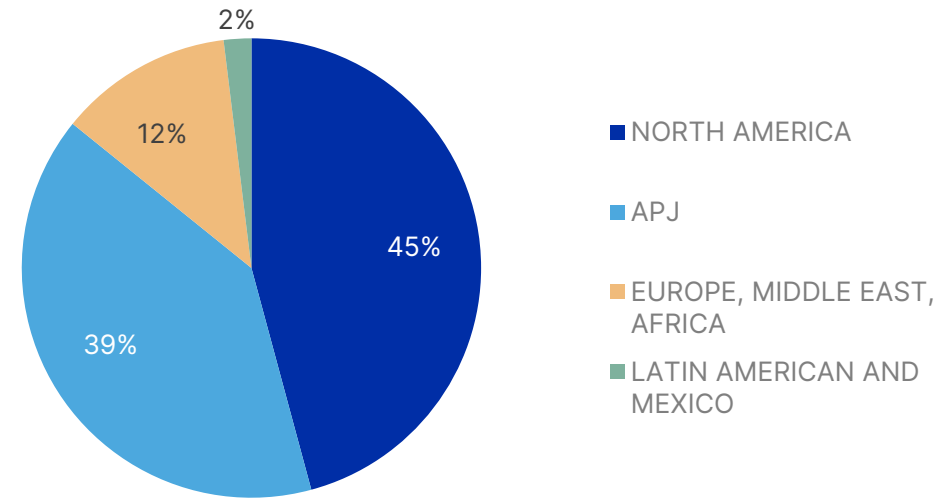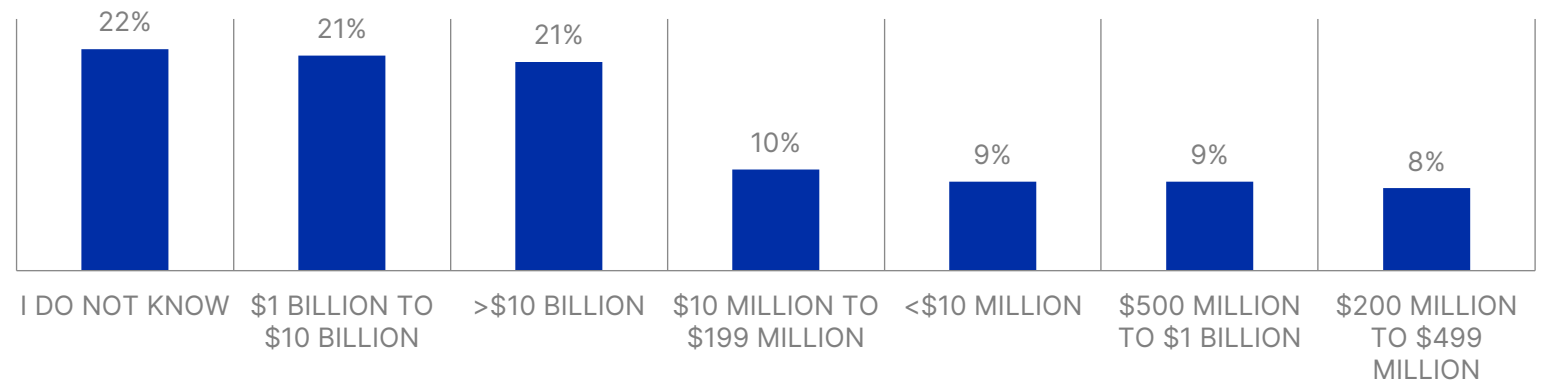# DETAILED FINDINGS

1

Between May and July 2023, SAPinsider surveyed a total of 159 members.

The survey participants came from various geographical regions worldwide and represented diverse organization sizes, contributing to a comprehensive dataset.

The primary objective of the survey was to gather insights from professionals who were involved in enterprise asset management decisions within their respective organizations.

- NORTH AMERICA — 45%
- APJ — 39%
- EUROPE, MIDDLE EAST, AFRICA — 12%
- LATIN AMERICAN AND MEXICO — 2%

Annual Revenue in the Last Fiscal Year

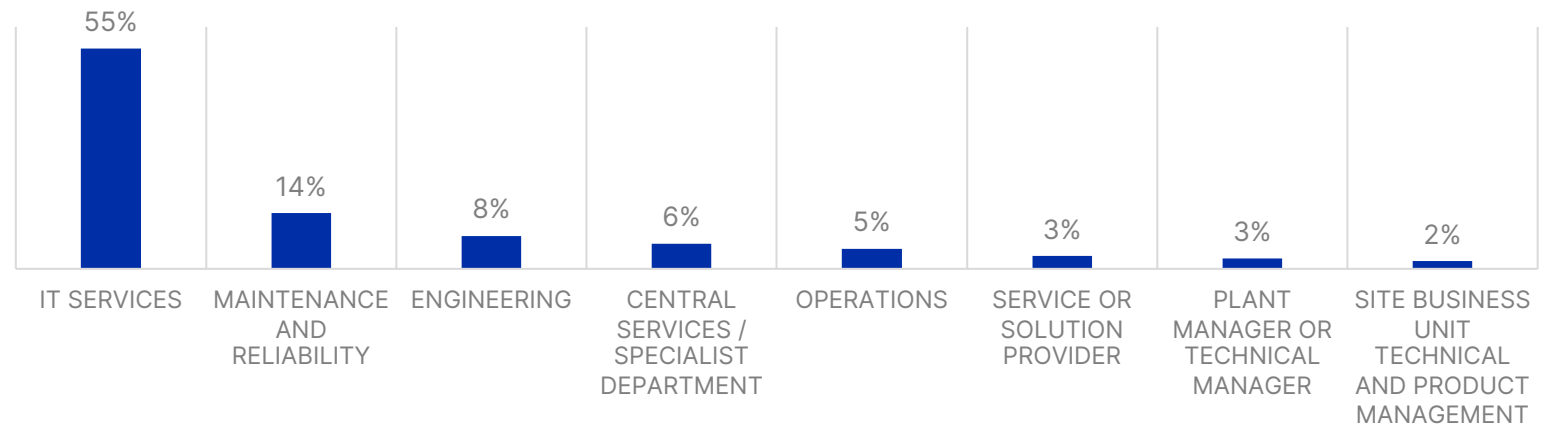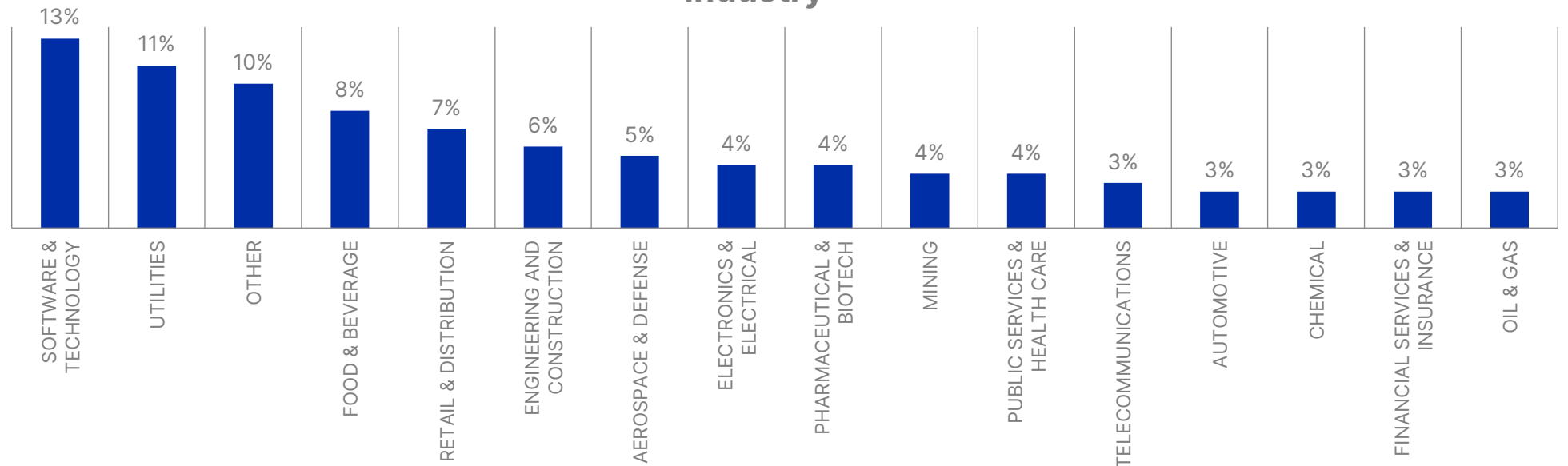| I DO NOT KNOW	$1 BILLION TO $10 BILLION	>$10 BILLION	$10 MILLION TO $199 MILLION	<$10 MILLION	$500 MILLION TO $1 BILLION	$200 MILLION TO $499 MILLION
22%	21%	21%	10%	9%	9%	8%

DETAILED FINDINGS

2

The participants were asked about their enterprise asset management plans and the strategies being implemented.

They were also asked about their organizational roles and the specific market sector in which their organizations operated.

Role

55%	14%	8%	6%	5%	3%	3%	2%
IT SERVICES	MAINTENANCE AND RELIABILITY	ENGINEERING	CENTRAL SERVICES / SPECIALIST DEPARTMENT	OPERATIONS	SERVICE OR SOLUTION PROVIDER	PLANT MANAGER OR TECHNICAL MANAGER	SITE BUSINESS UNIT TECHNICAL AND PRODUCT MANAGEMENT

Industry

13%	11%	10%	8%	7%	6%	5%	4%	4%	4%	4%	3%	3%	3%	3%	3%
SOFTWARE & TECHNOLOGY	UTILITIES	OTHER	FOOD & BEVERAGE	RETAIL & DISTRIBUTION	ENGINEERING AND CONSTRUCTION	AEROSPACE & DEFENSE	ELECTRONICS & ELECTRICAL	PHARMACEUTICAL & BIOTECH	MINING	PUBLIC SERVICES & HEALTH CARE	TELECOMMUNICATIONS	AUTOMOTIVE	CHEMICAL	FINANCIAL SERVICES & INSURANCE	OIL & GAS

DART
MODEL FRAMEWORK

Elevating 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 & machine learning (26%)
- Robotic process automation (25%)
- Asset condition monitoring and sensors (25%)
- Edge computing & analytics (25%)
- Mobility solutions (24%)
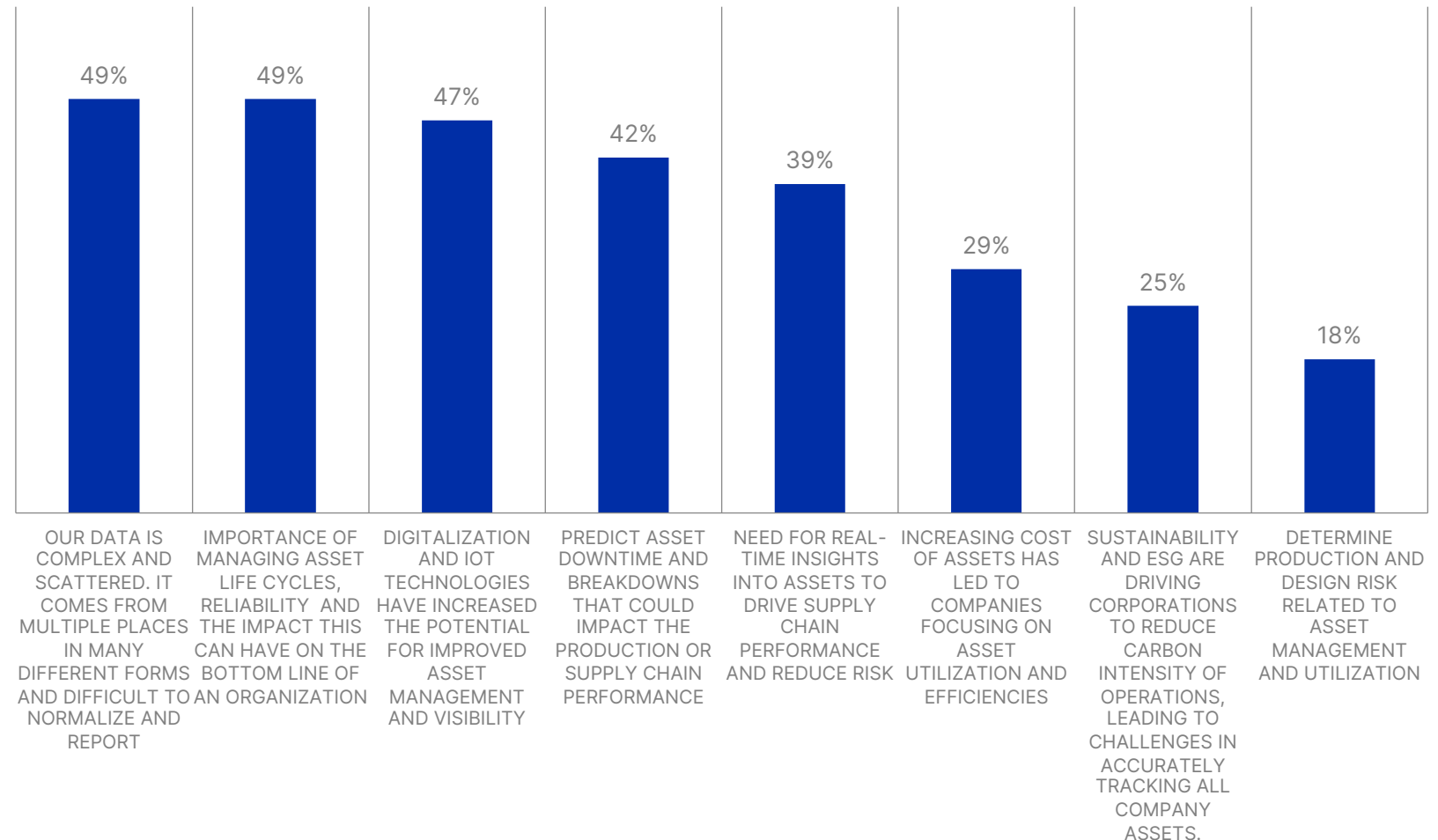
* Within 6-24 months

DETAILED FINDINGS

3

The top three factors driving asset management are the challenges posed by complex and diverse data resulting from legacy systems, the direct impact of asset performance on company financial performance, and the opportunities presented by emerging technologies such as the Internet of Things (IoT).

These recurring themes highlight the significance of data in predictive and prescriptive maintenance, the need to connect asset management with financial outcomes, and the advancements in efficiency and performance brought about by IoT, data analytics, and AI/ML.

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

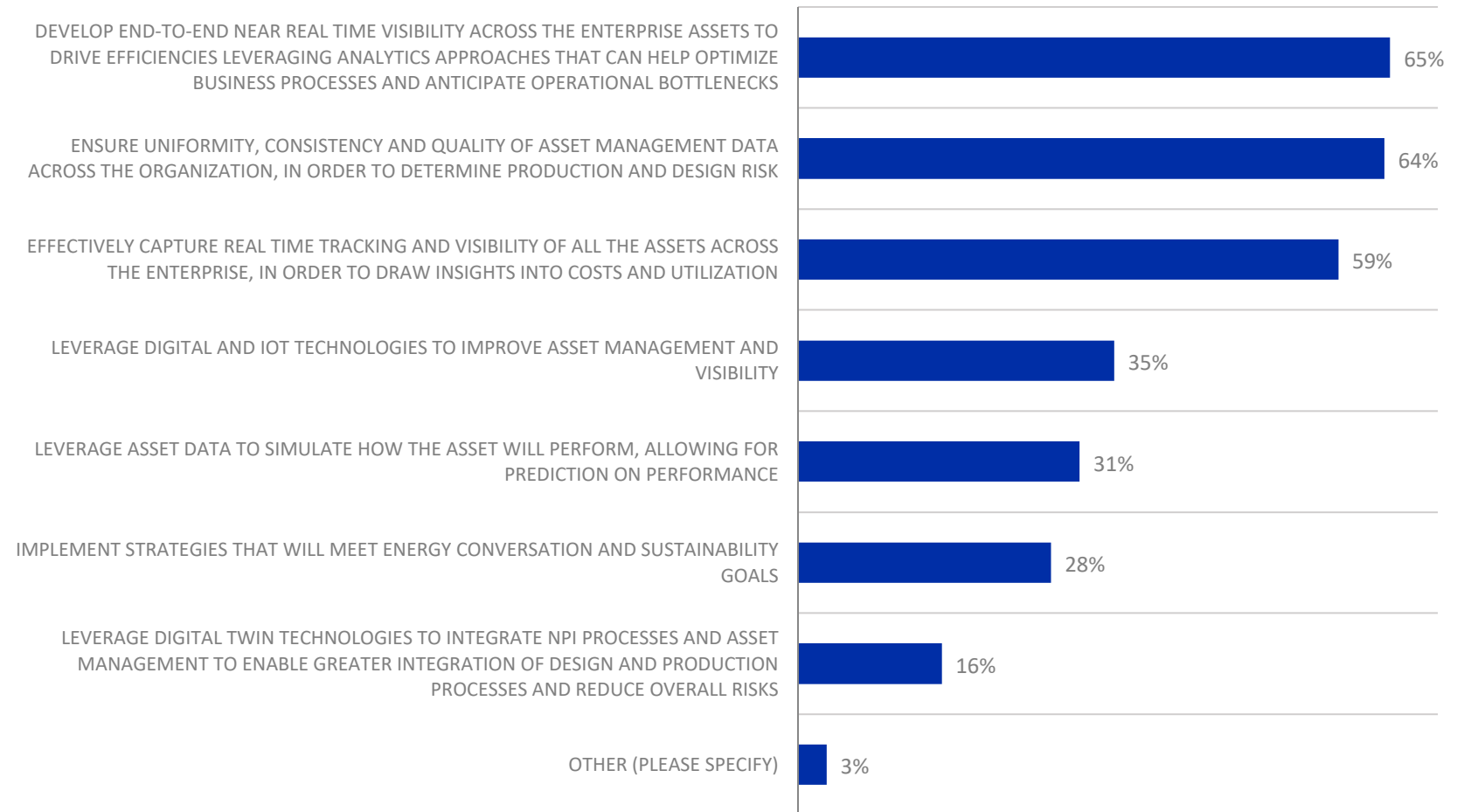| Driver	%
OUR DATA IS COMPLEX AND SCATTERED. IT COMES FROM MULTIPLE PLACES IN MANY DIFFERENT FORMS AND DIFFICULT TO NORMALIZE AND REPORT	49%
IMPORTANCE OF MANAGING ASSET LIFE CYCLES, RELIABILITY AND THE IMPACT THIS CAN HAVE ON THE BOTTOM LINE OF AN ORGANIZATION	49%
DIGITALIZATION AND IOT TECHNOLOGIES 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%
NEED FOR REAL-TIME INSIGHTS INTO ASSETS TO DRIVE SUPPLY CHAIN PERFORMANCE AND REDUCE RISK	39%
INCREASING COST OF ASSETS HAS LED TO COMPANIES FOCUSING ON ASSET UTILIZATION AND EFFICIENCIES	29%
SUSTAINABILITY AND ESG ARE DRIVING CORPORATIONS TO REDUCE CARBON INTENSITY OF OPERATIONS, LEADING TO CHALLENGES IN ACCURATELY TRACKING ALL COMPANY ASSETS.	25%
DETERMINE PRODUCTION AND DESIGN RISK RELATED TO ASSET MANAGEMENT AND UTILIZATION	18%

DETAILED FINDINGS

4

In response to the drivers, companies are developing asset management strategies that prioritize end-to-end asset visibility, consistent and high-quality asset management data, and real-time asset tracking for insights into costs and utilization.

However, these strategies rely on a robust cloud strategy to be effective. Organizations must move away from the traditional on-premise deployment models and leverage the cloud and the benefits it offers such as increased data storage capacity, enhanced security measures, and seamless integration with other applications.

Strategies that are Being Prioritized to Address Top Drivers

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 ACROSS THE ORGANIZATION, IN ORDER TO DETERMINE PRODUCTION AND DESIGN RISK — 64%

EFFECTIVELY CAPTURE REAL TIME TRACKING AND VISIBILITY OF ALL THE ASSETS ACROSS THE ENTERPRISE, IN ORDER TO DRAW INSIGHTS INTO COSTS AND UTILIZATION — 59%

LEVERAGE DIGITAL AND IOT TECHNOLOGIES TO IMPROVE ASSET MANAGEMENT AND VISIBILITY — 35%

LEVERAGE ASSET DATA TO SIMULATE HOW THE ASSET WILL PERFORM, ALLOWING FOR PREDICTION ON PERFORMANCE — 31%

IMPLEMENT STRATEGIES THAT WILL MEET ENERGY CONVERSATION AND SUSTAINABILITY GOALS — 28%

LEVERAGE DIGITAL TWIN TECHNOLOGIES TO INTEGRATE NPI PROCESSES AND ASSET MANAGEMENT TO ENABLE GREATER INTEGRATION OF DESIGN AND PRODUCTION PROCESSES AND REDUCE OVERALL RISKS — 16%
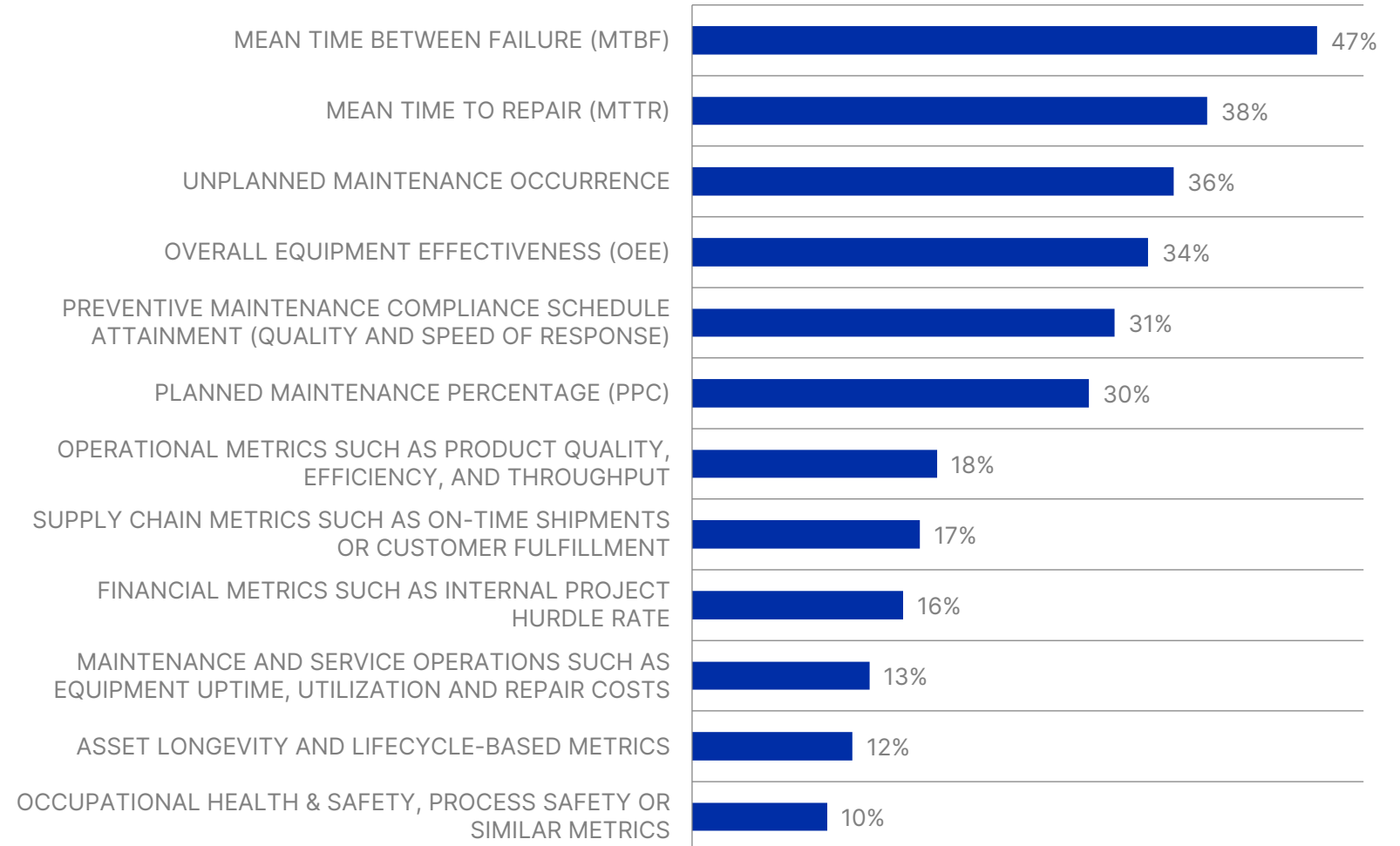
OTHER (PLEASE SPECIFY) — 3%

DETAILED FINDINGS

5

Commonly used metrics for asset performance measurement are mean time between failure (MTBF), mean time to repair (MTTR), unplanned maintenance, and overall equipment effectiveness (OEE).

However, maintenance and reliability leaders aiming to secure support and investment from executives need to connect these operational metrics to the company's financial performance. For instance, in one notable example, a maintenance team demonstrated that a 10% improvement in OEE resulted in a direct profit increase of $9.3 million.
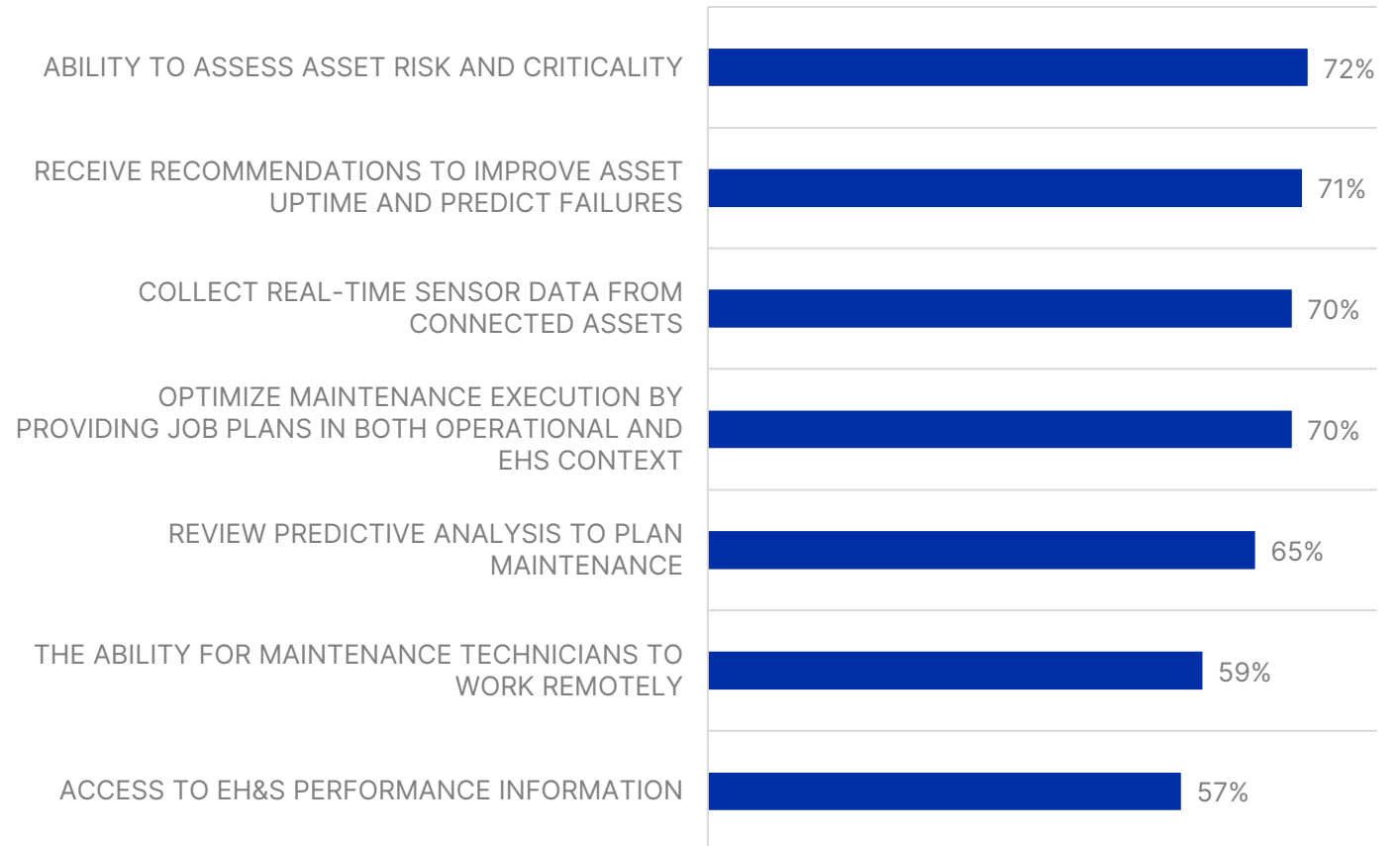
Metrics Used for Asset Performance Measurement

Metric	%
MEAN TIME BETWEEN FAILURE (MTBF)	47%
MEAN TIME TO REPAIR (MTTR)	38%
UNPLANNED MAINTENANCE OCCURRENCE	36%
OVERALL EQUIPMENT EFFECTIVENESS (OEE)	34%
PREVENTIVE MAINTENANCE COMPLIANCE SCHEDULE ATTAINMENT (QUALITY AND SPEED OF RESPONSE)	31%
PLANNED MAINTENANCE PERCENTAGE (PPC)	30%
OPERATIONAL METRICS SUCH AS PRODUCT QUALITY, EFFICIENCY, AND THROUGHPUT	18%
SUPPLY CHAIN METRICS SUCH AS ON-TIME SHIPMENTS OR CUSTOMER FULFILLMENT	17%
FINANCIAL METRICS SUCH AS INTERNAL PROJECT HURDLE RATE	16%
MAINTENANCE AND SERVICE OPERATIONS SUCH AS EQUIPMENT UPTIME, UTILIZATION AND REPAIR COSTS	13%
ASSET LONGEVITY AND LIFECYCLE-BASED METRICS	12%
OCCUPATIONAL HEALTH & SAFETY, PROCESS SAFETY OR SIMILAR METRICS	10%

DETAILED FINDINGS

6

To implement the strategies mentioned earlier, certain functional competencies are necessary. According to respondents, these include the ability to assess asset risk and criticality, receive maintenance recommendations, and collect real-time sensor data from assets.

To effectively carry out predictive maintenance, scheduling work before a failure occurs, an organization must prioritize assets based on criticality, trigger automated workflows using real-time data from connected machines, and sequence interventions in a manner that maximizes asset uptime across the enterprise.

Important or Very Important Functional Requirements

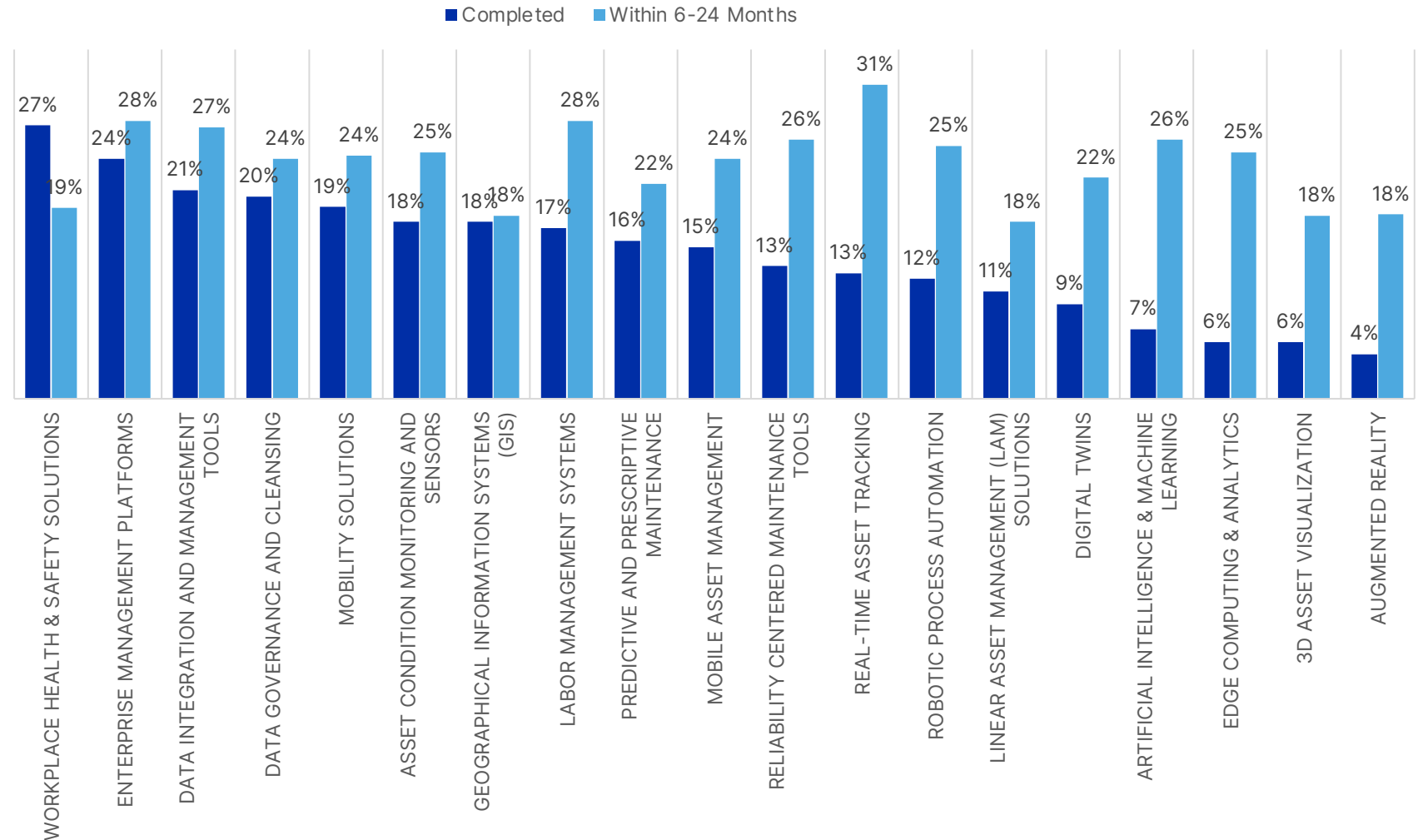| Requirement	Percentage
ABILITY TO ASSESS ASSET RISK AND CRITICALITY	72%
RECEIVE RECOMMENDATIONS TO IMPROVE ASSET UPTIME AND PREDICT FAILURES	71%
COLLECT REAL-TIME SENSOR DATA FROM CONNECTED ASSETS	70%
OPTIMIZE MAINTENANCE EXECUTION BY PROVIDING JOB PLANS IN BOTH OPERATIONAL AND EHS CONTEXT	70%
REVIEW PREDICTIVE ANALYSIS TO PLAN MAINTENANCE	65%
THE ABILITY FOR MAINTENANCE TECHNICIANS TO WORK REMOTELY	59%
ACCESS TO EH&S PERFORMANCE INFORMATION	57%

DETAILED FINDINGS

7

Not surprisingly, atop the list of EAM technologies currently deployed by respondents are mature tools in workplace health and safety, enterprise management platforms, and data integration and management. On the near- and mid-term horizons, companies are planning investments in real-time asset tracking, AI/ML, and reliability centered maintenance tools.

To facilitate future investment, it is recommended to establish an emerging technologies lab involving LOB and IT stakeholders to develop and promote a pipeline of automation use cases.
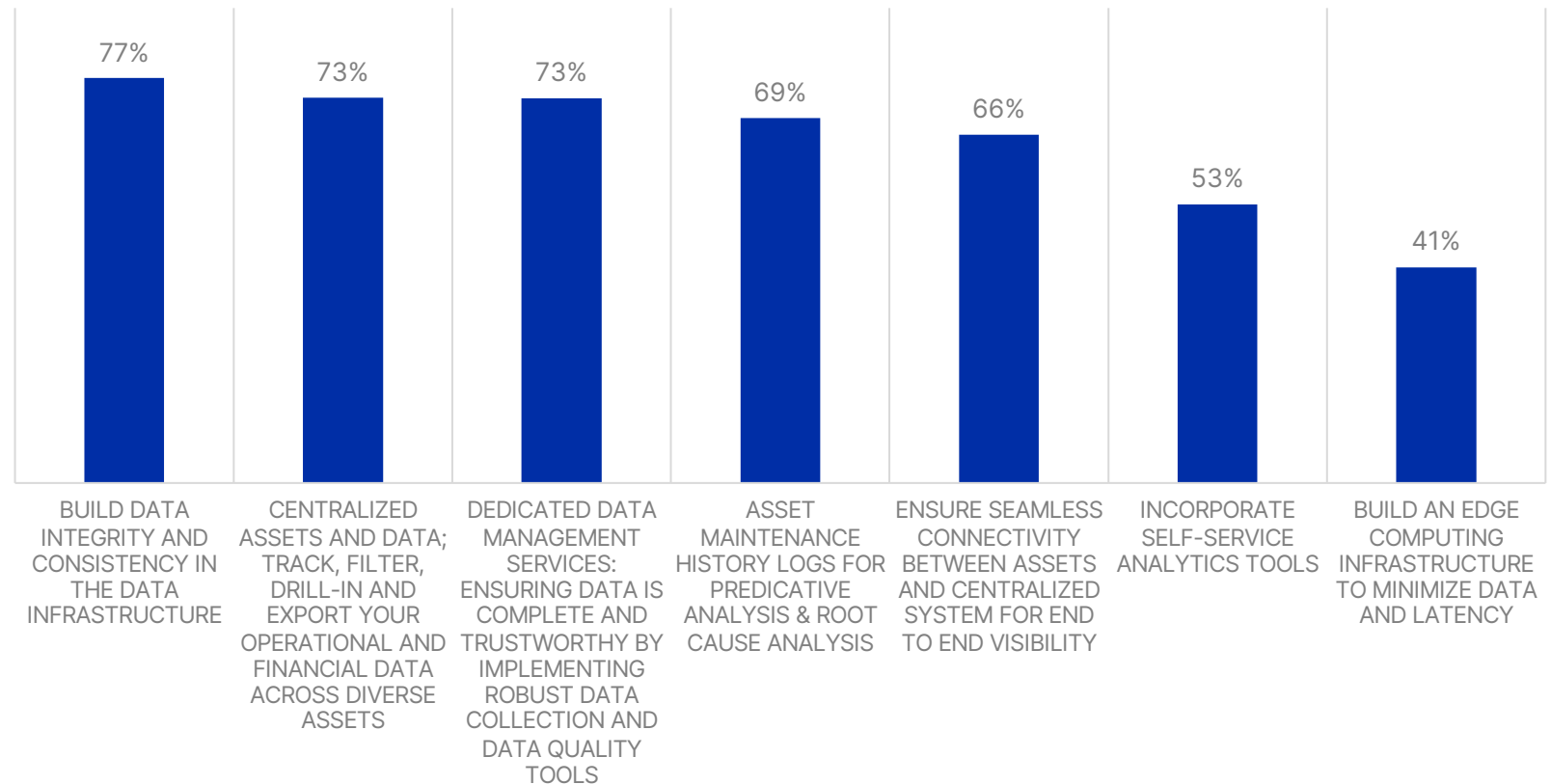
State of EAM Technology Adoption

■ Completed   ■ Within 6-24 Months

Technology	Completed	Within 6-24 Months
WORKPLACE HEALTH & SAFETY SOLUTIONS	27%	19%
ENTERPRISE MANAGEMENT PLATFORMS	24%	28%
DATA INTEGRATION AND MANAGEMENT TOOLS	21%	27%
DATA GOVERNANCE AND CLEANSING	20%	24%
MOBILITY SOLUTIONS	19%	24%
ASSET CONDITION MONITORING AND SENSORS	18%	25%
GEOGRAPHICAL INFORMATION SYSTEMS (GIS)	18%	18%
LABOR MANAGEMENT SYSTEMS	17%	28%
PREDICTIVE AND PRESCRIPTIVE MAINTENANCE	16%	22%
MOBILE ASSET MANAGEMENT	15%	24%
RELIABILITY CENTERED MAINTENANCE TOOLS	13%	26%
REAL-TIME ASSET TRACKING	13%	31%
ROBOTIC PROCESS AUTOMATION	12%	25%
LINEAR ASSET MANAGEMENT (LAM) SOLUTIONS	11%	18%
DIGITAL TWINS	9%	22%
ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	7%	26%
EDGE COMPUTING & ANALYTICS	6%	25%
3D ASSET VISUALIZATION	6%	18%
AUGMENTED REALITY	4%	18%

DETAILED FINDINGS

8

If you break down the various EAM technologies into their core capabilities, there are a few that were deemed most important by respondents: data integrity and consistency in the data infrastructure, centralized assets and data, and dedicated data management services.

These capabilities highlight the importance of effective data management in any EAM strategy, which requires reliable cloud-based tools and processes for various tasks such as capturing, storing, cleaning, updating, analyzing, and integrating asset and related data in a centralized repository. Without these robust data management tools and processes, an EAM strategy is likely to fail.

Important or Very Important
Asset Management Solution Capabilities

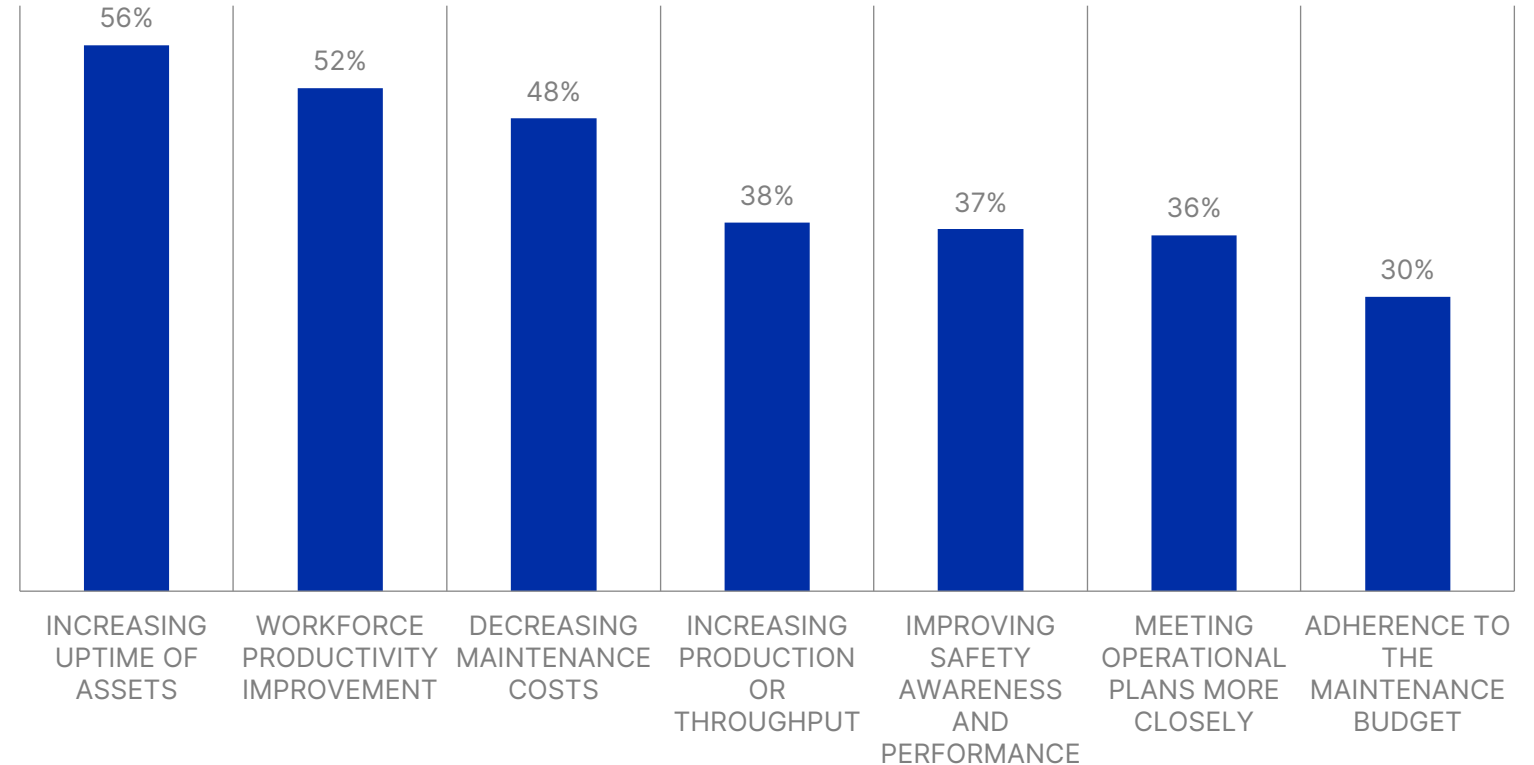| Capability	Percentage
BUILD DATA INTEGRITY AND CONSISTENCY IN THE DATA INFRASTRUCTURE	77%
CENTRALIZED ASSETS AND DATA; TRACK, FILTER, DRILL-IN AND EXPORT YOUR OPERATIONAL AND FINANCIAL DATA ACROSS DIVERSE ASSETS	73%
DEDICATED DATA MANAGEMENT SERVICES: ENSURING DATA IS COMPLETE AND TRUSTWORTHY BY IMPLEMENTING ROBUST DATA COLLECTION AND DATA QUALITY TOOLS	73%
ASSET MAINTENANCE HISTORY LOGS FOR PREDICATIVE ANALYSIS & ROOT CAUSE ANALYSIS	69%
ENSURE SEAMLESS CONNECTIVITY BETWEEN ASSETS AND CENTRALIZED SYSTEM FOR END TO END VISIBILITY	66%
INCORPORATE SELF-SERVICE ANALYTICS TOOLS	53%
BUILD AN EDGE COMPUTING INFRASTRUCTURE TO MINIMIZE DATA AND LATENCY	41%

DETAILED FINDINGS

9

To make the case for investment in asset management tools and programs, companies are leaning on traditional metrics like asset uptime, workforce productivity, and maintenance costs.

However, to be successful, maintenance leaders should collaborate with corporate stakeholders to demonstrate how maintenance operations contribute to the overall financial performance of the company. This involves identifying operational strategies that directly impact both revenue generation and cost reduction.

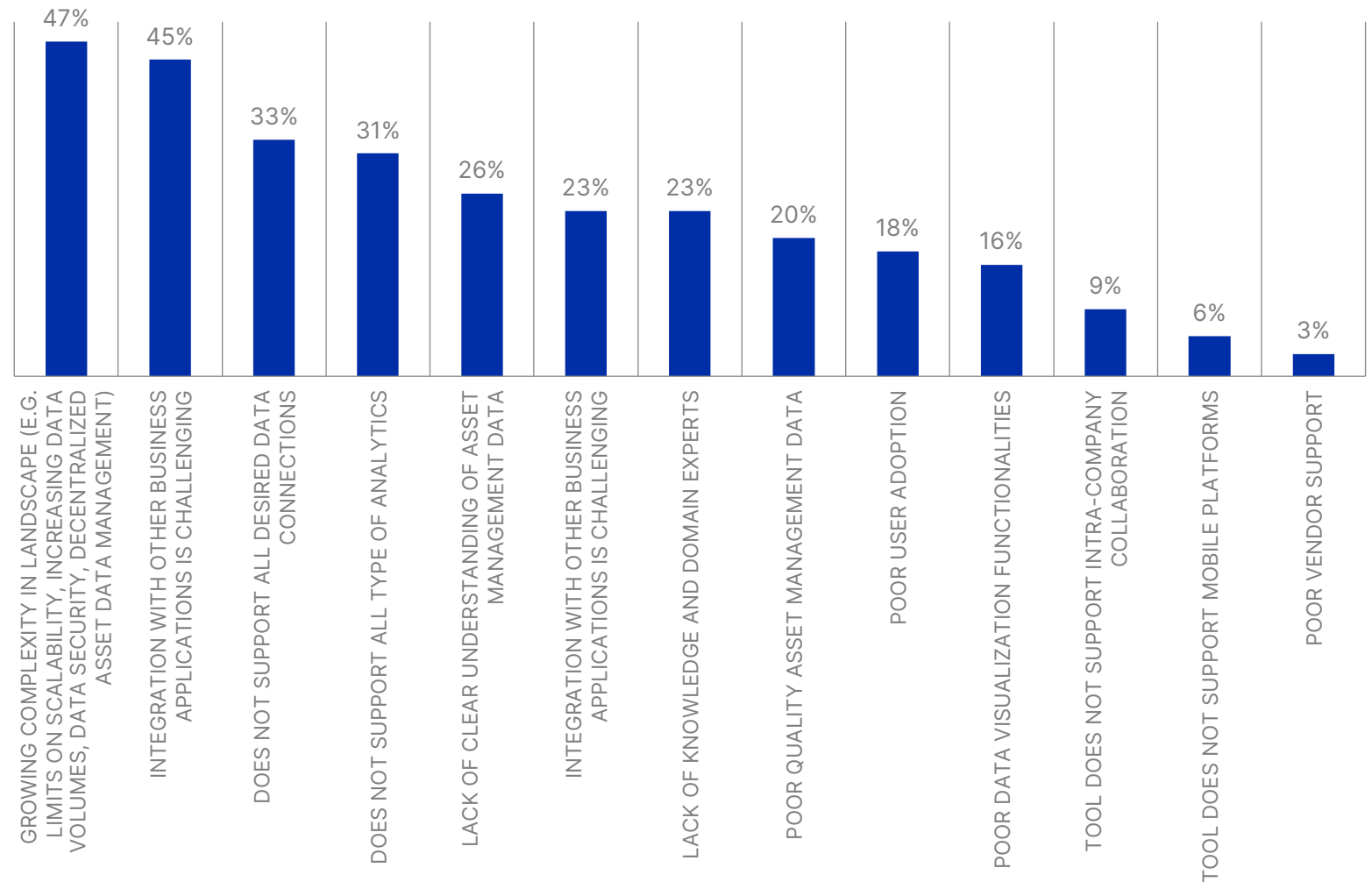## Justification for Investment In an Asset Management Program

56%	INCREASING UPTIME OF ASSETS
52%	WORKFORCE PRODUCTIVITY IMPROVEMENT
48%	DECREASING MAINTENANCE COSTS
38%	INCREASING PRODUCTION OR THROUGHPUT
37%	IMPROVING SAFETY AWARENESS AND PERFORMANCE
36%	MEETING OPERATIONAL PLANS MORE CLOSELY
30%	ADHERENCE TO THE MAINTENANCE BUDGET

DETAILED FINDINGS

10

Respondents identified two top challenges with existing EAM tools — the struggle to adapt and scale with increasing business complexities, and the difficulty in integrating these tools with other business applications.

However, these difficulties can be addressed through a cloud-based deployment strategy. The cloud offers companies the flexibility to expand and adapt to changes in their supply base and other disruptions in the asset lifecycle. Additionally, integrations are easier in the cloud. Supply chain systems integration is crucial for analyzing asset performance in relation to supply chain logistics and productivity.

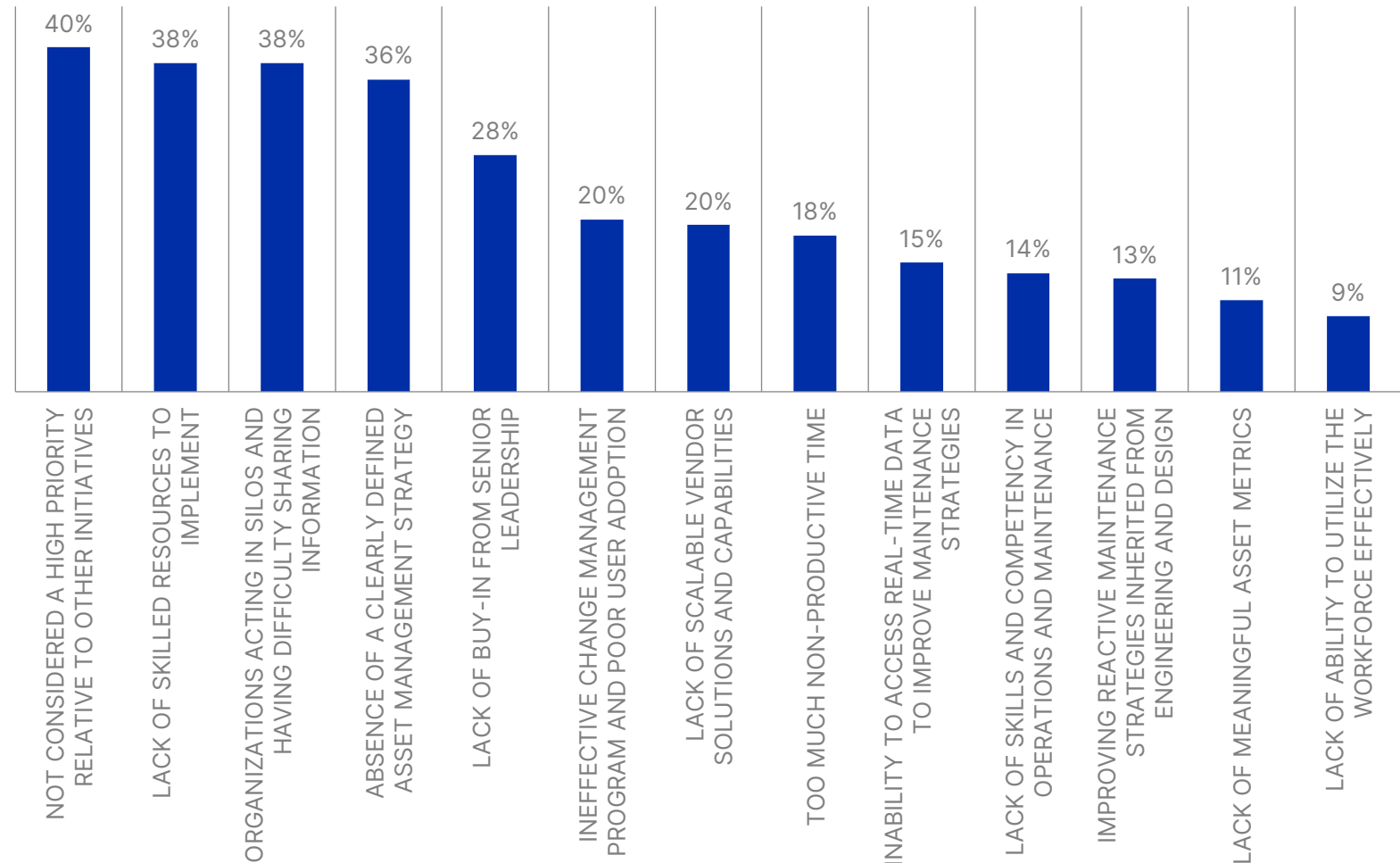## Key Challenges with Current Enterprise Asset Management Tools

Challenge	%
GROWING COMPLEXITY IN LANDSCAPE (E.G. LIMITS ON SCALABILITY, INCREASING DATA VOLUMES, DATA SECURITY, DECENTRALIZED ASSET DATA MANAGEMENT)	47%
INTEGRATION WITH OTHER BUSINESS APPLICATIONS IS CHALLENGING	45%
DOES NOT SUPPORT ALL DESIRED DATA CONNECTIONS	33%
DOES NOT SUPPORT ALL TYPE OF ANALYTICS	31%
LACK OF CLEAR UNDERSTANDING OF ASSET MANAGEMENT DATA	26%
INTEGRATION WITH OTHER BUSINESS APPLICATIONS IS CHALLENGING	23%
LACK OF KNOWLEDGE AND DOMAIN EXPERTS	23%
POOR QUALITY ASSET MANAGEMENT DATA	20%
POOR USER ADOPTION	18%
POOR DATA VISUALIZATION FUNCTIONALITIES	16%
TOOL DOES NOT SUPPORT INTRA-COMPANY COLLABORATION	9%
TOOL DOES NOT SUPPORT MOBILE PLATFORMS	6%
POOR VENDOR SUPPORT	3%

DETAILED FINDINGS

11

Companies face several obstacles when implementing EAM solutions. These challenges include 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, and technologies. This strategy should be developed with key stakeholders from IT, maintenance, and the corporate level. It is also important to underscore the impact of asset performance on revenue, profit, and customer experience.

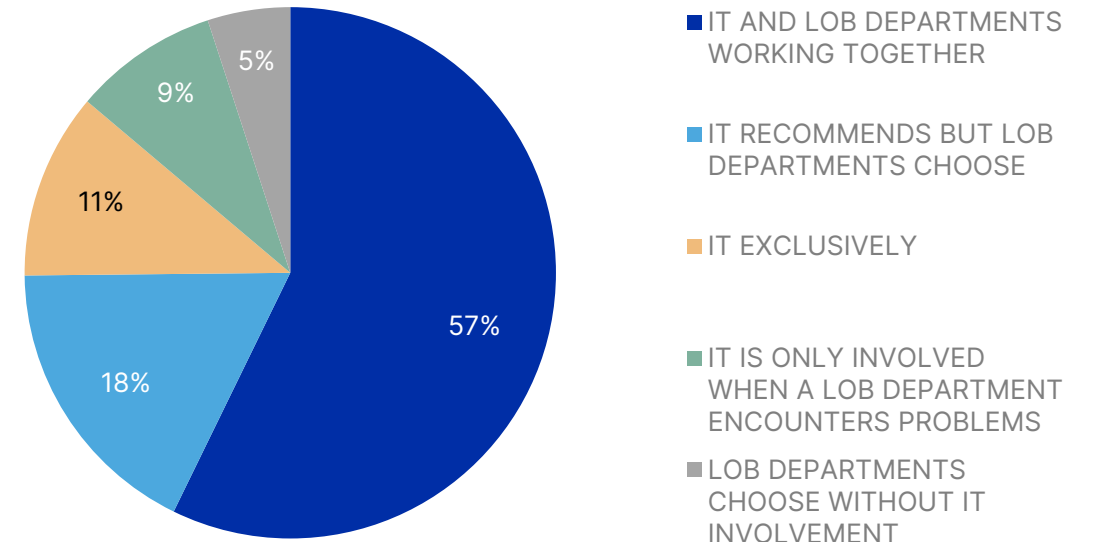## Key Obstacles to Implementing Enterprise Asset Management Solutions

Obstacle	Percentage
NOT CONSIDERED A HIGH PRIORITY RELATIVE TO OTHER INITIATIVES	40%
LACK OF SKILLED RESOURCES TO IMPLEMENT	38%
ORGANIZATIONS ACTING IN SILOS AND HAVING DIFFICULTY SHARING INFORMATION	38%
ABSENCE OF A CLEARLY DEFINED ASSET MANAGEMENT STRATEGY	36%
LACK OF BUY-IN FROM SENIOR LEADERSHIP	28%
INEFFECTIVE CHANGE MANAGEMENT PROGRAM AND POOR USER ADOPTION	20%
LACK OF SCALABLE VENDOR SOLUTIONS AND CAPABILITIES	20%
TOO MUCH NON-PRODUCTIVE TIME	18%
INABILITY TO ACCESS REAL-TIME DATA TO IMPROVE MAINTENANCE STRATEGIES	15%
LACK OF SKILLS AND COMPETENCY IN OPERATIONS AND MAINTENANCE	14%
IMPROVING REACTIVE MAINTENANCE STRATEGIES INHERITED FROM ENGINEERING AND DESIGN	13%
LACK OF MEANINGFUL ASSET METRICS	11%
LACK OF ABILITY TO UTILIZE THE WORKFORCE EFFECTIVELY	9%

DETAILED FINDINGS

12

Companies are experiencing advantages by involving both Line of Business (LOB) and IT departments in making decisions regarding asset management solutions. However, this collaboration should not be limited to internal departments. It should also extend to include Original Equipment Manufacturers (OEMs), component suppliers, operators, and service providers. This broader collaboration, referred to as "asset collaboration," aims to optimize Enterprise Asset Management (EAM) by facilitating the sharing of information and coordination of processes among all stakeholders involved in managing assets.

The primary objective of asset collaboration is to align the efforts of all participants in the asset ecosystem. This alignment ensures efficient and effective utilization of assets, minimizes downtime, reduces commissioning and maintenance costs, and enhances overall operational performance.

Which Group Makes Asset Management Solution Decisions?

- **IT AND LOB DEPARTMENTS WORKING TOGETHER** — 57%
- **IT RECOMMENDS BUT LOB DEPARTMENTS CHOOSE** — 18%
- **IT EXCLUSIVELY** — 11%
- **IT IS ONLY INVOLVED WHEN A LOB DEPARTMENT ENCOUNTERS PROBLEMS** — 9%
- **LOB DEPARTMENTS CHOOSE WITHOUT IT INVOLVEMENT** — 5%

THANK YOU

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