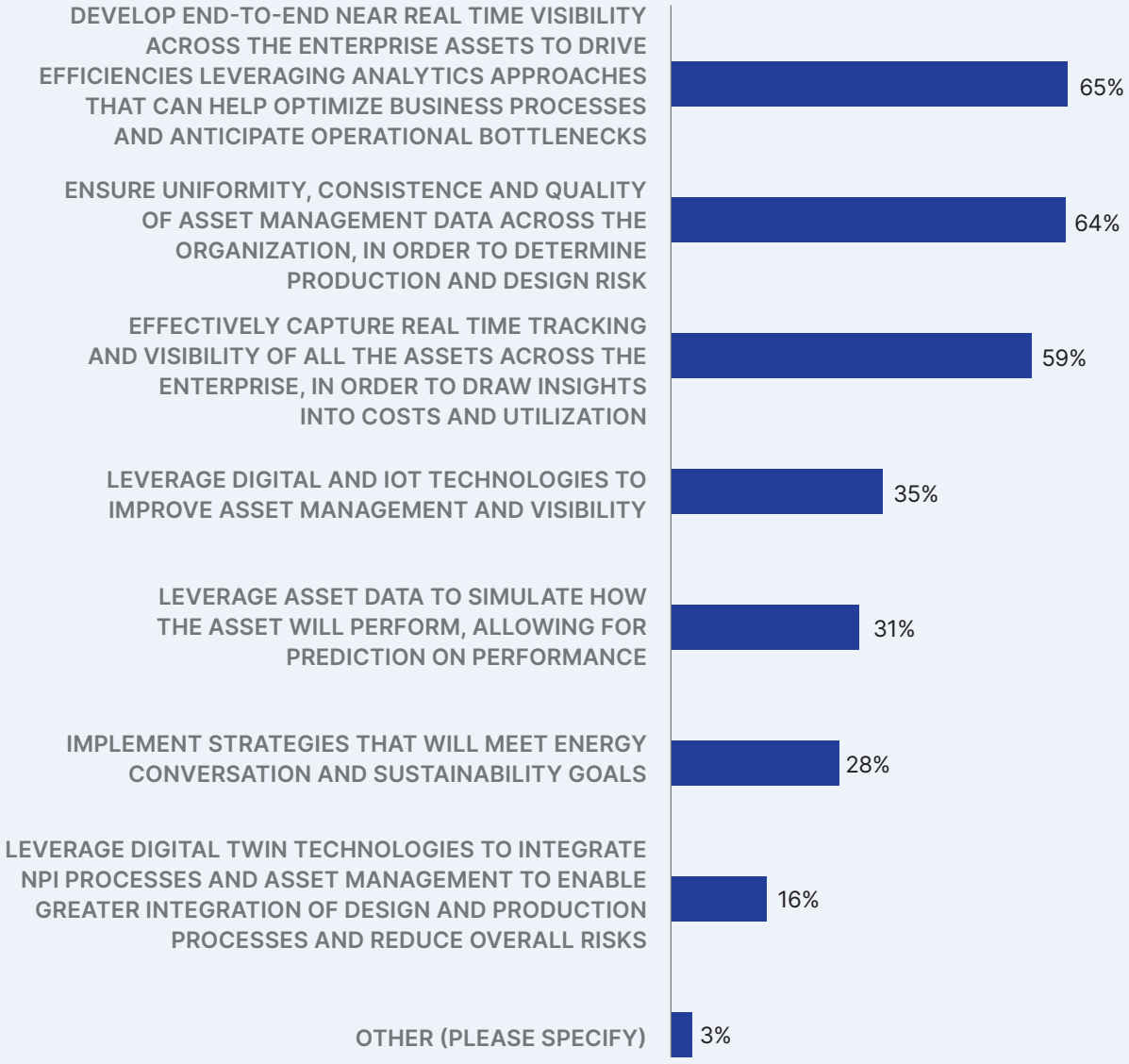


In response to the drivers, companies identified three top EAM strategies **(Figure 2):**

- Develop end-to-end near real-time visibility across the enterprise assets to drive efficiencies by leveraging analytics approaches that optimize business processes and anticipate operational bottlenecks.
- Ensure uniformity, consistency, and quality of asset management data across the organization.
- Effectively capture real-time tracking and visibility of all the assets across the enterprise to draw insights into costs and utilization.

The common theme underscoring these strategies is data. Optimizing asset health and performance is impossible without timely access to reliable, high-quality asset data. Some experts recommend a pairing of Master Data Governance (MDG) and Transactional Data Governance (TDG) to maintain timely and reliable asset data, with an emphasis on TDG. TDG encompasses the time-sensitive event data coming directing from the machine, including failure modes, condition before malfunction, effects on equipment operation, etc. Governance of transactional data must consider that if the data isn't captured and stored in near real-time, it's very difficult to reconstruct later. And introducing predictive maintenance models

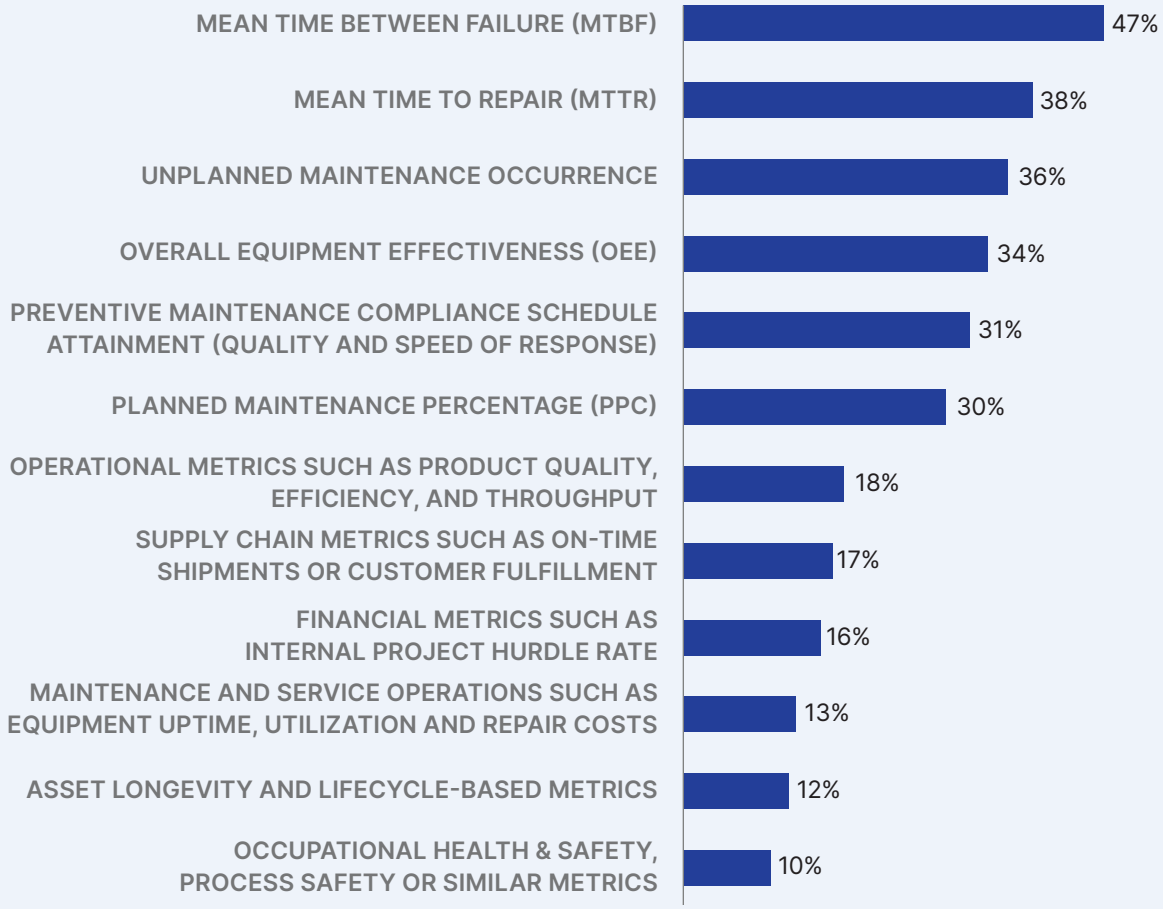
Figure 2: Strategies that are Being Prioritized to Address Top Drivers



that automatically plan, schedule, and deploy resources to intervene before an asset failure is also impossible without access to transactional, work history, and environmental data. Companies are now discovering they need to evolve their on-premise EAM solutions to the cloud to centralize their asset information, which makes monitoring and optimizing assets easier and allows proactive inspection and maintenance.

Any EAM strategy discussion is incomplete without a mention of Key Performance Indicators (KPIs) the strategies are intended to impact. When asked about the KPIs, the survey respondents reported Mean Time Between Failure (MTBF), Mean Time To Repair (MTTR), unplanned maintenance, and Overall

Figure 3: Metrics Used for Asset Performance Measurement



Equipment Effectiveness (OEE) as the most commonly used metrics for asset performance measurement **(Figure 3).** These are core operational, productivity, efficiency, reliability, and quality measurements. However, maintenance and reliability leaders need to connect these operational metrics to the company's financial performance to secure support and investment from executives. For instance, in one notable example, a maintenance team revealed that a 10% improvement in OEE resulted in a direct profit increase of $9.3 million. This type of enterprise value creation sparks an asset management dialogue that graduates from the breakroom to the boardroom.

As a general practice, if a maintenance organization has high quality, trustworthy data, they can map failure events directly to operational and financial consequences. They can also leverage detailed and timely asset failure data to optimize asset inspection intervals, which can have a material impact on the bottom line. In one simple example, a maintenance team managing a fleet of power generation units was changing the oil every 500 hours, shutting the unit down for 4 hours each time. By conducting an oil analysis, the team was able to extend the oil change interval to 1,500 hours, saving $8 million per year of operational expense.

A large oil company plagued by insufficient asset performance data was inspecting assets quarterly, which required a 24-hour shutdown each time, costing between $5 and $20 million per asset, across 50-60 assets. They are likely over-inspecting, which is not only costing them but also introducing systemic error into the asset fleet. So, they are now looking at a savings model of nearly $1 billion per year, enabled by improved data quality and an annual asset inspection interval. Again, this is tangible justification fit for a dialogue with the CFO.

Fundamental to the abovementioned strategies are the functional requirements that an organization must have. Chief among these is the ability to assess asset risk and criticality **(Figure 3).** Asset-intensive companies can have hundreds, thousands, even millions of assets. For every asset, it's critical for the company to be able to quantify the probability and effects of unplanned downtime and prioritize maintenance for every asset accordingly.

The second requirement is the ability to receive recommendations to improve asset uptime and predict failures, while the third is the ability to collect real-time sensor data from connected assets. Both of these requirements are interdependent. First-generation recommendations on asset management best practices came from the rich knowledge bases that consisted of all the institutional knowledge about scenario-specific service tactics. With the Internet of Things (IoT), companies connect directly to assets, monitor asset condition and performance in real-time, and introduce predictive algorithms that pair certain machine states with service recommendations and actions.

A rich fabric of technologies has been deployed or will be deployed in the next two years to fully operationalize EAM strategies identified by the survey respondents. Unsurprisingly, mature tools in workplace health and safety, enterprise management platforms, and data integration and management **(Figure 4)** top the list of EAM technologies currently deployed by respondents. On the near- and mid-term horizons, companies are planning investments in real-time asset tracking, artificial intelligence/machine learning (AI/ML), and reliability-centered maintenance tools.

Many EAM technologies attempt to augment and cleanse historical asset data, which can bear some fruit. But it's also critical for companies to address the root causes of poor asset data quality and leverage standard specifications to normalize and control data at the point of inception. So while it's a good sign that more than a quarter of respondents are planning deployments of data integration and management tools in the next 6 to 24 months, a rigorous approach to asset data quality should be employed more universally.

SAPinsiders should not overlook the criticality of maintenance planning and scheduling technologies, paired with their execution systems. The planning and scheduling work that models the timing and volume of resource consumption must precede the

Insider Perspective

"We spent 80% of our effort in developing advanced analytics use cases on understanding, standardizing, normalizing, cleaning up asset data. Once we'd done all that, then we were able to proceed with the analytics use cases."

— FORMER CIO IN CHEMICALS INDUSTRY

actual execution of asset maintenance work. The thoroughness of the planning and scheduling phase has a direct impact on asset management efficiency and effectiveness.

Much has been written about the potential impact of AI across all aspects of the enterprise, including asset management. Although most of the impacts are impending, the current time offers the opportunity to explore and experiment with potential use cases. The two types of AI most relevant to asset management are predictive AI and generative AI. While predictive AI uses historical data to predict future events or behaviors, generative AI creates new content such as text, audio, video, code, or images. A predictive AI use case could involve a visual asset inspection, where a mobile camera captures asset images, which

Figure 4: State of EAM Technology Adoption

are then automatically analyzed for asset defects or anomalies, and an alert or workflow is automatically triggered in case of a defect. On the other hand, generative AI use cases could be as simple as a conversational front-end to maintenance documentation like manuals, operating procedures, and installation guides; or a maintenance virtual assistant or chatbot that guides maintenance personnel through work tasks. One could also explore developing pre-defined templates to report asset issues based on the equipment type. Only 7% of respondents have "completed" AI/ML deployments, but many more are getting started and planning deployments within two years.When asked to rate EAM technologies according to their core capabilities, respondents rated data integrity and consistency in the data infrastructure, centralized assets and data, and dedicated data management services as the most important ones. These capabilities highlight the importance of effective data management in any EAM strategy, which requires reliable cloud-based tools and processes for tasks such as capturing, storing, cleaning, updating, analyzing, and integrating asset related data in a centralized repository. Without these robust data management tools and processes, an EAM strategy is likely to fail.

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When it comes to accurate data capture, it's important to highlight the vital role of mobility solutions in asset management. Fully 43% of respondents have either completed a mobility deployment or plan to within 6 to 24 months. Mobility solutions empower and equip maintenance workers to capture job reports, inventory consumed, parts replaced and other asset-specific data in near real-time. Even with the increase in data sourced directly from sensored machines, humans still play a role in the data value chain and they need robust mobility solutions to capture and transmit timely and accurate data at the point of service.

Most companies are on a journey when it comes to EAM technology deployment. To effectively navigate this journey, companies should consider setting up emerging technology "laboratories", where line-of-business and IT stakeholders vet and validate use cases for automation. These labs should drive a constantly evolving pipeline of ideas for innovation and transformation. And the best operating labs are also building business cases, and are prioritizing recommendations based on timing and magnitude of business impact.

Figure 5: Justification for Investment In an Asset Management Program

Companies are also relying on traditional metrics like asset uptime, workforce productivity, and maintenance costs **(Figure 5)** to make the case for investments in asset management tools and programs. However, maintenance leaders should collaborate with corporate stakeholders to demonstrate how maintenance operations contribute to the company's overall financial performance. This involves identifying operational strategies that directly impact revenue generation and cost reduction.

However, companies are facing several obstacles that are hindering them from implementing EAM solutions and executing on their transformational visions. These challenges pertain to the lower priority given to EAM compared to other initiatives, lack of skilled resources for implementation, organizational silos, and the absence of a well-defined asset management strategy. Companies should develop a comprehensive strategy that includes people, processes, data, and technologies in collaboration with key stakeholders from IT, maintenance, and the C-suite. To effectively secure funding, it is also important to underscore the impact of asset performance on revenue, profit, and customer experience.

Companies that have succeeded in justifying and deploying EAM tools have also faced certain challenges in deploying and operating these solutions. The top two challenges identified by the respondents with existing EAM tools are the difficulties with adapting and scaling the tools as business complexities increase, and integrating them with other business applications. However, these difficulties can largely be addressed through a cloud-based deployment strategy. The cloud allows companies to expand and adapt to changes in their supply base and other disruptions in the asset lifecycle. Additionally, application integrations are manageable in the cloud. An example of a vital EAM integration is supply chain systems, which are crucial for analyzing asset behavior and performance in relation to supply chain logistics, availability, and resilience.

Companies are also benefitting from involving Line of Business (LOB) and IT department leaders to take decisions regarding asset management solutions. However, this collaboration should not be limited to internal departments, but should extend to include Original Equipment Manufacturers (OEMs), component suppliers, operators, and service providers. This broader collaboration can result in optimized Enterprise Asset Management (EAM) through seamless data sharing and process coordination across all the entities managing assets. This collaboration works best when all parties are speaking the same language regarding equipment reliability. One way to establish this common language is to adopt standards such as ISO 14224, which provides standard terms, definitions, and data specifications, and ISO 8000, which provides semantic encoding and normalized data input. The primary mission of this inter-company

approach to asset management is to harmonize the efforts and contributions of all participants in the asset ecosystem. This alignment ensures efficient and effective utilization of assets, maximizes asset performance, minimizes unplanned downtime, reduces repair and maintenance costs, and bolsters overall operational performance.

REQUIRED ACTIONS

Based on the survey responses, organizations should make the following plans around their enterprise asset management strategies:

- **Address root causes of data quality problems.** No company has perfect data. Maintaining high quality asset data is an ongoing commitment that requires standard specifications like those offered by ISO 14224 and ISO 8000. It is important to capture and analyze transactional data, that is the events occurring at each asset, in near real-time to gain a complete and accurate view of asset behavior and performance. Quality controls need to be in place that constantly audit the asset data being collected to ensure it conforms to the defined standard. This data hygiene will pay off when it comes to applying more advanced analytics to asset management, leveraging emerging technologies like AI/ML, and collaborating with ecosystem partners.
- **Carefully consider the move to the cloud.** Line-of-business and IT execs need to look at the costs and benefits of a cloud-based EAM solution strategy. There are plenty of benefits, including a consolidated approach to data management, easier integration with adjacent enterprise applications like supply chain management, flexibility to expand and adapt to changes in supply base, and other disruptions in the asset lifecycle. But factors like data security and residency also need to be considered.
- **Bridge the organizational divide.** Thirty-eight percent of the respondents reported organizational silos and having difficulty sharing information as a chief obstacle to EAM solution adoption. Often, the divide between the C-suite and the maintenance organization can be detrimental when it comes to pace of innovation in asset management. Asset management will remain a back-office tactical function until maintenance leaders can speak the language of corporate financial outcomes and translate operational metrics and investment cases into terms a CFO can get behind. In general, the practice of breaking down silos in an organization needs to include four elements: data, process, personnel, and systems.
- **Don't forget about asset ecosystem partners.** Along with the maintenance organization within a company that owns an asset, other entities also impact asset performance, including the company that manufactured the asset or the Original Equipment Manufacturer (OEM), service providers, and component suppliers. When mapping out processes, building strategies, assessing functional capabilities, setting KPI targets, or building cases for technology investment, it is critical for the asset-owning companies to consider the contributions of the asset ecosystem partners, and if necessary, to specify required changes to partner processes or systems.
- **Establish a cross-functional emerging technology laboratory.** This research surveyed companies on their adoption plans across 19 different technologies. However, as the technology landscape constantly shifts, companies need to adopt structured methods to evaluate technologies worthy of investments. They can do this by setting up cross-functional laboratories where business and technology leaders collaborate to evaluate use cases, build business cases, and manage an innovation pipeline. Asset management can be a dedicated track within a larger enterprise technology lab.
- **Get started with AI.** Under the governance of an emerging technology lab, companies should experiment with predictive and generative AI use cases in enterprise asset management. There are multiple ways to integrate AI. EAM solution providers are beginning to integrate AI into their offerings and offer inexpensive proof-of-concept deployments. Start small, vet some POC candidates in the lab, and accumulate learnings that can be applied to subsequent deployments.

DART
MODEL FRAMEWORK

EAM IN THE DIGITAL AGE

DRIVERS

- Data is complex, scattered, comes from multiple sources in different forms, and is difficult to normalize and report (49%)
- Importance of managing asset life cycles, reliability, and their impact on the bottom line of an organization (49%)
- Digitalization and IoT technologies have increased the potential for improved asset management and visibility (47%)
- Predict asset downtime and breakdowns that could impact the production or supply chain performance (42%)

ACTIONS

- Develop end-to-end near real-time visibility across the enterprise assets to drive efficiencies leveraging analytics approaches that can help optimize business processes and anticipate operational bottlenecks (65%)
- Ensure uniformity, consistency, and quality of asset management data to determine production and design risk (64%)
- Effectively capture real-time tracking and visibility of all assets across the enterprise to draw insights into costs and utilization (59%)
- Leverage digital and IoT technologies to improve asset management and visibility (35%)

REQUIREMENTS

- Ability to assess asset risk and criticality (72%)
- Receive recommendations to improve asset uptime and predict failures (71%)
- Collect real-time sensor data from connected assets (70%)
- Optimize maintenance execution by providing job plans in both operational and EHS context (70%)
- Review predictive analysis to plan maintenance (65%)
- The ability for maintenance technicians to work remotely (59%)

TECHNOLOGIES*

- Real-time asset tracking (31%)
- Enterprise management platforms (28%)
- Labor management systems (28%)
- Data integration and management tools (27%)
- Reliability-centered maintenance Tools (26%)
- Artificial intelligence and machine learning (26%)
- Robotic process automation (25%)
- Asset condition monitoring and sensors (25%)
- Edge computing & analytics (25%)
- Mobility solutions (24%)

* Within 6-24 months

Appendix: The Dart™ Methodology

SAPinsider has rewritten the rules of research to provide actionable deliverables from its fact-based approach. The DART methodology serves as the very foundation on which SAPinsider educates end users to act, creates market awareness, drives demand, empowers sales forces, and validates return on investments. It is no wonder that organizations worldwide turn to SAPinsider for research with results.

THE DART METHODOLOGY PROVIDES PRACTICAL INSIGHTS, INCLUDING:

DRIVERS	These are macro-level events that are affecting an organization. They can be both external and internal, and they require the implementation of strategic plans, people, processes, and systems.
ACTIONS	These are strategies that companies can implement to address the effects of drivers on the business. These are the integration of people, processes, and technology. These should be business-based actions first, but they should fully leverage technology-enabled solutions to be relevant for our focus.
REQUIREMENTS	These are business and process-level requirements that support the strategies. These tend to be end-to-end for a business process.
TECHNOLOGY	These are technology and systems-related requirements that enable the business requirements and support the company's overall strategies. The requirements must consider the current technology architecture and provide for the adoption of new and innovative technology-enabled capabilities.

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