

Trends in Asset Management Report 2025



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Setting the standard for industry best practices



Setting the standard for industry best practices

Good enterprise asset management (EAM) practices are fundamental to how asset owners build and sustain the infrastructure that supports the way we live and work. As a leading enterprise asset management company, Pragma works with more than 390 clients globally to refine the processes, skills, and systems essential for building a solid EAM capability.

Our work with clients across the globe as well as our proprietary Asset Management Improvement Planning (AMIP) benchmark allow us to generate valuable data and insights relating to asset management maturity.

These insights inform both industry best practices and the ongoing evolution of our asset management solutions. They help organisations navigate shifting policies, regulations, technologies, and workforce dynamics to stay ahead of the challenges defining the future of enterprise asset management.



Leveraging insights from our extensive benchmarking efforts and the research carried out by our advisory, business process outsourcing, and EAM software implementation teams, we continue to set the standard for industry best practices.

Drawing on this wealth of expertise, we present the top ten trends that will shape the future of enterprise asset management. Where relevant, we have used insights from our AMIP assessment database to provide insight into how these trends are evolving.

The latest iteration of the AMIP framework encompasses

20 key performance areas and over

3,800 verification points,

offering clients a structured approach to assess their asset management maturity and pinpoint areas for improvement.

Look out for a launch report describing our latest AMIP framework later in 2025.

The changing context for asset and maintenance managers



The changing context for asset and maintenance managers

Good enterprise asset management practices are constantly influenced by global geopolitical, supply chain, and technological factors. These factors combine to create a dynamic environment that challenges asset managers to continually adapt their strategies, tools, processes, and systems to maintain operational efficiency and effectiveness.

Political and regulatory complexity



Regulatory compliance

Adherence to safety and environmental regulations is crucial. Asset owners must stay up to date with relevant standards and ensure maintenance practices meet compliance requirements.



Sustainability goals

Global sustainability co-operation agreements, consumer preferences, and a focus on responsible corporate citizenship have compelled manufacturers to create energy-efficient equipment designs, reduce their carbon footprints, and use sustainable materials. Asset managers are increasingly tasked with implementing eco-friendly practices to reduce waste and make operations more energy-efficient.



Global supply chain dynamics

Disruptions to the global supply chain can affect the availability of spare parts and maintenance resources, which means asset managers need to develop sourcing strategies that support operational resilience. Recent global supply chain instability has prompted manufacturers to design machinery that is easier to repair and upgrade locally, reducing the dependency on specific spare parts or suppliers.



Rapidly changing technology



Changing asset design

As equipment design continues to evolve, so do related maintenance strategies. Design elements such as modularisation, component standardisation, the increased use of sensors, onboard intelligence, and the emergence of autonomous assets add further complexity to asset management practices.



Remote monitoring and management

The push towards digital transformation has accelerated the use of realtime monitoring technologies, allowing asset managers to oversee equipment performance remotely and respond quickly to issues.



Data-driven decision-making

The increasing availability of data analytics tools enables asset managers to make informed decisions based on equipment performance metrics, historical data, and predictive insights. An increasing investment in software and skills development is required to maximise the benefits of these tools.



Advancements in industrial technology

The rapid evolution of technology, including the Internet of Things (IoT), artificial intelligence (AI), and increased levels of automation requires asset management professionals to adapt to new tools and systems with capabilities such as predictive maintenance and realtime condition monitoring.

Complex operating context



Workforce challenges

Experienced technicians are ageing and leaving the workforce. They are not being replaced fast enough, creating a growing skills gap in the technical workforce. This makes it essential for asset owners to invest in training and recruitment to build a competent team.



Cost management

Economic pressures necessitate effective budget management. Organisations (and their asset managers) must constantly balance cost-containment with the need for reliable equipment and minimal downtime.



Client expectations

Rising client expectations for quality and service reliability are leading to new client-facing operating models and maintenance processes. The need for quicker production cycles, custom product configuration, and increased efficiency has influenced how machinery is designed, leading to more flexible, adaptable production facilities that can handle a variety of processes and respond quickly to changes in production demands or external conditions.



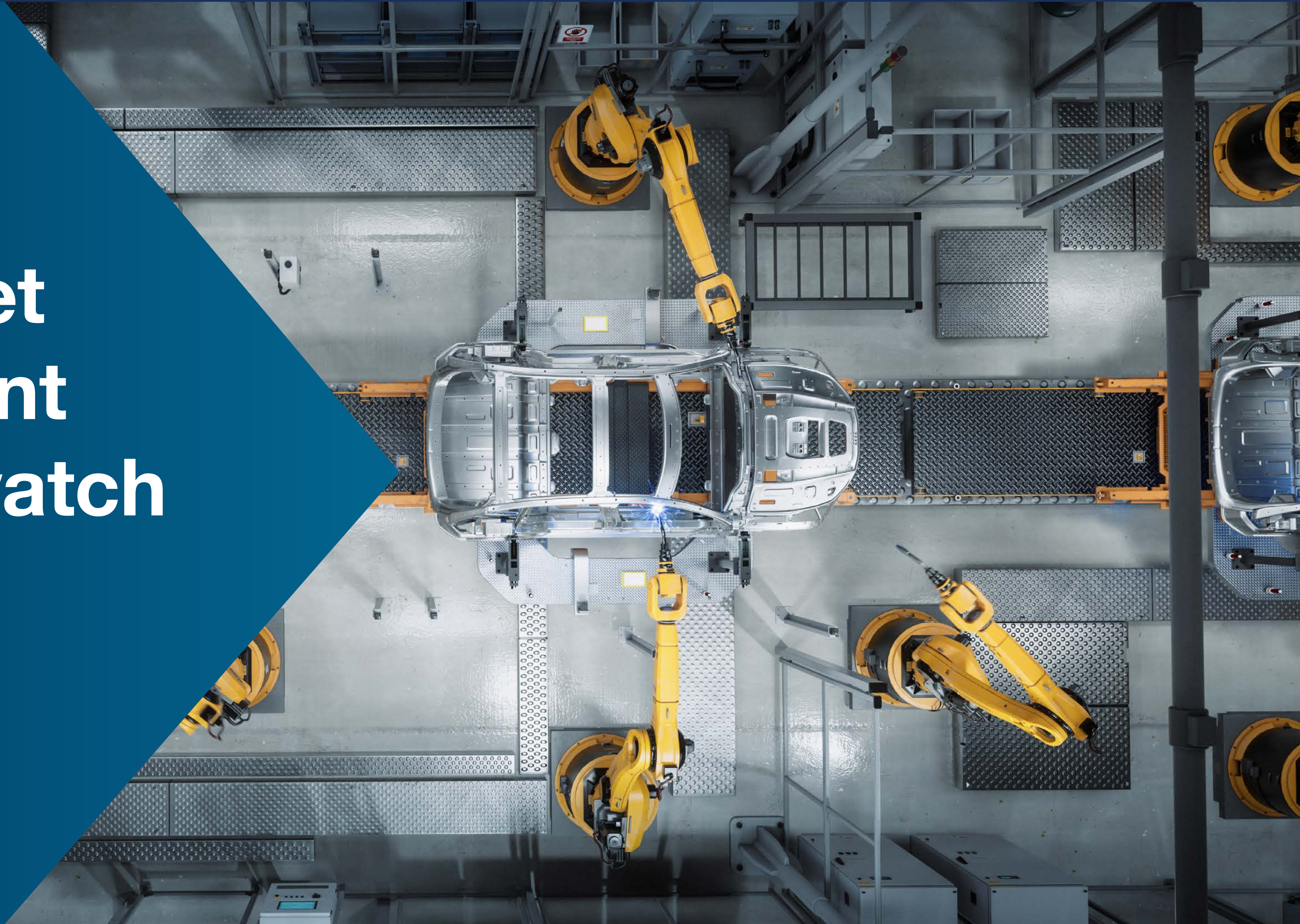
Cross-functional collaboration

Enhanced collaboration between maintenance and operations teams and management is critical for aligning maintenance strategies with organisational goals and production needs.

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The interplay of these factors is redefining leading practice in enterprise asset management, and it is in this context that we explore the top trends to watch in the coming years.

Top 10 asset management trends to watch in 2025



Research and insights from real-world sources

From advisory and training to business process outsourcing and EAM software implementation, Pragma provides a range of specialist asset management services to clients across the globe.

With teams of professionals solving real-world problems for clients in diverse industries, every day, we have direct access to the latest challenges, trends and technologies in our industry.

Through our four communities of practice (CoPs), our experts from around the world regularly discuss emerging technology, process refinements, and lessons learned from across our client base.

These CoPs provide invaluable research data from real-world sources, and we draw on this data for our annual trends reports.

Top 10 trends at a glance

Based on our research, we believe the following trends will come under the spotlight in 2025 and beyond:

- 01 Managing maintenance data quality – the foundation of the digital twin
- 02 Improving data utilisation and value delivery with AI and ML
- 03 Increased use of condition-based and predictive maintenance technologies
- 04 Moving to precision maintenance
- 05 Renewed focus on work management fundamentals
- 06 Increased integration with the sourcing and procurement function
- 07 Evolving servitisation models for original equipment manufacturers
- 08 Maintaining and expanding institutional knowledge
- 09 Improving the impact of learning programmes through coaching and mentoring
- 10 Enabling improved ESG and sustainability practices





01

Managing maintenance data quality – the foundation of the digital twin

Digital twins are being used more and more in asset management as organisations increase their digitisation and digital transformation efforts.

The concept of digital twins has been around for several years. In principle, a digital twin is a virtual representation of a physical object, system, or process that uses realtime data and simulations to mirror its characteristics, behaviour, and performance. This virtual representation allows for scenario analysis, performance monitoring, and design optimisation of the physical counterpart by providing insights into how it operates and how it can be improved.



Use cases for digital twins

Condition-based and predictive maintenance

Digital twins analyse realtime data from sensors placed on assets to predict failures before they occur. By evaluating performance trends and identifying anomalies, maintenance teams can schedule maintenance proactively, thereby preventing failures, minimising downtime, and reducing repair costs.

Simulation and testing

Maintenance teams can use digital twins to simulate different maintenance strategies and scenarios. This helps asset owners understand the reliability and cost impact of various tactics without risking the actual asset, resulting in more effective maintenance planning.

Schedule optimisation

By continuously analysing maintenance and failure data, digital twins can optimise maintenance schedules based on the actual usage, breakdown work required, safety exposure, and condition of the asset rather than relying solely on manufacturer recommendations or fixed intervals. This helps to reduce costs and increase asset availability.

Documentation

Digital twins can maintain a comprehensive record of asset status, maintenance history, and performance metrics. This makes it easier for maintenance teams to perform root cause analysis and track statutory compliance over time.

4D shutdown scheduling

4D scheduling can combine the use of a 3D model of the physical plant with the shutdown-time schedule to optimise the movement of equipment during a shutdown, and to measure and report progress.

Training and support

Maintenance teams can use digital twins as training tools, simulating realworld scenarios they may encounter. This enhances their preparedness and response skills without affecting equipment availability.

Remote monitoring through integration with IoT devices

When combined with IoT devices, digital twins can provide a holistic view of asset performance across different locations, making it easier to manage assets that are part of larger networks or systems. Performance issues or breakdowns can be automatically detected and corrective actions triggered without human intervention.



Emerging focus areas

01

Maintaining the accuracy of the digital twin

Knowing which assets a company owns as well as their exact configuration and location is the foundation of an accurate digital twin. Asset owners are reviewing asset registers for accuracy to ensure the locations as well as the functional- and component-level breakdowns are accurate. This allows for all maintenance tactics, work order data, and spare parts data to be assigned correctly, thereby enabling accurate and granular planning and analysis.

02

Updating asset and component criticality

Not all asset (or component) failures have the same impact on production output or safety. Asset owners will therefore develop and update criticality matrices for their asset base to ensure the appropriate selection of tactics and spare parts holding to improve overall system reliability. Given the cost of data acquisition, asset criticality also determines priorities for data collection, storage, and processing.

03

Reviewing tactics for condition monitoring

Improvements in sensor design and the development of reliable, low-cost edge devices have made it easier and cheaper to gather condition and performance data from equipment.

04

Capturing failure data

Without access to information about the root cause of failures or the impact of failure on production output, safety, or risk, it is very difficult to make improvements to equipment design and maintenance practices. Asset owners are therefore updating data models and operating procedures to ensure all failure data is captured against the appropriate assets. This enables them to better analyse failure trends and reliability, and improve their selection of maintenance tactics.

05

Cleaning up bill of materials (BOM) and spare parts data

Poor spare parts availability can significantly impact equipment reliability, even if proper maintenance tactics and work planning processes are in place. Spare parts procurement is usually seen as a supply chain responsibility, but procurement needs accurate spare parts demand forecasts to ensure adequate availability of parts. Asset owners are spending more time during operational-readiness projects and after asset commissioning to ensure that vital spare parts information such as the BOM, costs, and lead times are captured. This supports more accurate demand forecasting and efficient procurement practices.

06

Implementing data strategy and governance

Data integrity is key to realising sustainable benefits from a digital twin. At the same time, data models must be standardised to ensure interoperability between systems. To maintain clean master data sets and improve speed to access for all potential users, asset owners need to implement agile data strategies and governance structures as part of managing an evolving enterprise architecture.

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● 2. Realising value from AI and ML

○ 3. PDM and CBM technology adoption

○ 4. Moving to precision maintenance

○ 5. Focus on fundamentals

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○ 8. Managing institutional knowledge

○ 9. Impact through coaching and mentoring

○ 10. Enabling ESG and sustainability



02

Improving data utilisation and value delivery with AI and ML

Increasing levels of industrial automation, widespread digitalisation programmes, the proliferation of cheap sensors, and improving connectivity have facilitated the collection and storage of vast amounts of data. Recently, access to powerful AI and machine learning (ML) tools has opened many opportunities to better integrate and utilise data sets.

Open-access large language models such as ChatGPT and DeepSeek, and the machine-learning algorithms provided by companies like Microsoft and Amazon, have created significant opportunities for asset managers to extract more value from data sets.



Use cases for AI and ML

Improved failure detection and prediction

AI algorithms can analyse realtime and historical failure data and detect patterns that indicate when equipment is likely to fail. This allows organisations to schedule maintenance before failures occur, thereby minimising downtime.

Enhanced condition monitoring

ML models can analyse realtime data from IoT sensors to assess the condition of assets continuously, providing alerts when performance deviates from normal patterns. Analyses occur in near-realtime, and accuracy is improved by reducing the dependence on human interpretation of the data.

Automated maintenance scheduling

Where an asset base is standardised and maintenance tasks well understood, maintenance scheduling can be completely automated. Teams can be dispatched based on realtime geolocation, and work completion can be monitored through mobile apps and the use of advanced algorithms.

Easier data-driven decision-making

AI tools can enhance traditional business intelligence applications. They can process and analyse large datasets from various sources, such as maintenance records and sensor data, to generate useful visualisations and actionable insights. This enables better-informed maintenance decisions, optimising resources and reducing unnecessary work.

Faster root cause analysis and failure pattern detection

AI can help identify the root causes of equipment failures by analysing historical failure data and operational conditions and linking these to specific failure modes. This insight allows maintenance teams to address underlying issues rather than just symptoms.

More accurate anomaly detection

ML algorithms can detect unusual patterns in equipment performance, indicating potential failures, quality problems or operational inefficiencies. Early detection allows for timely intervention.

Optimisation of maintenance schedules

AI models can optimise maintenance schedules by considering factors like equipment usage, resource availability, historical failure rates, and seasonal performance variations. This ensures that maintenance is performed at the most effective times, balancing costs and performance.

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Enhanced safety and compliance

By analysing data from equipment inspections and statutory operational procedures, AI applications can monitor compliance with safety standards and regulations. This helps to improve compliance reporting, reduce the risk of accidents, and maintain safety measures.

Training and knowledge transfer

AI chatbots are appearing everywhere, from vendor websites to EAM software and EAM help desks. The bots make it easy to search large amounts of unstructured data from sources such as application specifications and training manuals, improving employee efficiency in the areas of training and support.





Emerging focus areas

01

Selecting technology providers

Not all AI platforms are designed for the same range of use cases, and many may not be compatible with all enterprise architecture elements in an organisation. When selecting their AI platform, asset owners should consider factors such as the quality of the available technology stack, scalability, integration capability, data security, availability of support, and cost.

02

Developing AI policies

The introduction of AI and ML technologies will create a variety of policy and regulatory challenges for asset owners. Developing clear policy guidelines governing which technologies can be used, and under which governance rules, will help organisations address emerging legal and regulatory risks. Key policy elements include ethical guidelines, data governance rules, bias mitigation strategies, data-privacy rules, and regulatory compliance guidelines.

03

Updating maintenance data models

When using AI for applications such as schedule optimisation or failure prediction, enterprise data models and standards need to be updated to reflect additional elements such as environmental data, staff skills and availability, production loss, and environmental hazard information.

04

Developing proofs of concept for value cases

When first exploring the use cases for AI and ML technology, many asset owners prefer to start with developing a proof of concept (PoC) for one or several value cases relevant to their business model. To contain costs and manage risk, organisations should develop a clear scope definition, confirm data availability, select a specific technology stack, and specify clear performance metrics. A post-PoC strategy should also be established to either develop and scale the value case further or discard it.

05

Reassessing cybersecurity

Introducing AI and ML technology into an existing enterprise architecture increases the attack surface and associated risk. When reviewing the cybersecurity implications of these technologies, asset owners need to consider data security, data-privacy compliance requirements, ethics, access control, and incident response protocols.

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03

Increased use of condition-based and predictive maintenance technologies

Access to cheaper and more reliable sensor technology, powerful processing capabilities, and advanced machine-learning algorithms have increased the speed at which condition-based maintenance (CBM) and predictive maintenance (PDM) have been adopted.

CBM uses realtime condition and performance data from assets to determine when maintenance should be performed – usually, when there is a change in condition. This helps to optimise maintenance intervals and improve the reliability and lifespan of assets. Evolving from CBM, PDM is a proactive maintenance strategy that uses advanced data analysis and predictive modelling to anticipate equipment failures before they occur.

Using asset condition data as well as data related to the operating conditions of the asset, such as ambient temperature and humidity, PDM models can predict asset failure in specific operating settings. They also give asset owners insight into the remaining life of components under certain operating and maintenance conditions, before the condition of the component changes.



Being more sophisticated and with prescriptive tactics, CBM and PDM require additional investments in technology to deliver outcomes and benefits to the business.

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Use cases for CBM and PDM

Reduced downtime

By predicting equipment failures before they occur, organisations can schedule maintenance during planned downtimes, minimising disruptions to operations.

Maintenance-cost reduction

Predictive maintenance reduces or eliminates unnecessary maintenance tasks as well as the costs associated with unplanned maintenance.

Extended equipment lifespan

Preventing asset failure through timely maintenance reduces breakdown-related damage and maintenance-induced failures, and can therefore prolong the life of assets.

Improved safety and environmental compliance

Anticipating potential equipment failures helps organisations prevent accidents, hazardous situations, harmful spills, and other potential incidents. This enhances workplace safety for employees, and prevents or reduces environmental hazards.

Increased operational efficiency

Predictive maintenance optimises equipment performance and availability, leading to more efficient operations, better resource utilisation, and, ultimately, increased asset output.

Enabling data-driven decision-making

Data analytics and insights allow organisations to make informed decisions about maintenance strategies and capital investments based on actual maintenance, failure, and asset performance data.

Resource optimisation

Accurate failure predictions allow maintenance teams to focus their efforts on the equipment that truly needs attention, ensuring that labour and materials are used efficiently.

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Better management of spare parts inventory

Predictive maintenance can help identify when parts will be needed, reducing the requirement to carry excessive stock “just in case”.



Improved strategic planning

Insights gained from predictive maintenance can inform broader asset management and replacement strategies, aligning maintenance strategies with overall business objectives.



Improving original equipment manufacturer (OEM) service model performance

Many OEMs are implementing or expanding after-sales service models to add new revenue streams to their businesses. Introducing CBM or PDM maintenance tactics to their service models can improve client satisfaction and reduce service costs, ultimately improving the organisation’s competitive positioning.



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Emerging focus areas

01

Selecting data-science capabilities and tools

Failure prediction relies on sophisticated data-science techniques and tools to correlate equipment failure modes to the data points. Once a critical asset or component has been identified for PDM, the data points and algorithms must be modelled, tested, and proven accurate before operational adoption. Organisations choosing this route should develop, or partner for, these capabilities to ensure success.

02

Refining data-collection capabilities

Once an asset has been identified for CBM or PDM, the asset design, connectivity, and selection of edge devices and sensors should all be considered to enable appropriate data collection.

03

Reassessing data quality and integration

Integrating data from various sources and ensuring the data set is clean and usable are not insignificant challenges. Asset owners are exploring tools for data cleansing and data governance, and aligning legacy CMMS data and new environmental and performance data sets to provide a consistent and reliable analytics environment.

04

Democratising data

In many cases, OEMs are reluctant to provide access to data coming from their equipment to a third party. Asset owners are reassessing their purchase and OEM agreements to ensure efficient and safe access to all data generated by their operations, for inclusion in analysis, simulation, and reporting activities.

05

Reassessing maintenance operating models

The remote monitoring of assets has increased the accuracy of condition assessment and failure prediction but maintenance tasks must still be actioned and managed for this to be effective. Asset management teams are developing new roles, training programmes, and team allocations to incorporate monitoring and inspection activities triggered by online monitoring alerts.

06

Training and change management

Adopting CBM and PDM tactics will require cultural and behaviour changes in maintenance and planning teams. Building trust in the technology, explaining the rationale for the changes, and training staff on the updated planning and work execution techniques will help ensure smoother adoption.

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Correlation with AMIP benchmark data

Condition monitoring maturity has a weak to moderate correlation with overall asset management maturity and performance, suggesting it is a supporting function rather than a primary driver of good asset management execution capability.

The correlation between the use of condition monitoring capabilities and technology and overall asset management maturity is less clear, most likely because this element is relatively new and not as pervasive as other elements of the AM framework.



Industry insight

Condition monitoring contributes to performance, but the data suggests it is an enabler rather than a primary driver.

To see stronger performance gains, organisations need to align condition monitoring with effective work execution and a broader reliability-centred maintenance strategy. If condition monitoring maturity is increasing but performance isn't improving, it may indicate a gap in how insights are acted upon – meaning work execution, planning, and intervention strategies need to be optimised.

Organisations should therefore invest in condition monitoring as part of a broader asset management strategy rather than relying on it as a standalone solution to improve maturity or performance.

Relationship between maturity of condition monitoring and asset management maturity

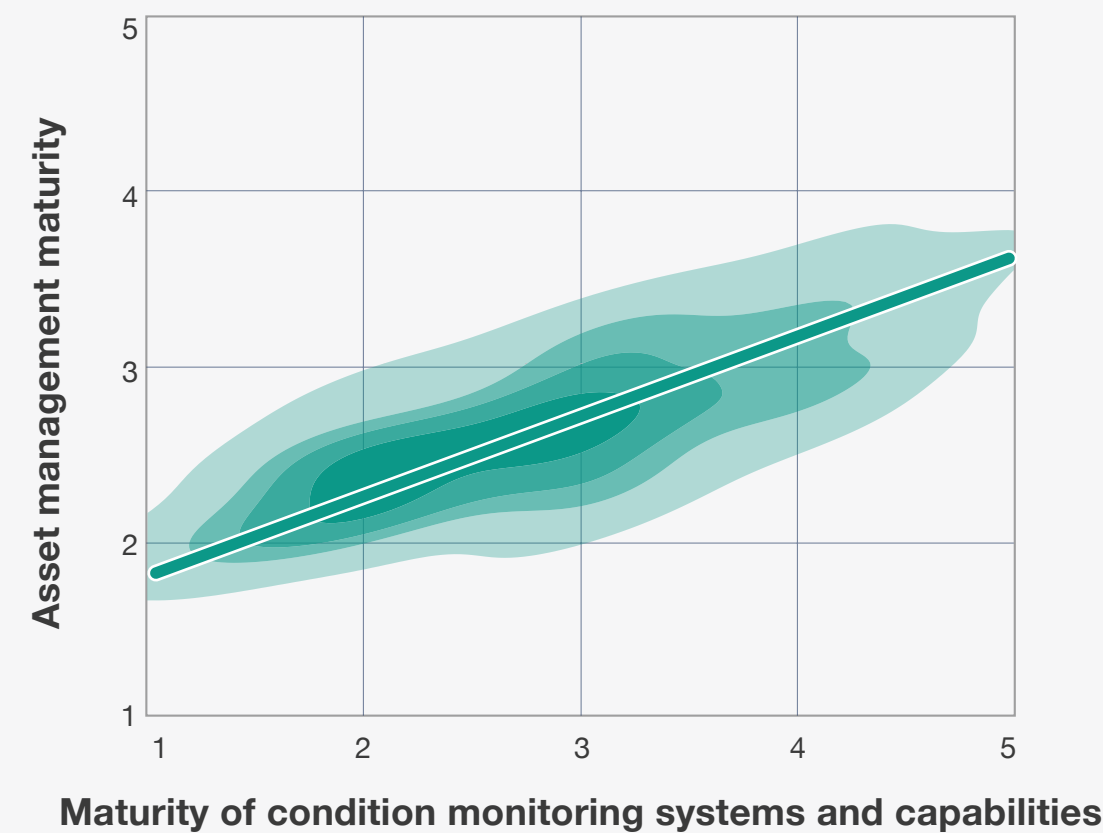


Figure 1: Relationship between maturity of condition monitoring systems and capabilities and overall asset management maturity.

Source: AMIP Benchmark database

Relationship between maturity of condition monitoring and asset management performance

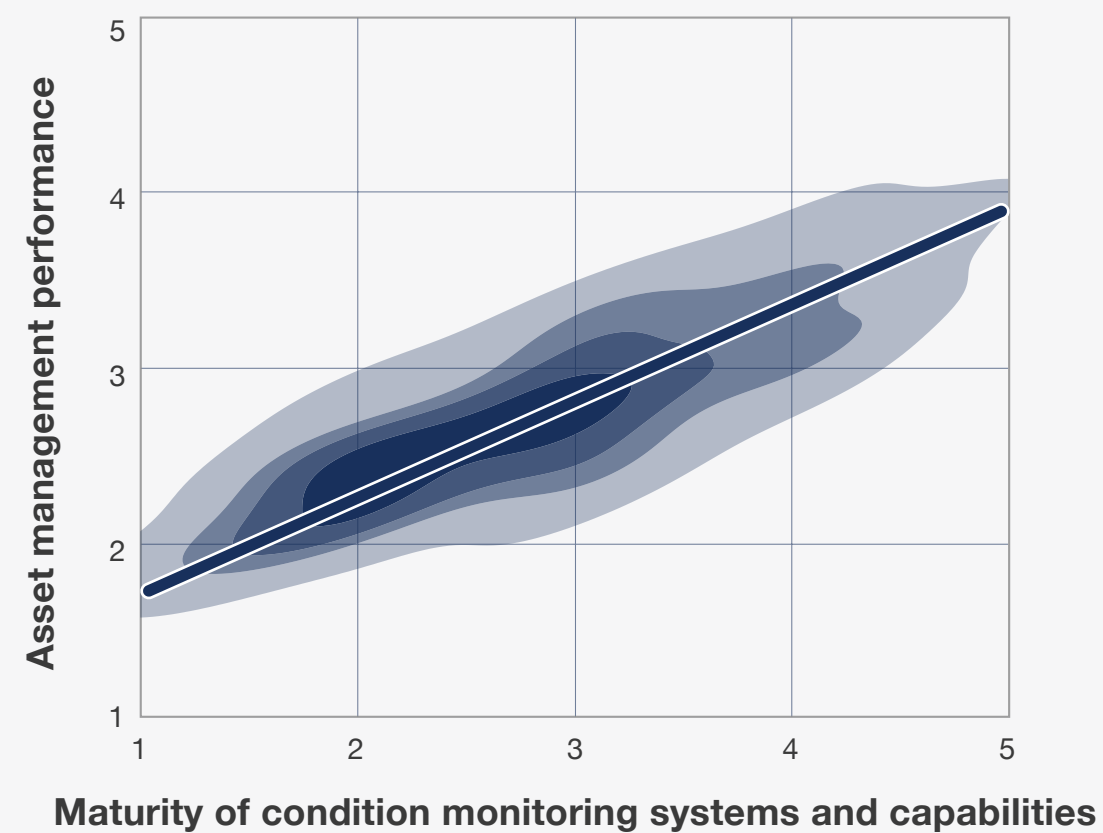


Figure 2: Relationship between maturity of condition monitoring systems and capabilities and asset management performance.

Source: AMIP Benchmark database

The low correlation with cost and performance KPIs implies that condition monitoring alone is not sufficient to drive efficiency and performance gains – it must be integrated with proactive maintenance and asset reliability strategies.

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04

Moving to precision maintenance

In many organisations, an accurate asset register and good maintenance tactics do not result in the expected increase in equipment reliability. Often, this is because planned maintenance work is not executed to the expected levels of quality, resulting in premature, often maintenance-induced, equipment failure.

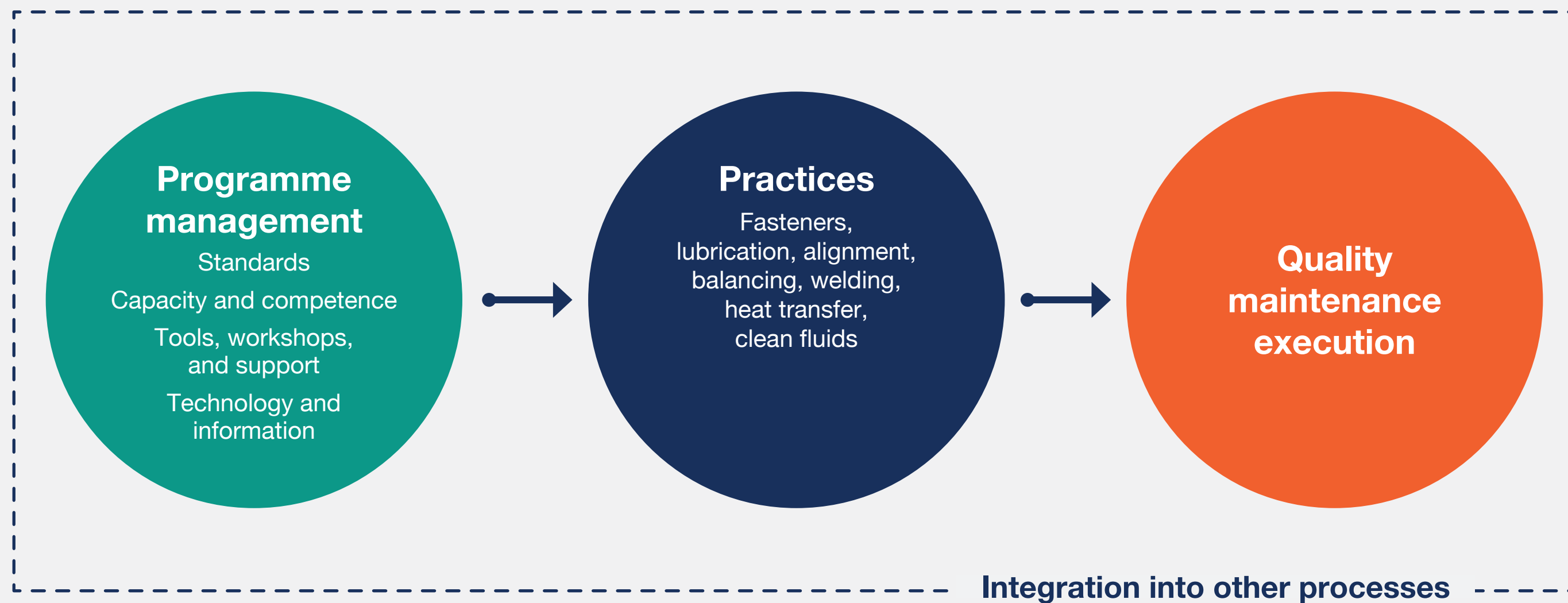
Precision maintenance is the strict adherence to exact machinery health standards and systematically ensuring that maintenance activities are performed correctly and accurately the first time. Where condition-based maintenance aims to detect degradation as early as possible, precision maintenance aims to postpone this degradation as far as possible.

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Benefits and applications

The aim of precision maintenance is to increase the mean time between failures (MTBF) of critical components by delaying their deterioration and replacement, and to eliminate infant mortality failures caused by poor installation or replacement practices.

Effective precision maintenance implies that the life expectancy of assets would be extended through high-quality maintenance practices that prevent forced deterioration. To support these practices, the availability of specifications and standards, and the operational discipline to implement them well, are essential.



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Precision maintenance programmes

To ensure maintenance teams follow best practices and perform quality maintenance work in a safe and organised manner, asset owners are designing and rolling out precision maintenance programmes that include:

- Reviewing all maintenance plans to ensure the inclusion of precision maintenance activities and standards
- Establishing processes to manage the provision, use, control, maintenance, and calibration of hand and machine tools
- Providing maintenance facilities such as workshops and general work areas
- Providing support equipment such as forklifts, scissor lifts, and mobile cranes
- Integrating precision maintenance practices with other disciplines, systems, and processes, such as work management, maintenance planning, reliability and health monitoring, safety, and material management
- Implementing a continuous improvement programme by checking and reviewing processes and procedures to ensure that the maintenance work is of the best quality and in line with current and new technologies
- Risk-based quality control
- Implementing the appropriate technology, systems, and processes to manage asset-related information for precision maintenance activities

Precision maintenance practices

Typical precision maintenance programmes include the following practices:

- Applying correct torques and tensions to fasteners
- Fastening bolts and nuts effectively
- Using laser alignment for shafts and couplings
- Cleanliness and control of all fluids and lubricants
- Using the correct type and quality of spare parts
- Ensuring machinery has accurate tolerances at the specified temperature
- Properly and frequently balancing rotating equipment like fans, rotors, and turbines
- Following proper installation procedures
- Following the operating and maintenance procedures specified in the maintenance standards

Looking at the list above, one would expect these to be standard practices in a well-organised maintenance environment. However, maintenance supervisors and engineering managers across industries and geographies report that these practices are not adequately used in their technical teams, requiring them to put special training and inspection plans in place to minimise the impact of substandard maintenance work on equipment reliability.

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Emerging focus areas

01

Development of precision maintenance standards

Reliability engineers are conducting risk–benefit analyses to identify the assets and maintenance practices on which precision maintenance can have the biggest impact. They then develop the appropriate standards with the support of experts such as equipment suppliers, experienced artisans or technicians, maintenance supervisors, and engineering specialists.

02

Rollout of precision maintenance task descriptions

Work orders must include detailed precision maintenance steps and standards in the task descriptions, and make provision for artisans to record measurements and give feedback. The maintenance supervisor must then review and sign off work orders to trigger follow-up work. Precision maintenance activities on critical equipment should have quality assurance hold points for supervisors or reliability engineers to oversee compliance with the standards, ideally before start-up of the equipment.

03

Provision and inspection of tools and equipment

The state of artisans’ toolboxes and tool-storage areas is often an indication of the quality of the maintenance work performed, so it is important to have toolbox inspections and proper tool-control procedures in place. Engineering management teams are investing in the tools needed for precision maintenance and ensuring that these tools are calibrated regularly.

04

Training and culture

Once the scope of the precision maintenance programme is defined, the skills of the artisans should be assessed and a skills training plan developed to ensure they can carry out the work and use the tools in accordance with precision maintenance standards. Organisations are focusing on developing a culture of pride, accountability, and collaboration to support the work ethic required for effective precision maintenance.

05

Rolling out 5S programmes

Precision maintenance requires a culture of neatness, discipline, and quality. A good way to create this culture is through the implementation of 5S programmes (sort, set in order, shine, standardise, and sustain).

06

Updating coaching and control processes

Asset owners are training supervisors on the principles and benefits of precision maintenance to ensure standards are effectively implemented. Supervisors are also involved in setting standards and are incentivised to spend time in the workplace to ensure compliance.

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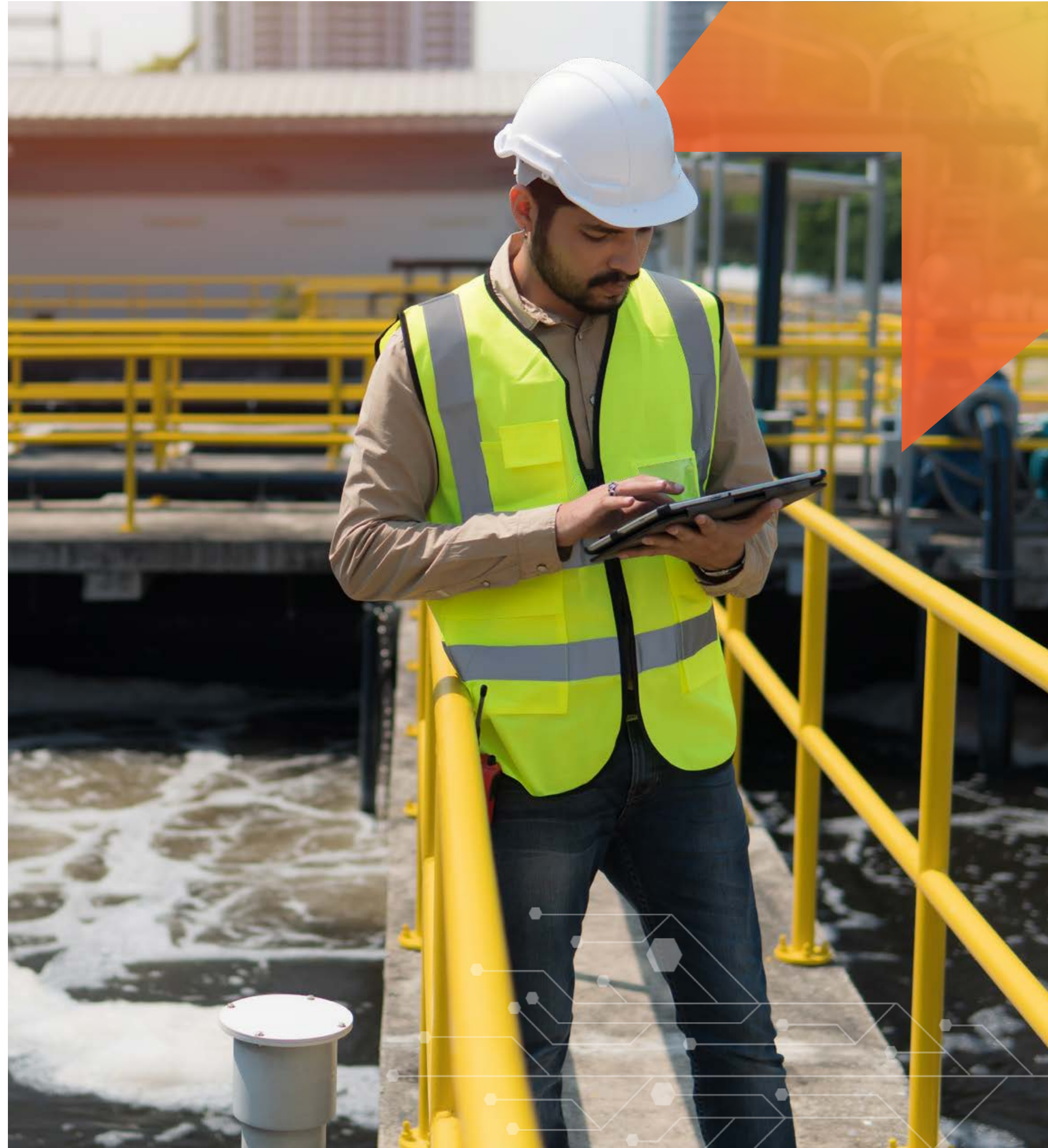
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05

Renewed focus on work management fundamentals

Good maintenance work management is the most important foundational element of physical asset management, regardless of industry or asset location.

Without the ability to identify, plan and schedule maintenance work, manage work execution, and provide feedback on work done, any effort to add sophistication or digitisation to an asset management environment will have very limited or no impact.

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Benefits and applications

In many cases, organisations spend time and money on improving maintenance systems or reviewing tactics, only to find out that the root cause of their equipment reliability problems lies with an ineffective maintenance work management capability.

By investing in this capability they not only address immediate reliability issues but also ensure a strong foundation for implementing advanced techniques or digital solutions to support long-term asset performance.



Figure 3: Maintenance work management process. **Source:** Pragma Work Management body of knowledge

Maintenance work management for performance areas

An effective process and system to manage all maintenance work, covering both tactical and non-tactical tasks, is an essential component of good asset management practice.



Non-tactical work identification

- Maintenance scheduling
- Closing the work feedback loop



Tactical work identification

- Establishing work planning and scheduling routines
- Developing the appropriate capacity and competence in the maintenance organisation



Maintenance work planning

- Daily work allocation
- Implementing the appropriate technology platforms and supporting data to support the required level of maturity

Factors contributing to the deterioration of work management

The organisations we work with have many of these factors in common.



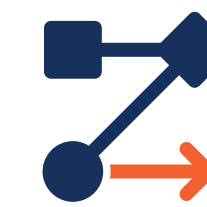
Loss of critical skills

There are many industries and roles requiring technical skills, so asset owners struggle to recruit and retain these skills. In addition, the competitiveness of the market means that maintenance technicians move between employers more frequently, which means technical teams lack depth of experience. As the maintenance workforce ages and retires, critical institutional knowledge is lost.



Initiative overload

Many organisations get lost in a maze of improvement initiatives, often driven by a digitisation strategy. With technology in the spotlight and initiatives that are not aligned to clear outcomes, the maintenance workforce can easily lose focus on the essentials of good work management.



Lack of clarity in process and communication practices

Many organisations go through regular cycles of changes aimed at improving technical or financial performance. These include changes to business and production processes, organisation structures, and supporting technology. If the work management process is not aligned to these changes, and communication becomes slow or unclear, the quality of work identification and execution often suffers.



Insufficient training

High staff turnover rates and reduced training budgets often result in less technical training, especially in the fundamentals of maintenance work management. A limited understanding of foundational principles has an impact on the quality of basic work execution.



Inadequate resource allocation

Some organisations fail to allocate sufficient resources (people, budget, and time) to maintenance activities. This results in tasks that are rushed, neglected, or not executed at all, all of which have a negative impact on equipment reliability.



Increased planning complexity

With condition monitoring and predictive maintenance techniques becoming more common, maintenance schedules are moving away from a predictable, interval-based environment to more dynamic, condition-based schedules, significantly increasing planning and scheduling complexity.

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Emerging focus areas

01

Updating or enhancing a CMMS

Many computerised maintenance management system (CMMS) implementations are becoming outdated or were poorly implemented from the start. Organisations are therefore conducting health checks and updating EAM software to improve CMMS utilisation and effectiveness. In several cases, asset owners are moving away from their corporate enterprise resource planning (ERP) systems and implementing a best-of-breed EAM software to improve their work effectiveness.

02

Reviewing established standard operating procedures (SOPs)

Maintenance teams are updating or developing clear SOPs for maintenance tasks to ensure consistency, quality, and adherence to best practices.

03

Investing in training and development

To enhance the skills and knowledge of maintenance personnel and ensure they are well-equipped to perform their tasks effectively, organisations are running regular training programmes. Training ranges from machine-specific technical training, planning, and scheduling to more sophisticated reliability engineering skills.

04

Automation of maintenance scheduling

Organisations are using historical data and predictive analytics to determine when maintenance tasks are likely to be needed, based on usage patterns, equipment performance, and failure rates. Schedules for maintenance tasks are then automatically created, including routine inspections, repairs, and preventive maintenance. Resource allocation, work notifications, and reporting are all automated and executed using mobile technology.

05

Automated spare parts management

The integration of AI and IoT is significantly enhancing spare parts management in asset-intensive industries by providing a centralized, real-time view of inventory across locations. Virtual systems can predict when parts will fail and allow organisations to reallocate parts between sites based on real-time needs, reducing downtime and unnecessary costs. This enables more accurate stock tracking, automated reordering and better procurement decisions, reducing the risk of both overstocking and stock outs.

06

Increased focus on routine inspections and audits

Regular inspections of completed work and audits of work practices help organisations to identify issues before they lead to major problems, allowing for timely interventions and continuous improvement.

07

Using leading and lagging key performance indicators (KPIs)

To measure effectiveness and identify areas for improvement, organisations are defining and monitoring leading and lagging KPIs related to maintenance performance. These include work order completion rates, equipment downtime, response times, and overtime levels.

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Correlation with AMIP benchmark data

Our client engagements indicate that good maintenance work management is the foundation of good enterprise asset management, and that more sophisticated capabilities will always suffer if the fundamentals are not in place.

Our benchmark data shows a strong correlation between work management maturity and overall asset management maturity, indicating that improvements in work management are closely aligned with a more mature asset management system. The relationship between work management maturity and asset performance (KPIs) is also significant, though slightly more variable, suggesting that higher maturity generally leads to better performance outcomes, albeit with less consistency, due to the multitude of asset management practices that have a direct impact on asset performance. Work management alone is unlikely to significantly influence asset management performance.



Industry insight

Effective work management is a fundamental enabler of overall asset management maturity.

Organisations with strong work management practices are more likely to achieve higher asset management performance levels, and those with well-developed work management practices tend to have a structured and mature asset management approach.

Although work management plays a key role in driving performance, other factors such as asset strategy, condition monitoring, and operational execution also influence performance results.

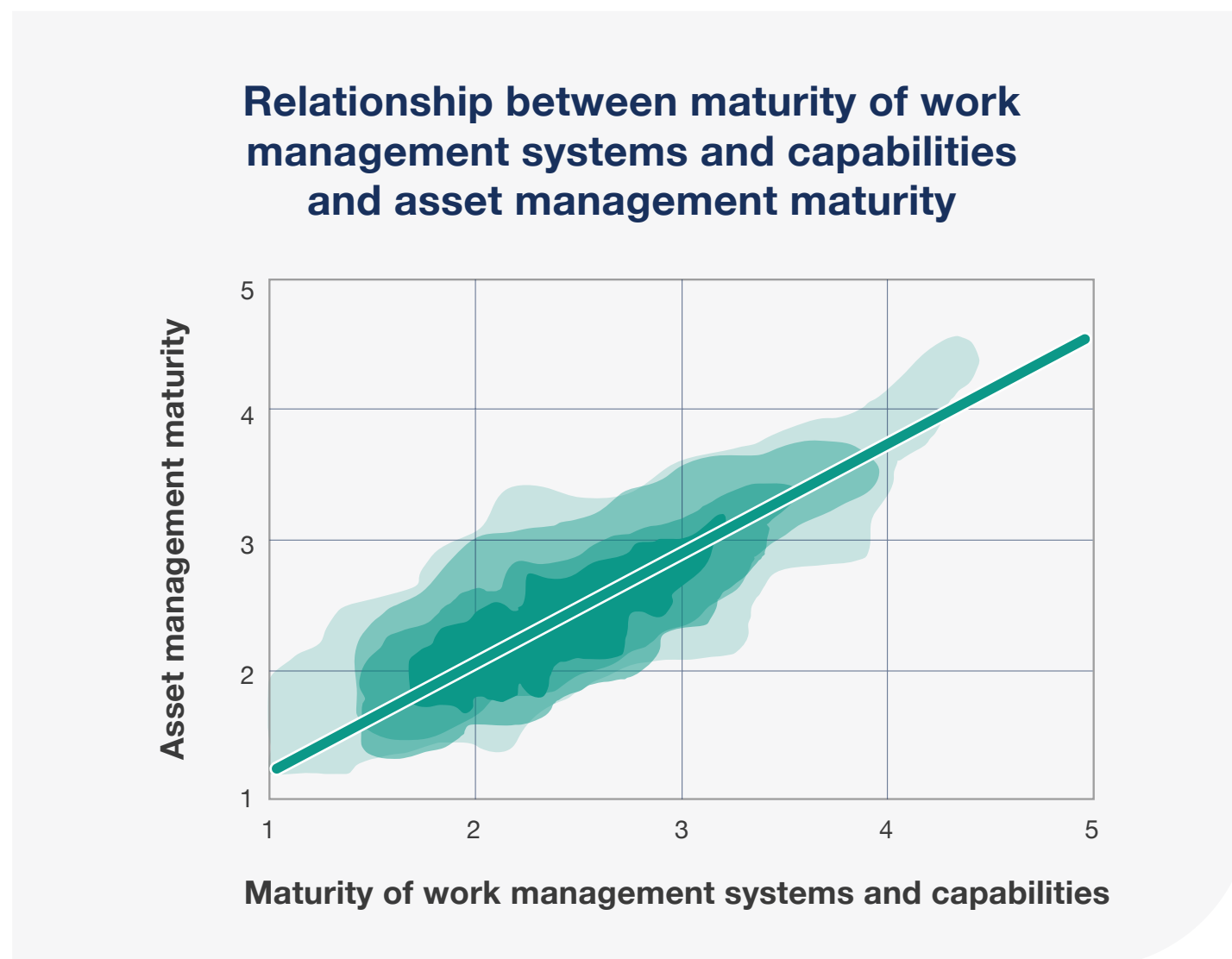


Figure 4: Relationship between work management maturity and overall asset management maturity.

Source: AMIP Benchmark database

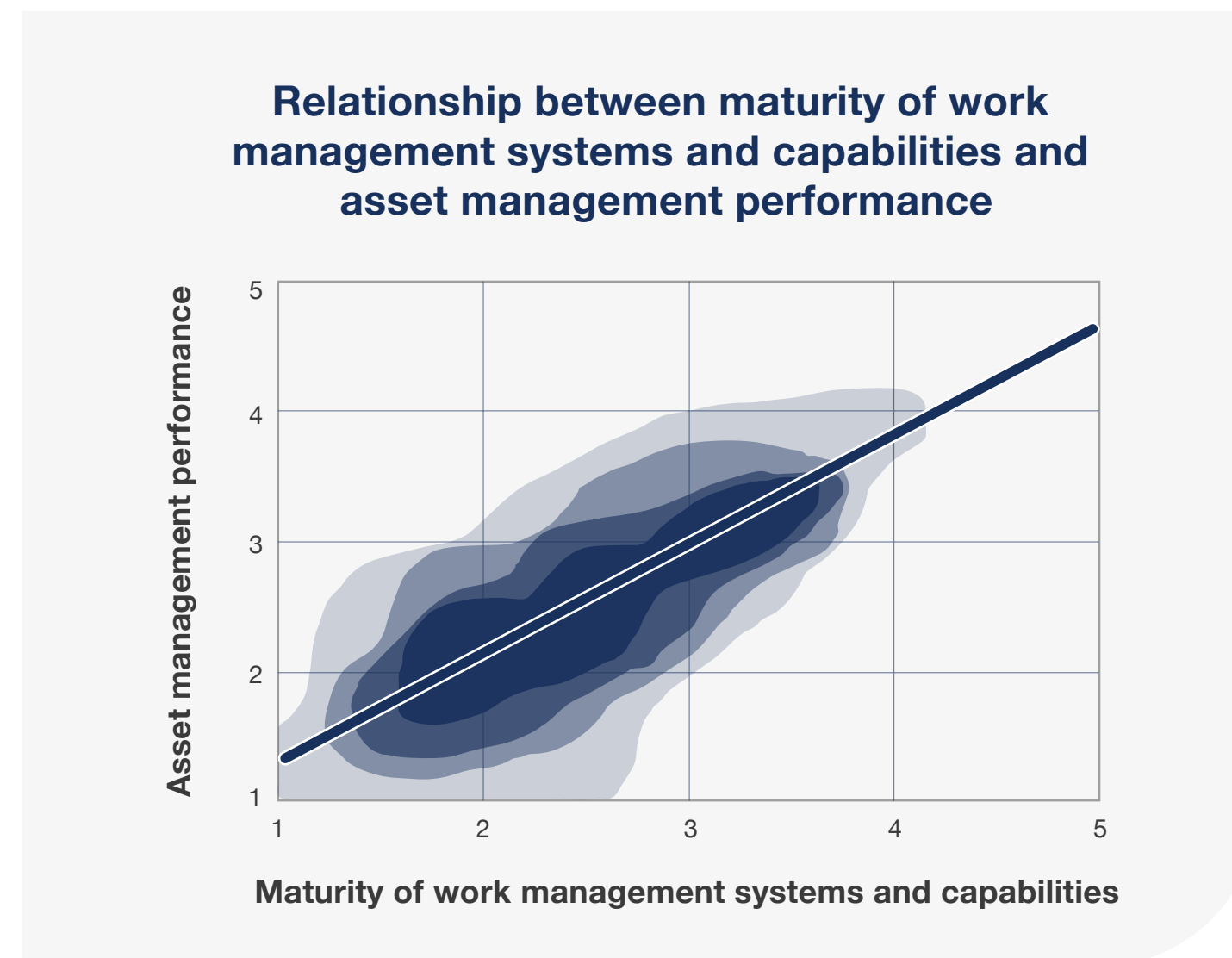


Figure 5: Relationship between work management maturity and asset management performance.

Source: AMIP Benchmark database

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06

Increased integration with the sourcing and procurement function

Maintenance teams are often frustrated by inadequate spare parts availability, and chief financial officers (CFOs) complain about excessively high levels of working capital taken up by engineering spare parts. Engineering and asset management teams have a significant role to play in improving the accuracy of procurement decisions by driving a much closer integration between maintenance and procurement planning.

Having the correct number and quality of engineering spare parts available has traditionally been seen as a sourcing and procurement function. Spare parts lists are typically generated by project teams as part of operational-readiness activities on capital projects. These are then coded by supply chain teams and included in master data lists for procurement teams to use.

Re-order points and order quantities are refined over time, based on historical spare parts consumption data. Spare parts are typically classified as fast, medium or slow movers, and spare parts holding strategies are adapted based on these classifications.

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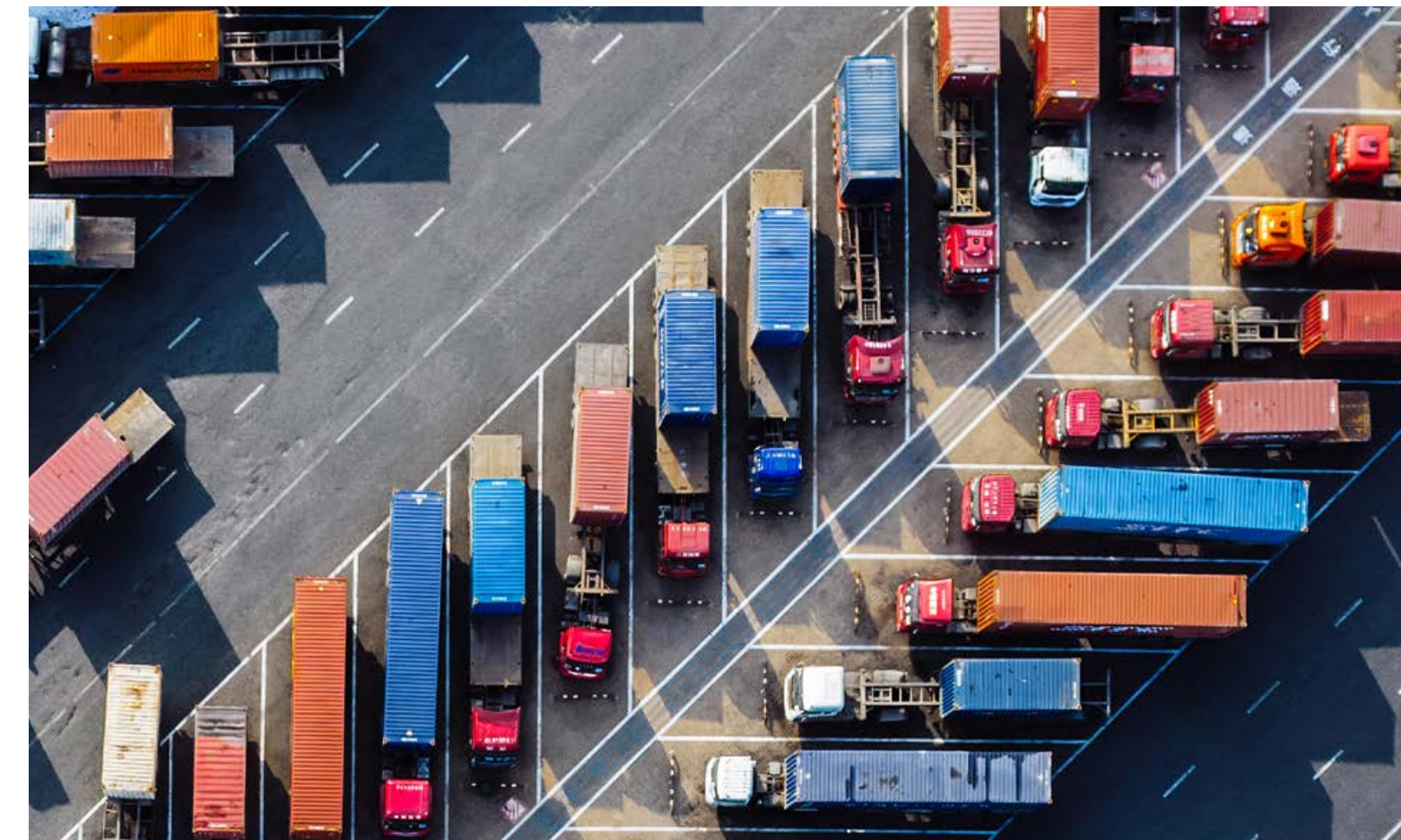
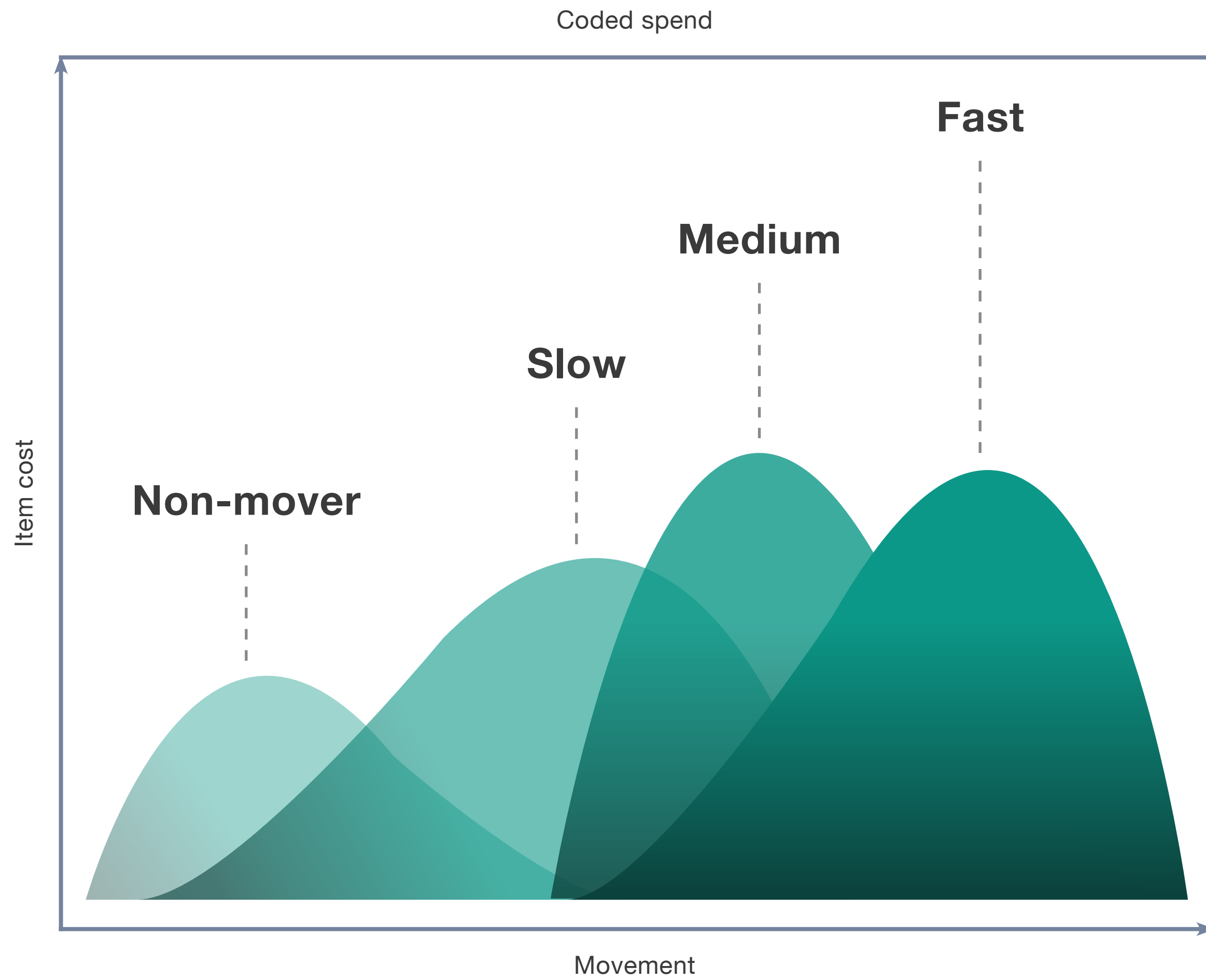
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Un-coded spend
needs to be identified and addressed.

Non-movers
should be analysed to identify obsolete items and "insurance spare parts" that can be capitalised and depreciated together with the parent asset.

Slow and non-movers
cannot be optimised based on statistics only. Criticality needs to be understood, and maintenance plans with spares requirements must support forecasting.

Fast and medium movers
can be optimised through an analysis of stock holding and service levels.

Figure 6: Classification of spare parts
Source: Pragma Spares Parts Optimisation body of knowledge

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Use cases for integrating sourcing and procurement

Better governance of spare parts master data

In addition to a more detailed focus on creating a BOM during project development, engineering teams are supporting their procurement colleagues by codifying a larger proportion of total spare parts and keeping master data up to date as equipment configuration and maintenance procedures change.

More accurate demand planning

Planning maintenance work dynamically, and with increased lead times, improves the forecasting of spare parts demand, thereby increasing the accuracy of procurement processes.

Developing collaborative spare parts criticality frameworks

A spare parts criticality classification matrix that includes both procurement (lead time; minimum order quantity; supplier risk) and engineering (safety, health and environment (SHE) impact; production impact of failure) elements allows organisations to develop a more useful service level agreement for the availability of all engineering spare parts, reducing availability risk as well as transactional costs.

Adding value metrics to spare parts classification matrices

Typically, spare parts criticality calculations involve only safety or production inputs to inform procurement strategies. Adding financial (value) elements such as holding costs or logistics costs for large items to the decision matrices improves the working-capital impact of engineering spare parts and overall financial performance.

Using additive manufacturing techniques for just-in-time spare parts delivery

In some cases, the use of technologies such as 3D scanning and printing and photogrammetry allows engineering teams to manufacture spare parts on site and in time, further reducing spare parts holding costs.

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Emerging focus areas

01

Developing detailed BOMs during operational readiness

Organisations are developing detailed spare parts lists for new or significantly upgraded assets during the operational-readiness phases of projects. They work with engineering, procurement and construction management (EPCM) companies and OEMs to define the spare parts requirement as part of maintenance tactics development, and engage with supply chain teams to ensure that spare parts are correctly coded for procurement.

02

Improving spare parts demand forecasting through detailed work planning

Many asset owners continually review and improve their maintenance tactics to optimise efficiency and address recurring reliability issues as they occur. These tactics include detailed spare parts lists as an input into the planning process. Combined with improvements in condition monitoring and predictive maintenance techniques, increased digitisation, and more sophisticated technology for maintenance planning, these tactics allow planning teams to generate more accurate spare parts demand forecasts, with more lead time.

03

Using AI tools to clean up and maintain spare parts master data

Cleaning up spare parts master data can be a daunting and time-consuming task. Correctly identifying the spare part in the procurement system typically requires the review of each record in the database, together with a variety of OEM spare parts lists, to find the correct classification and part number. It also requires some technical knowledge to evaluate the physical characteristics of the spare part in cases where the data quality is poor. Then, the records need to be manually populated.

Organisations are now starting to use AI tools to search their unstructured data and match records to more structured data, such as OEM catalogues and other verified spare parts databases. The AI algorithms can then populate an "ideal" master data record from the unstructured data. This process significantly improves the accuracy and speed of data-cleansing projects.

04

Virtualisation of maintenance activities

In remote or dangerous work environments, augmented reality tools allow highly skilled workers to guide less experienced on-site workers through complex maintenance tasks virtually.

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07

Evolving servitisation models for original equipment manufacturers

Lower margins on equipment sales – the result of increased competition and higher potential margins for after-sales service – have given rise to a number of interesting offerings.

Models for the ownership of capital equipment are changing across the world. Product manufacturers typically bought their production equipment from OEMs and maintained the equipment themselves or through service contracts. Now, OEMs are offering increasingly sophisticated after-sales service models as part of their value offering, a move driven largely by economic factors.

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Pragma is working with several original equipment manufacturers to develop their after sales service strategy and service delivery capabilities. As an example, our research into trackless mining equipment – based on publicly available information – shows the margin differential between equipment sales and after sales service options.

7.5%

Products average

+30%

Services average

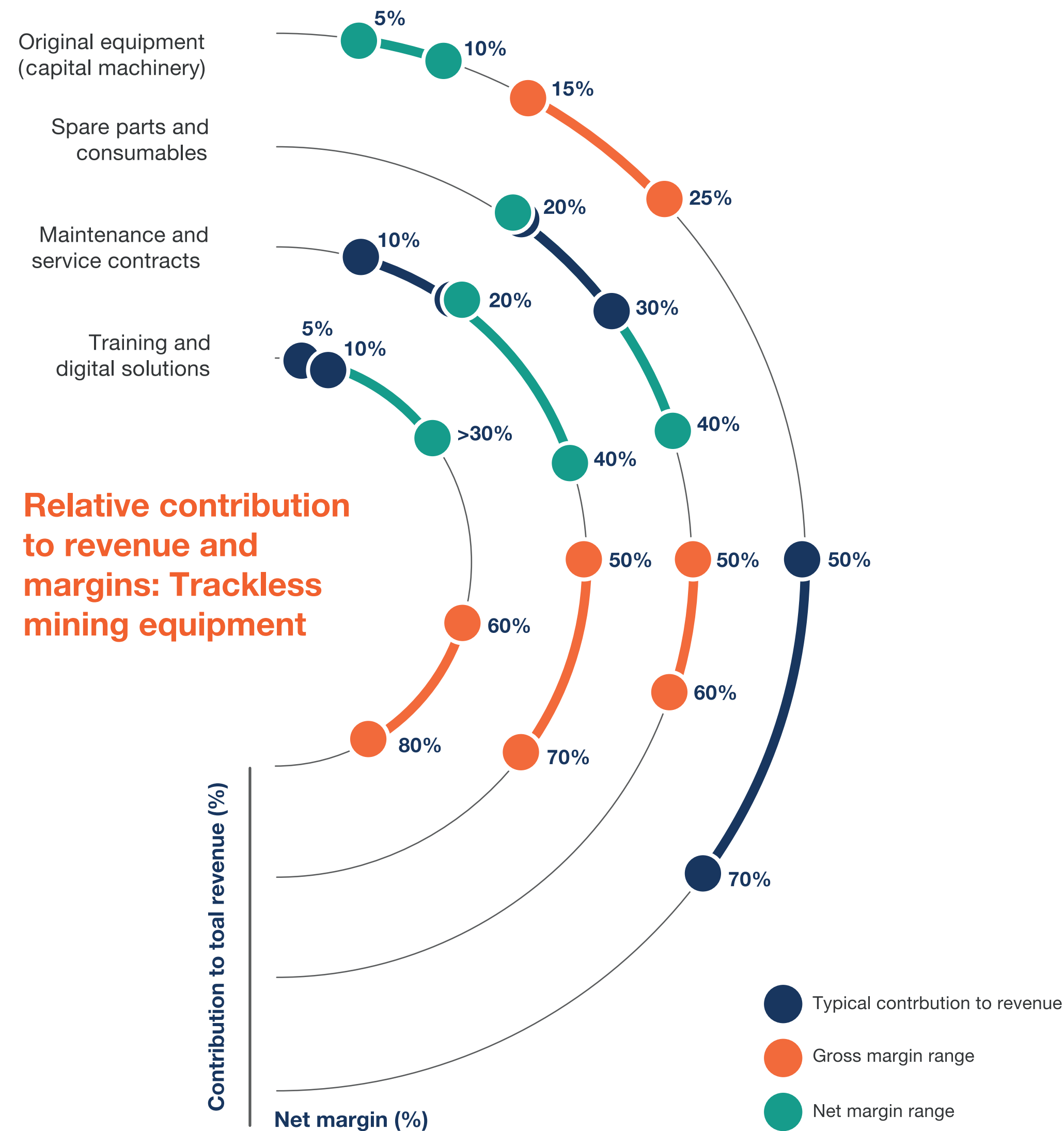


Figure 7: Industry segment contributions and margins
Source: Pragma research

Benefits and applications

➤ Maintenance and spare parts as a service

Many OEMs already offer maintenance contracts and supply spare parts as an after-sales service. The asset owner buys the machinery but relies on the OEM to execute planned maintenance and supply spare parts where needed. In many cases, warranty extensions are offered to clients who use these types of services.

➤ Data as a service

In cases where asset owners want to focus on high-value activities such as supply chain planning and root cause analysis, OEMs offer asset performance, asset condition, failure, and spare parts demand data as a service. This allows the asset owner to conduct their own reliability and supply chain modelling while relying on a reputable source for the required data inputs.

➤ Output as a service

Some OEMs offer output-based contracts that effectively remove the requirement for capital expenditure from the asset user. In these arrangements, the OEM retains ownership of the equipment and fees are based on production output and quality. This model shifts equipment ownership and maintenance to the OEM, which is accountable for the capital equipment and its maintenance.

➤ Health monitoring as a service

The increased availability of cheap and reliable sensors, combined with improved connectivity, has enabled the cost-effective implementation of remote monitoring solutions by OEMs. They can monitor equipment performance in realtime and make maintenance recommendations based on the condition of the asset.

➤ Performance as a service

OEMs are increasingly offering risk-based services that are linked to equipment performance (for example, overall equipment efficiency). This spreads the risk between the OEM and the asset owners while improving quality and reliability, as parties share both data and accountability for inspection and maintenance activities.

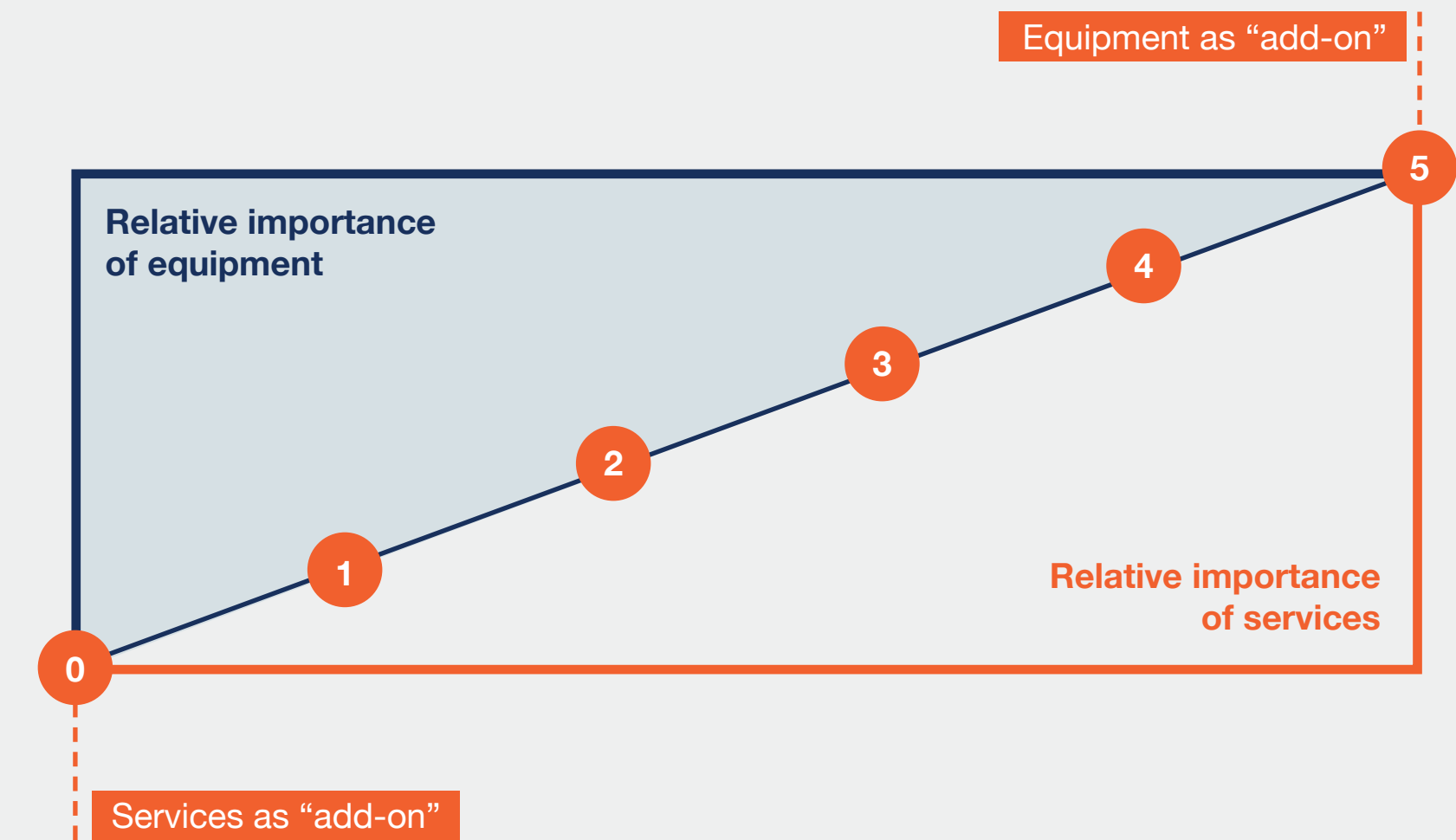


Figure 8: Relative changes in the commercial contribution of services as after sales service models mature

Source: Pragma OEM servitisation body of knowledge

The market for after-sales services is very competitive, with asset owners demanding efficiency, cost optimisation, data security, and performance from their supplier of choice. OEMs need to invest significantly in technology and analytics capabilities to design and effectively deliver these models.



Emerging focus areas

01

Leveraging installed base data for service design

In their own version of the digital twin, OEMs are investing in systems and supporting capabilities to maintain an accurate picture of which machines they have, where they are, what they are producing, and what their operating performance is. In some cases, they are collaborating with asset owners to track both planned and unplanned maintenance as well as the impact of specific operating conditions on equipment performance. This data allows them to simulate and design sophisticated after-sales service offers based on real asset-performance data.

02

Improving demand planning

Once a clear picture of the installed base is available, OEMs use the data to predict future demand patterns for maintenance services and spare part use. This allows them to develop more efficient operating models and designs, and improve the accuracy of procurement and logistics planning.

03

Measurement of service level agreements

As performance-based service contracts increase in value, OEMs are incorporating more accurate measurement technology and increased connectivity into their equipment designs. This ensures the performance data required for commercial service level measurement is reliable and available to all parties.

04

Maintenance plan optimisation

OEM recommendations for inspections, maintenance work, and spare parts holding are initially based on the design parameters used when equipment is developed. Design teams use average production estimates, standard environmental parameters, and baseline assumptions of clients' operational practices to set maintenance tactics for any new equipment design. Some OEMs are working with their client base to assess real-world equipment performance and failure data so they can optimise maintenance recommendations, thereby reducing costs and increasing client satisfaction.

05

Designing dedicated service organisations

For many OEMs, after-sales services have been a secondary focus for many years, with equipment design, manufacture, and sales taking the lion's share of management attention. To scale a service business, many OEMs are developing standalone service organisations that have their own culture, talent pool, investment model, and commercial model. The rationale behind this approach is that it allows for a dedicated focus in a fit-for-purpose organisation which is set up for growth.

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08

Maintaining and expanding institutional knowledge

The latest version of the ISO 55001 standard, issued in 2024, is very clear about the fact that awareness, knowledge, competence, training, and experience are critical to achieving an organisation’s asset management goals.

The importance of developing, maintaining, and sharing knowledge at the appropriate level of an organisation has been recognised as a key enabler of good asset management practice since the first formalisation of global asset management frameworks.

However, here are many challenges associated with getting the right knowledge to the right resources within the asset management context, specifically because a significant portion of asset management knowledge on a specific site may have been developed and is held by only a few highly experienced resources.

Challenges to knowledge transfer in asset management



Employee turnover and an ageing workforce

There is significant competition for technical skills, and many employers, especially those in remote locations, pay significant premiums to attract technical talent. Millennial and Gen Z employees have different skill sets, unique expectations, and a wide range of career options, and many are not as eager as older generations to go into technical careers. A consistent theme in feedback from our clients is that it is now much harder to recruit for artisan-level technical skills that it was 15 years ago.

High turnover rates mean valuable knowledge is lost when experienced employees leave and, as older employees retire, they take critical knowledge and skills with them, creating knowledge gaps.



Inadequate systems

The accuracy and relevance of knowledge are crucial for asset management decisions, but the abundance of data and information available can make it difficult to identify and retain the most critical knowledge. Often, tacit knowledge is not well-documented, so it cannot be transferred effectively within the organisation. In addition, as knowledge evolves and changes over time, it requires ongoing data curation and maintenance.

Without efficient tools and processes for knowledge capture, sharing, and retrieval, institutional knowledge can be lost.

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Challenges to knowledge transfer in asset management



Cultural barriers

If the organisational culture does not prioritise knowledge-sharing, this may hinder collaboration and the transfer of information. Organisations may also need to invest in change-management activities if employees are reluctant to adopt new practices or tools designed to facilitate knowledge retention.



Limited training

Inadequate training and orientation can make it difficult for new employees to integrate existing knowledge and practices into their roles and activities in order to achieve asset management objectives.

Correlation with AMIP benchmark data

When assessing the link between investment in talent and asset management maturity and performance, our data shows a moderate correlation.

The moderate correlation between people management practices and asset management maturity suggests that while people management is important in driving overall asset management maturity, other technical and operational factors also play a substantial role. The slightly weaker correlation between people management and asset management performance is expected, as culture, competency and leadership support are enabling factors and not primary drivers of performance. Without people management, however, performance tends to suffer.

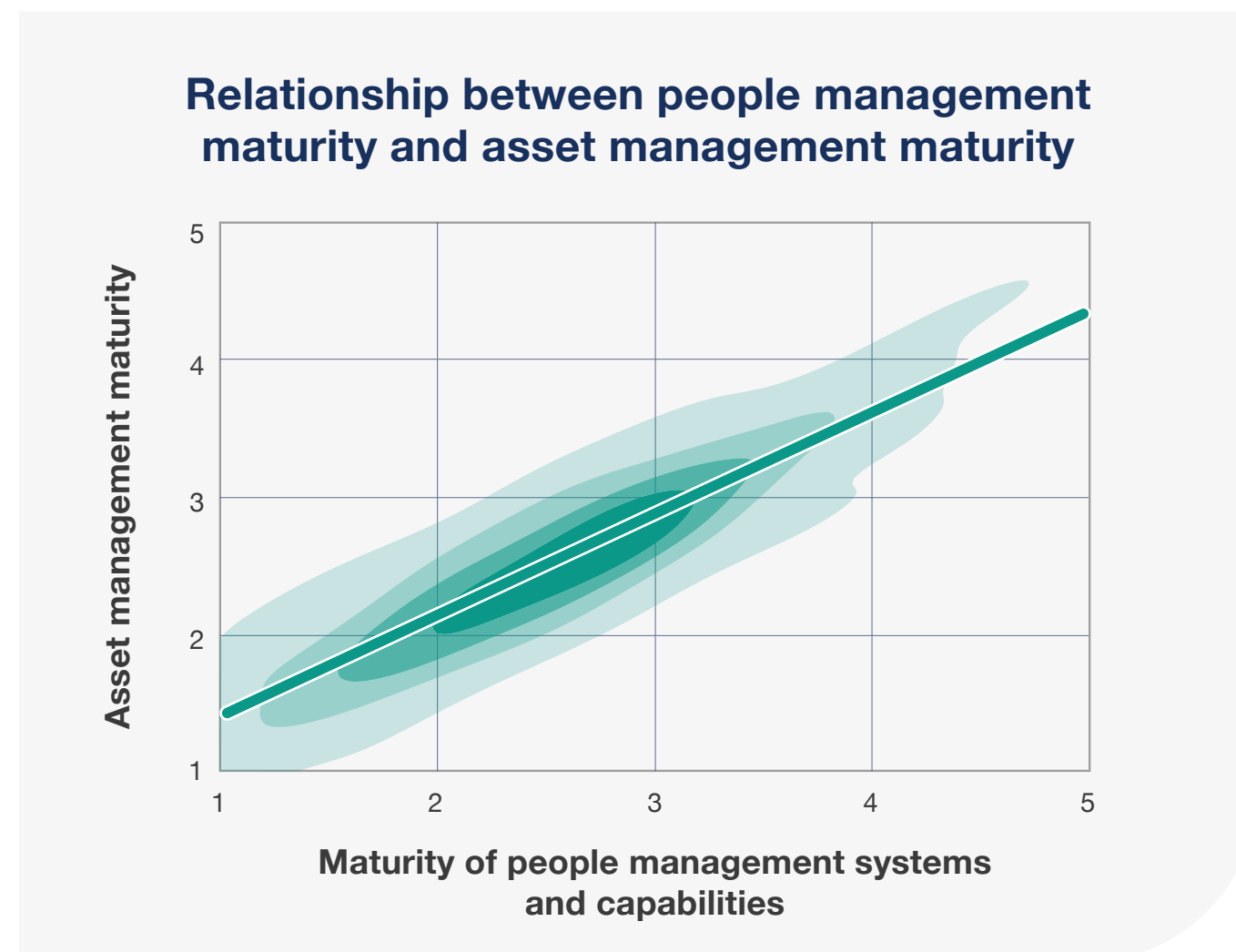


Figure 9: Relationship between people management maturity and overall asset management maturity.
Source: AMIP Benchmark database

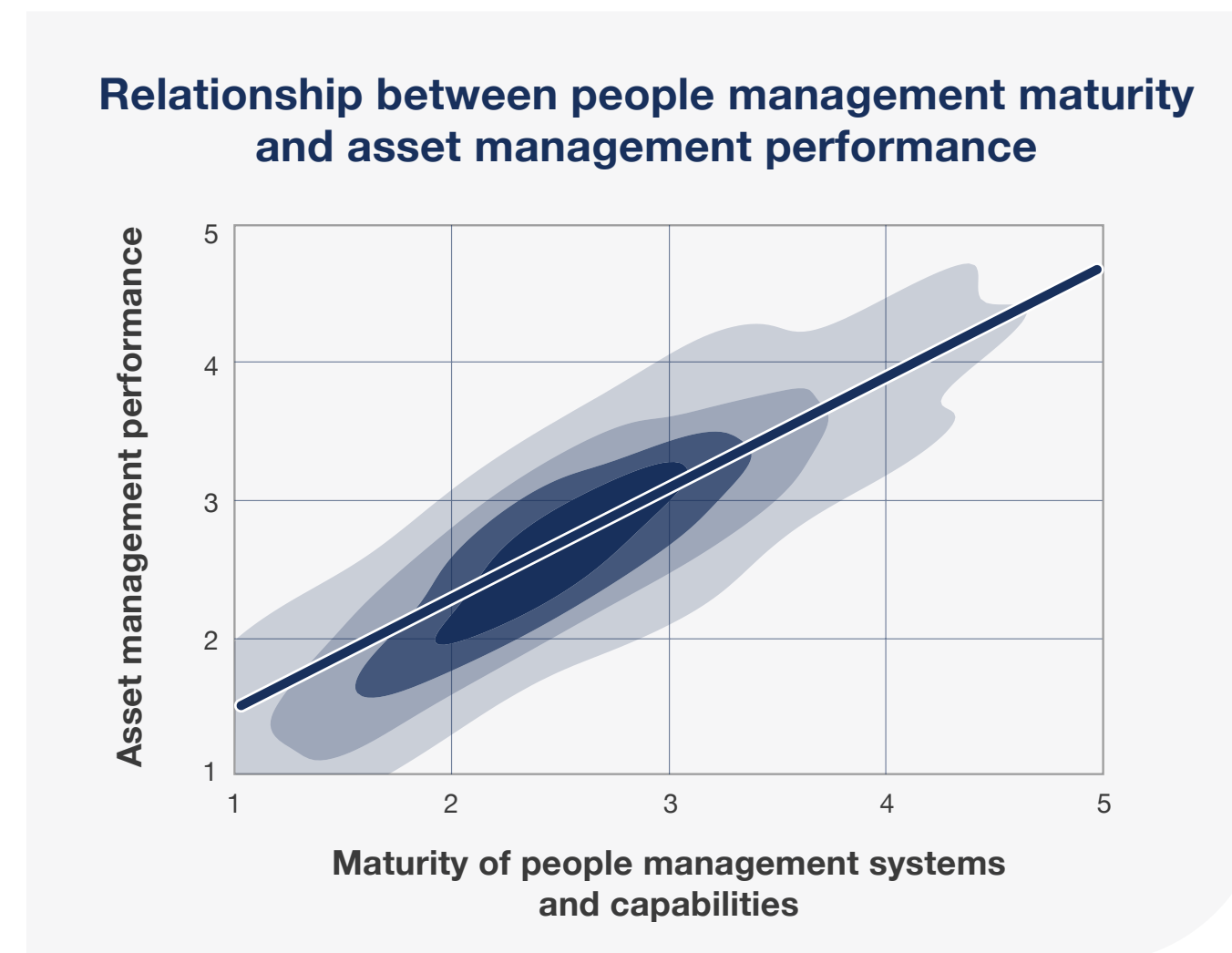


Figure 10: Relationship between people management maturity and asset management performance.
Source: AMIP Benchmark database

Organisations that invest in people management tend to realise their objectives more consistently and have higher levels of asset management maturity and better-performing asset portfolios than organisations that neglect to make this investment.



Industry insight

Organisations aiming for higher asset management maturity should invest in people management practices. To maximise performance, this should be coupled with strong work management and strategic execution.

Since people management encompasses organisational culture, competency development, training, and leadership support, well-structured people management practices will contribute significantly to the maturity of asset management overall.

Strong people management practices alone do not guarantee high asset performance – operational, technological, and strategic factors are also key. However, people management will play a crucial supporting role in improving overall performance.

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Emerging focus areas

01

Developing an integrated skills strategy

Learning and development teams are defining the skills the organisation will need in the future. To ensure the continuity and availability of critical skills, they are developing training and education programmes, technology roadmaps, and succession planning tools.

02

Building a skills pipeline

For critical asset management skills, organisations are developing and maintaining a skills pipeline through internship and sponsorship programmes, structured talent development and management processes, cross-skilling of employees (with specific transition plans in place), and innovative recruitment policies.

03

Developing structured learning pathways for critical roles

Organisations are defining the specific skills and competencies required for each asset management role and developing a content curriculum, progression framework, evaluation methodology, and feedback mechanisms to ensure effective learning across their workforce.

04

Adopting new learning philosophies

Understanding different learning styles is critical to developing effective development programmes – especially in technical knowledge areas. The adoption of technology such as mobile devices and AI is helping organisations implement new learning philosophies like skills-based learning, learning in the flow of work, and microlearning to increase understanding and retention of knowledge among learners.

05

Asset management awareness

Learning platforms that incorporate self-directed learning approaches can help new and existing employees to understand the organisation’s asset management objectives and how these align with organisational goals. These programmes can be accessed on demand and included in induction and refresher training programmes to communicate essential information quickly and effectively.

06

Implementing robust knowledge management frameworks

To prevent the loss of institutional knowledge, organisations are taking steps to capture tacit knowledge and make it accessible to all employees. This is typically done by incentivising a culture of knowledge creation and curation, and integrating knowledge and content management systems in asset management teams. In addition, many asset owners are implementing skills-based communities of practice to provide a structure for knowledge-sharing, leveraging the power of peer-to-peer and community-based learning.

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09

Improving the impact of learning programmes through coaching and mentoring

Coaching and mentoring can address gaps in learning by giving employees personalised guidance to apply their knowledge in their daily roles, and the support to overcome work-related challenges. Overall, coaching and mentoring empower employees to become more effective and engaged in their roles, leading to improved performance, job satisfaction, and retention within the organisation.

While the leadership teams of many asset management organisations believe (and invest) in learning programmes for their teams, the question of return on investment is always relevant. In our experience, there is often a perception that the significant time and effort spent on developing staff does not result in significant improvements in on-the-job performance.

There are several potential reasons for this lack of correlation between training investment and performance:

↗ Unclear objectives

If learning objectives are not well-defined or aligned with job requirements, employees may not see the relevance of the training to their roles.

↗ Poor training quality

When training programmes are poorly designed and do not have engaging content or effective learning methodologies, employees may not retain the information provided or be able to apply it effectively in the workplace.

↗ Insufficient management support

When leadership fails to actively endorse or encourage learning initiatives and provide opportunities for the practical application of new knowledge, employees may lack the confidence and motivation to fully engage in the training or apply their new skills.

↗ Inadequate resources

To participate in training programmes successfully – and apply the skills they have learned in the workplace – employees need resources such as time, tools, and learning materials, in addition to knowledge.

↗ Resistance to change

Employees may be reluctant to apply new ideas or methods, preferring to “stick with what they know”. They may also lack the confidence to challenge the status quo or have reservations about the leadership team's ability to implement or adopt a new way of working.

↗ Poor transfer of learning

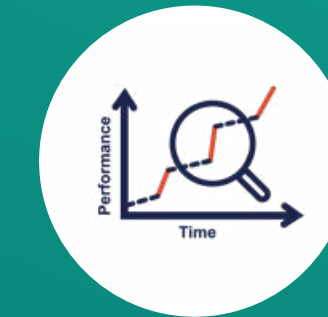
If the learning environment or context does not closely mimic the actual job environment, employees may struggle to apply new skills in their roles.

↗ Lack of feedback mechanisms

The absence of constructive feedback may prevent employees from understanding how they can improve performance or apply their new skills effectively.

↗ Cultural barriers

A workplace culture that lacks a focus on learning and knowledge-sharing in support of personal development can inhibit the motivation to enhance and improve job performance.



Industry insight

In our experience, training is most effective if it is accompanied by guided application, visible tracking of results, and learning within the flow of work.

After training, employees need:

- opportunities to apply their learning in practical contexts
- permission to learn from their mistakes
- access to experienced coaches and mentors
- clear, measurable performance targets
- support from line management
- a safe environment where they can ask for help from a trusted coach and mentor

If employees do not feel supported to achieve success through their leadership structures, they often revert to their previous working methods.

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Use cases for coaching and mentoring



Personalised development and clear goal-setting

Coaching and mentoring provide tailored guidance that addresses an individual's specific strengths and weaknesses. This allows employees to focus on areas most relevant to their growth and their role. A coach or mentor can help the employee to set clear, achievable goals relevant to specific business outcomes, providing a roadmap for their professional development.

Increased confidence and accountability

A relationship of trust and the regular support and encouragement of coaches or mentors can boost an employee's confidence, encouraging them to take on new challenges and responsibilities to improve their impact on the organisation. A coach or mentor helps employees stay focused and motivated to achieve their goals and take accountability for their development.

Improved knowledge-sharing and collaboration

When experienced professionals share their insights and practical experiences through a mentorship, employees gain valuable knowledge about the industry, organisation, and career progression. Coaching and mentoring relationships also strengthen connections within the organisation and broader industry, fostering a culture of support and collaboration that enhances employee satisfaction.



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Emerging focus areas

01

Including coaching and mentoring in training programme designs

Leading training providers are including coaching and mentoring requirements in their course designs. They require learners to identify a coach or mentor, select a real-world problem as a case study, and complete an agreed and relevant project as part of the training programme to demonstrate the practical application of their skills. Coaches and mentors are required to help select the project, guide the development of project approaches, and be available to answer questions and share knowledge.

02

Developing formal coaching and mentoring skills

Various organisations are formalising the skills requirements of internal and external coaches and mentors. Governing bodies such as the International Coaching Federation (ICF) and the European Mentoring and Coaching Council (EMCC) Global are using their networks to accredit training providers to train and certify coaches and mentors in accordance with recognised competency standards. This gives credibility to coaching and mentoring programmes offered to employees as part of their professional development.

03

Educating leadership teams about the value of coaching and mentoring

Leaders who want their asset management professionals to perform better must acknowledge their own role in creating an inclusive culture, providing learning opportunities, and working with learning and development specialists to build fit-for-purpose learning programmes. They need to be actively involved in coaching and mentoring programmes focused on workplace application.

04

Measuring performance

Performance management systems are adapted to track not only performance changes in learners after training but also whether the organisation's leadership is playing their part in reinforcing the required behaviours and creating space for development in their teams.

○ 1. Maintenance data quality: enabling the digital twin

○ 2. Realising value from AI and ML

○ 3. PDM and CBM technology adoption

○ 4. Moving to precision maintenance

○ 5. Focus on fundamentals

○ 6. Integration with sourcing and procurement

○ 7. Evolving servitisation models

○ 8. Managing institutional knowledge

○ 9. Impact through coaching and mentoring

● 10. Enabling ESG and sustainability



10

Enabling improved ESG and sustainability practices

Enterprise asset management plays a significant role in helping organisations achieve their ESG goals.

Increasing environmental awareness, shareholder and consumer activism, and initiatives such as the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement have encouraged organisations to align their operations with sustainability objectives and frameworks, contributing to the global focus on ESG.

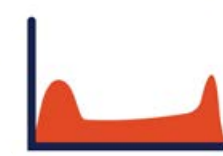
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EAM strategies and practices that support ESG



Promoting resource efficiency

The effective management of physical assets can reduce energy and resource consumption, for example, maintaining equipment for energy efficiency, minimising waste through accurate planning, and reducing the carbon footprint of spare parts through optimised supply chain planning.



Improved lifecycle management

Sustainable lifecycle management ensures that assets are designed, maintained, and disposed of in ways that minimise environmental impact. It includes considering recyclability and sustainability in the procurement process.



Better regulatory compliance

Robust physical asset management helps organisations minimise asset failure. This supports compliance with safety and environmental regulations and standards, reducing legal risks and promoting good governance.



Improved risk mitigation

By assessing and managing the risks associated with maintaining physical assets, organisations can proactively address potential environmental and safety issues, enhancing their overall sustainability performance.



Reduced community impact

Sustainable practices in asset management can contribute to broader social goals by producing results that foster positive relationships with local communities, such as reducing noise pollution and environmental waste.



Improved transparency and reporting

Asset management systems can provide data that facilitates accurate reporting on ESG performance, helping organisations communicate their sustainability progress to stakeholders and reinforce governance practices.



Supply chain management

Adopting sustainable practices in the management of physical assets can extend to suppliers. Organisations can promote ESG goals throughout the supply chain by ensuring responsible sourcing and compliance with sustainability standards.

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Emerging focus areas

01

Developing ESG skills in asset management teams

Transitioning to more sustainable practices requires changes in the types of assets used. Renewable energy sources, battery-powered tools, drones, and electric vehicles are examples of assets that require new skills and knowledge for conducting the required reliability studies and developing appropriate maintenance tactics. The increased use of sensors and data analytics also requires new skills to maintain the sensors and supporting infrastructure, and data-science skills to derive insights from data.

02

Optimisation of energy efficiency in work execution

Maintenance teams are regularly assessing and maintaining equipment to ensure optimal energy consumption. Asset managers are implementing energy-efficient technologies and practices that reduce resource consumption, such as upgrading to energy-efficient motors and implementing energy management systems.

03

Adoption of sustainability standards

Asset owners are adopting sustainability standards and certifications, such as ISO 14001 for environmental management systems and ISO 50001 for energy management systems, to guide their work practices and demonstrate commitment to ESG principles.

04

Reduction of waste

Organisations are implementing waste-reduction strategies in maintenance operations, such as recycling materials, minimising packaging, and disposing of hazardous materials in compliance with regulations.

05

Monitoring and reduction of emissions

Reliability teams are actively measuring and tracking emissions from equipment and processes to identify opportunities to reduce emissions, for example, by transitioning to cleaner technologies or alternative fuels.

06

Promotion of sustainable procurement

Asset management teams are following sustainable procurement practices when sourcing tools, spare parts, and materials. Organisations are selecting suppliers that demonstrate strong ESG practices and share their commitment to sustainability.

Conclusion



Conclusion

The ability to provide a reliable, safe and cost-efficient asset base remains a key component of all responsible business operations across the globe.

Changing geopolitical, technology, and human-performance factors continue to challenge asset managers to implement and sustain the appropriate enterprise asset management capabilities.

The trends described in this report will continue to evolve as the global landscape changes, and asset managers that are able to adapt will be in a strong position to identify and seize new opportunities as they emerge.

At Pragma, we look forward to helping our clients navigate the ever-changing asset management landscape, and to help shape the way we look after our assets – providing asset owners with peace of mind.

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List of abbreviations

AI	artificial intelligence
AM	asset management
AMIP	Asset Management Improvement Programme
BOM	bill of materials
CBM	condition-based maintenance
CFO	chief financial officer
CMMS	computerised maintenance management system
CMRP	Certified Maintenance and Reliability Professional
CoPs	communities of practice
EAM	enterprise asset management
EMCC	European Mentoring and Coaching Council
ERP	enterprise resource planning
ESG	environmental, social and governance
GFAM	Global Forum on Maintenance and Asset Management

ICF	International Coaching Federation
IoT	Internet of Things
KPA	key performance area
KPI	key performance indicator
ML	machine learning
MTBF	mean time between failures
OEM	original equipment manufacturer
PAM	physical asset management
PDM	predictive maintenance
PoC	proof of concept
SDG	Sustainable Development Goals
SHE	safety, health and environment
SOP	standard operating procedure
VDA	Verband der Automobilindustrie (German Association for the Automotive Industry)



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asset management | engineered