

Complete Guide to

ASSET STRATEGY MANAGEMENT (ASM)



Everything you need to know to transform the way your organization manages asset reliability

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About Cordant™ Asset Strategy

Introduction

Is your reliability program living up to its true potential?

The principles and tools of Reliability Centered Maintenance (RCM) have been around for decades, and most organizations understand the key elements that underpin a sound Reliability program. They invest time and money into creating and implementing Asset Management and Reliability improvement initiatives, in the effort to avoid unexpected failures, outages, safety exposures and costs to meet business performance goals.

Why then, time after time, do we see organizations struggle to deliver performance improvements and realize value from their efforts?

Are you experiencing any of these problems?

- High maintenance costs and unplanned downtime
- Uncertainty in the quality of strategies across the asset base
- No line of sight from the tasks being executed in the field to reliability strategy decisions
- Creating and deploying optimal maintenance strategies is an excessively time-consuming process
- Challenges in benchmark asset performance and measuring continuous improvements
- Inconsistent maintenance plans and Master Data

When organizations are plagued with these common problems, there is often one vital, but overlooked, area in their approach to asset management.

The effective development, deployment and ongoing management of asset maintenance strategies to realize reliability.

Whether it's process, people, technology, data related, if you aren't effectively managing the strategy on how your assets are maintained, you will fail to make the step change in your reliability improvement efforts to deliver value.

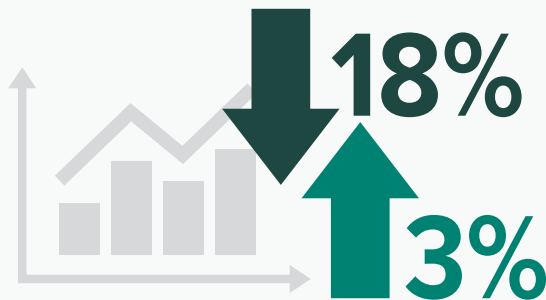
Real Life Example



We were asked to lead a project to review the maintenance strategies for sites and assets not meeting their availability targets, suffering frequent unplanned failures, and/or high maintenance costs.



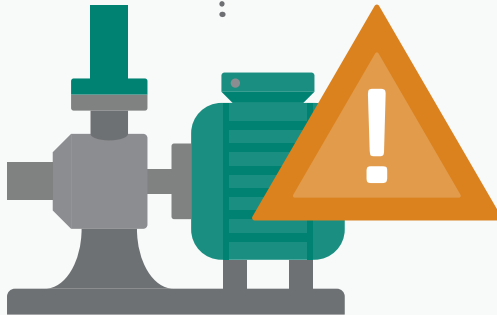
We got to work collecting the asset hierarchy, work order history, and current maintenance plans. Using all this data, we applied sophisticated methodologies to build an optimized maintenance strategy.



The resulting revised strategies were forecasted to reduce maintenance costs by -18% per annum and improve availability by +3%.

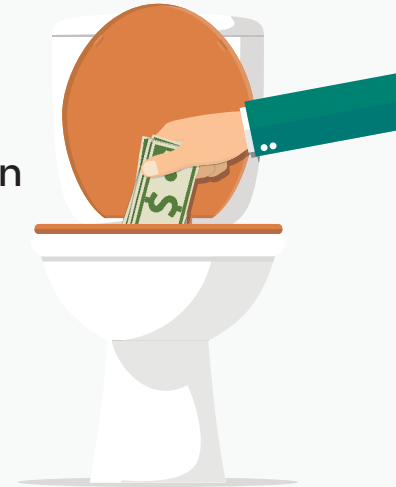
Real Life Example (cont'd)

This is a great outcome.



But – and herein lies the problem – the site failed to effectively implement and execute the strategy and continued to suffer from unplanned failures and poor availability.

There's the money down the drain.

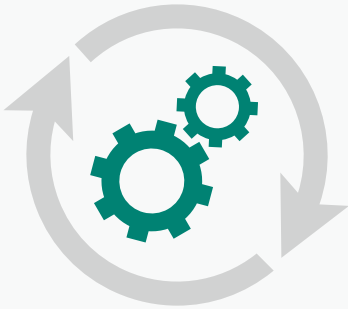


Ten years ago, when RCM was really hitting its strides, more and more organizations started investing in the task of developing maintenance strategies. But, according to research*, a massive **60 percent of these strategies were never implemented**. Think of the money wasted. It's money that can easily be saved if you know why it's disappearing and how to save it.

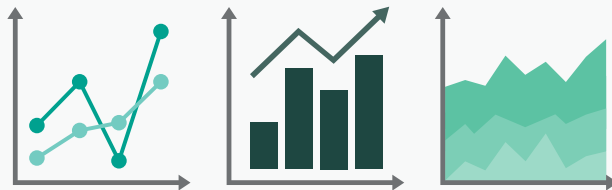
60%
of strategies never implemented

*Source: reliabilityweb.com

Real Life Example (cont'd)



To truly realize the value of a reliability program, optimal strategies need to be developed, implemented and then updated over time. The strategy needs to be managed. Many Reliability Managers find themselves so busy putting out day-to-day fires, so to speak, that it is hard to focus on more strategic issues.



It doesn't have to be this way.

You can utilize the data and equipment expertise that your already own to drive performance improvement with **Asset Strategy Management (ASM)**.



Part 1

What is Asset Strategy Management?

strat·e·gy

[stradejē]

noun

a plan of action or policy designed to achieve a major or overall aim.

Asset Strategy Management Defined

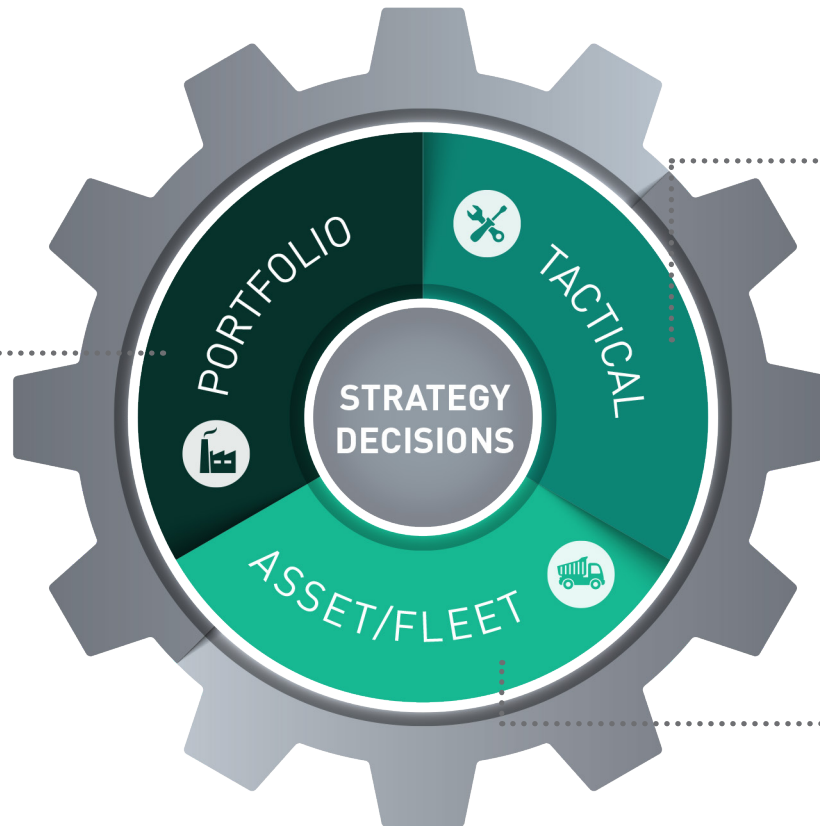
Asset Strategy Management (ASM) is a best practice approach to managing your asset strategies, organization-wide. It is a process, that is enabled by people, technology and data, to connect physical assets and independent plants and sites to a central system, allowing you to effectively develop, implement, maintain and optimize asset strategies.

Implementing an ASM program ensures that optimal strategies are always deployed, quickly and efficiently, to all assets, across your whole operation. It will deliver performance improvements through increased Reliability and the reduction of failures, downtime and risk, and consequently, a lower cost of operations, helping you to achieve your business performance goals.

What does *strategy management* cover?

PORTFOLIO:

Optimization of budget allocation for a portfolio to maximize value given the financial and resource constraints.



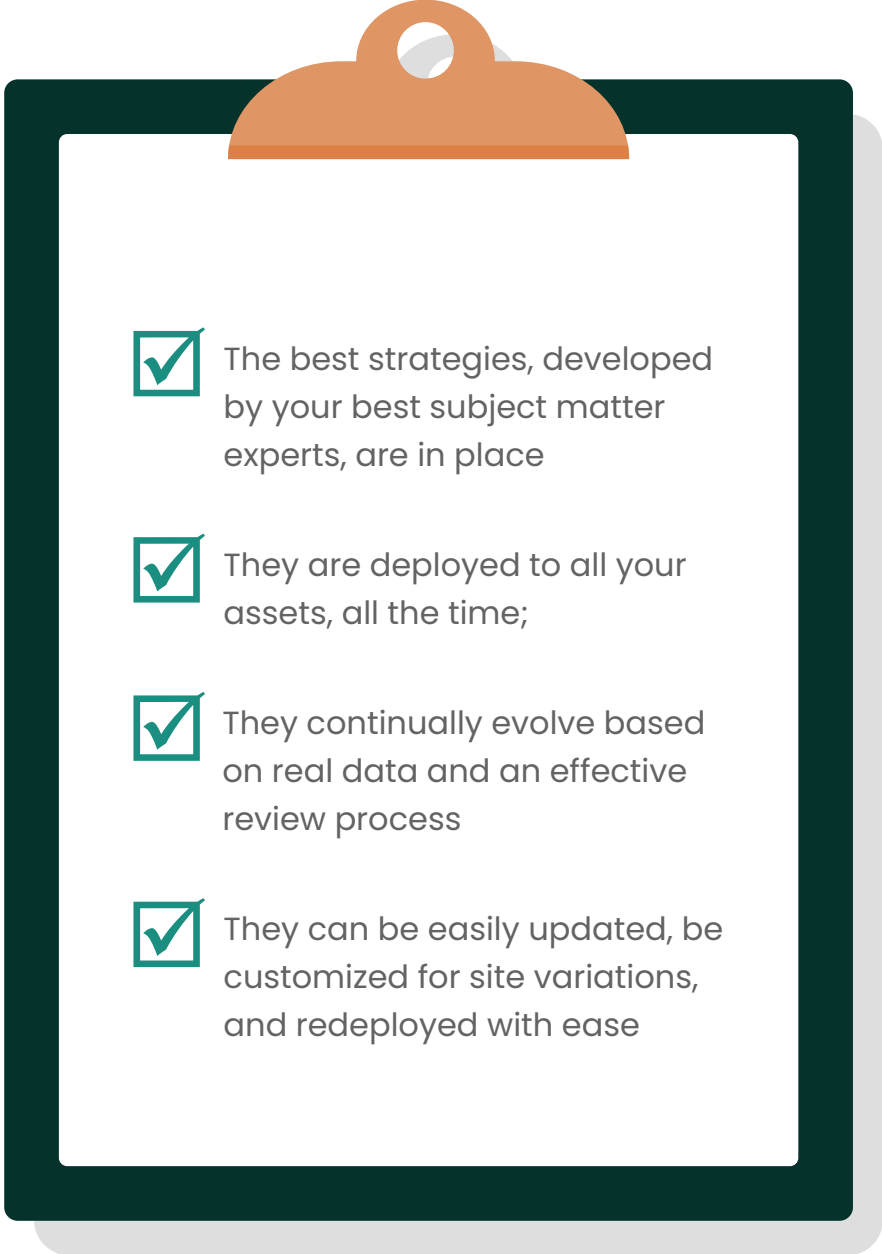
TACTICAL PLANS:

The maintenance plans that will be executed. Including the tasks to be performed, when they are done, how they are done, who does them, materials required.

ASSET/FLEET:

The decisions made at an asset level such as major component or asset replacement ages, major shutdown or system outage schedules.

In short,
**Asset Strategy
Management** means that:

- 
- ✓ The best strategies, developed by your best subject matter experts, are in place
 - ✓ They are deployed to all your assets, all the time;
 - ✓ They continually evolve based on real data and an effective review process
 - ✓ They can be easily updated, be customized for site variations, and redeployed with ease

ASM and your Enterprise Asset Management infrastructure

ASM and Work Management

Work Management is a well-established, integrated process, supported by software, that has been implemented into most mid to large scale organizations to help schedule work more efficiently, to meet consumer needs and to utilize assets and evaluate performance.

Given how embedded the work management process is in many organizations, there is a tendency is to focus on maintenance execution alone, in the belief that reliability will improve. To improve execution, the focus is placed on the work management process, work management KPIs, and Master Data and as a result an organization can realize benefits due to shorter outages and increased availability and production.

However, inconsistent or sub-optimal strategies are still executed, which can hamper performance and lead to variable results, continued under-performance, and significant failures and outages.

Essentially, most organizations are trying to deliver Reliability through work management, instead of strategy management – yet they are entirely different processes with completely different objectives. The focus of an organization needs to differentiate between strategy management and work management.

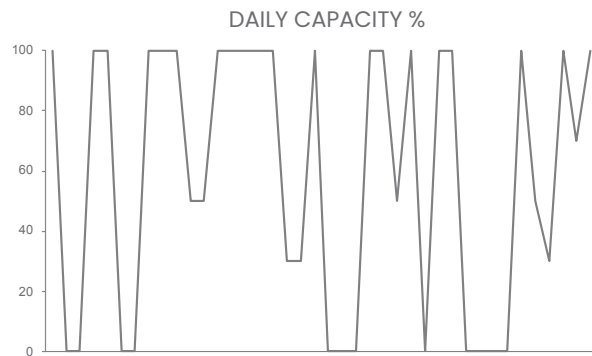
Work Management = Managing execution of work

Strategy Management = Managing the strategy that will be executed

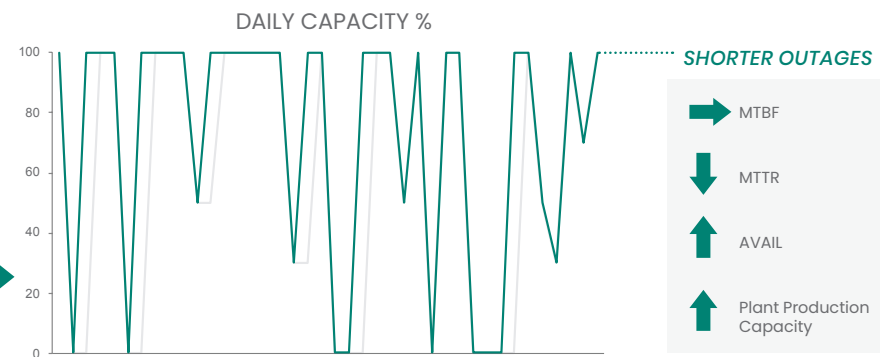
Think about it. Work management is all about executing tasks. Strategy management is all about deciding what tasks should be executed, when.

World-class execution of a poor strategy won't deliver on operational objectives in a predictable consistent way.

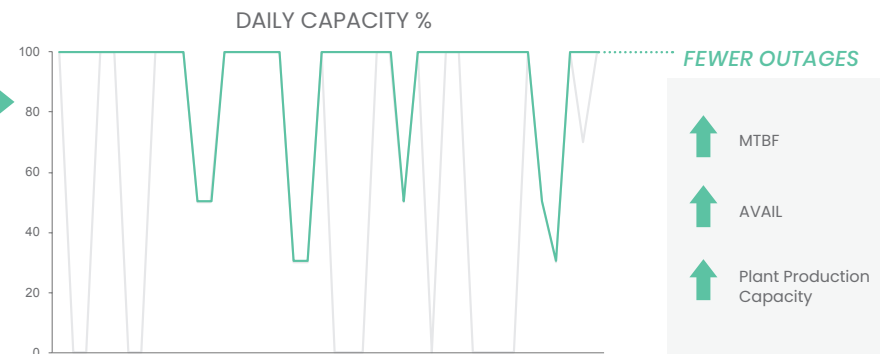
Let's look at what happens when you focus on **improving work management**. The mean time to repair decreases which is a good thing, however the mean time between failures stays the same as the core driver behind the performance has not been addressed through strategy review. When you focus on **Asset Strategy Management**, the mean time between failures increases which means less downtime, and increased availability and productivity.



IMPROVING WORK MANAGEMENT

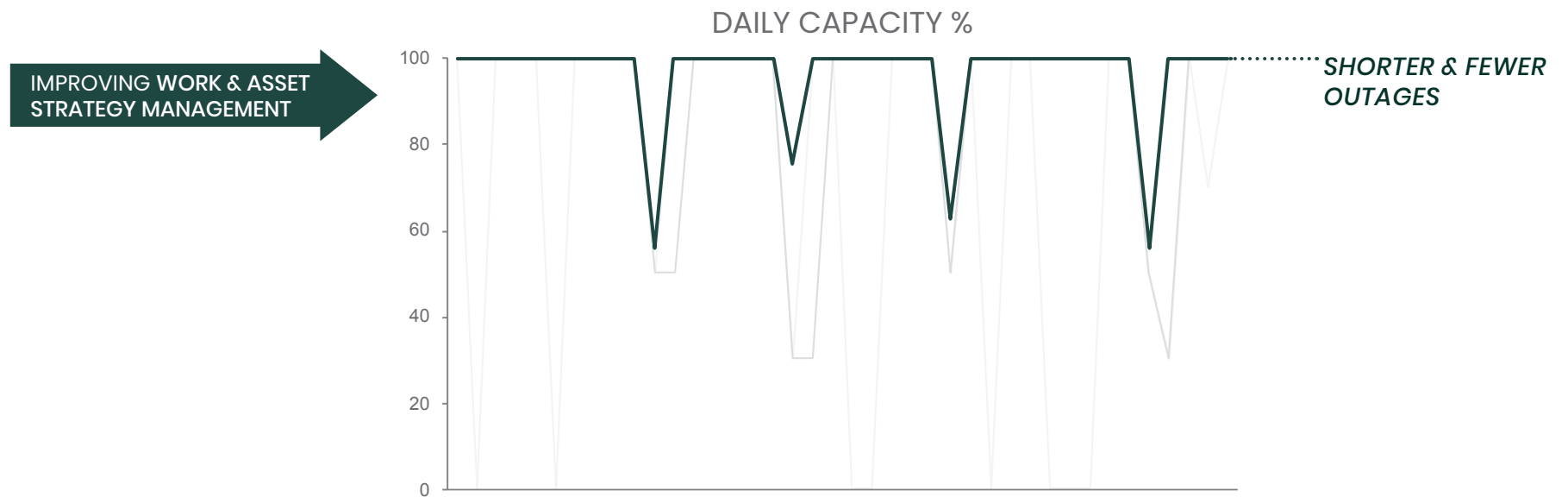


IMPROVING ASSET STRATEGY MANAGEMENT



World-class execution of a poor strategy won't deliver on operational objectives in a predictable consistent way. (cont'd)

Focus on improving both processes **TOGETHER**, will see the overall performance improvement of **shorter** and **fewer** outages.





ASM and Asset Health Management

ACM manages the risk of catastrophic failure, particularly on critical assets, by monitoring current conditions and providing alerts when an intervention is required.

ACM applicability is expanding due to recent technological advancements and a subsequent reduction in cost to implement. With these tools becoming more affordable, organizations can deploy condition monitoring on not only critical assets but across their balance of plant.

It is important to note that ACM does not manage asset strategy, but rather that ASM and ACM work in conjunction to deliver performance and manage risk.

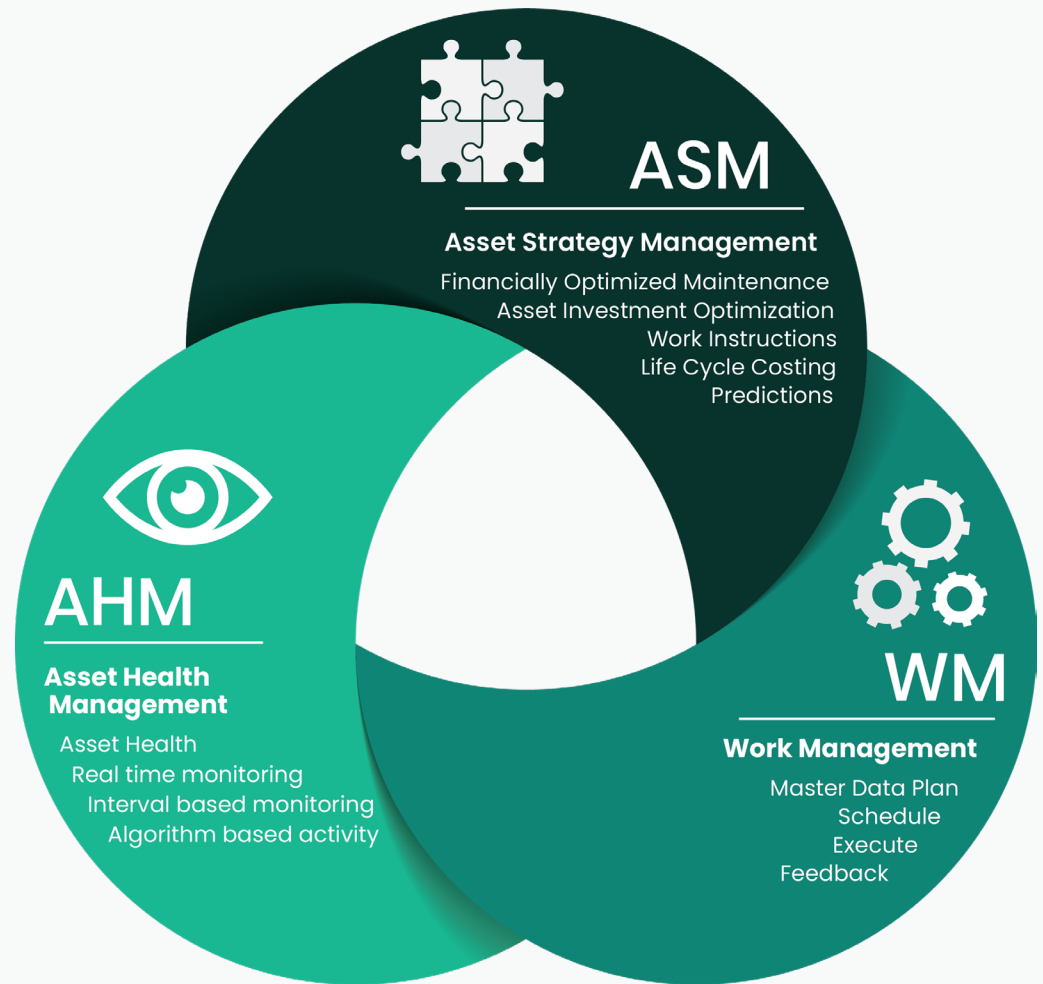
Asset Health Management = Monitors asset health and condition and alerts when remedial action is required

Asset Strategy Management = Manages the strategy to maintain asset health

Integrated Asset Performance Management

Seamless digital connection

Together, ASM, AHM and Work Management sit alongside one another to make sure that routine maintenance strategies, whole of life asset strategies, and condition monitoring and plant protection, are best-in-class and aligned to business performance requirements.



Part 2

Making the Case for Asset Strategy Management

Addressing the Challenges

Having optimal maintenance strategies, deployed to all assets always, should be a goal for every reliability and maintenance program, yet there are several challenges that can hold an organization back.

1. Strategies are not reviewed or updated
2. Informal approach to strategy development
3. Subjective strategies
4. Poor Master Data
5. Strategy work has a disregard for Specific Operating Context
6. Varied strategies across like assets
7. Lack of governance
8. Using an EAM system or Excel to manage maintenance strategy decisions

1. Strategies are not reviewed or updated

The operating environment is a dynamic one whereby operating context may constantly alter, required operating duties may change, the cost of downtime may change, and all the while assets are aging and perhaps what we expect from them is subject to change also. It is important then that the maintenance strategies we implement, stay up to date with all these changes.

If you have not reviewed or updated your maintenance strategies recently or worse still you don't have a defined process of review, it is likely your strategies are out of alignment with your current assets and their performance targets.

The maintenance strategies you execute are one of the single biggest contributors to performance. Ensuring your strategies are up to date is a key to successfully meeting your operational targets.

Common Setbacks:

Why aren't strategies reviewed?

- **A lack of formal triggers** to drive strategy review. In other words, there is nothing that initiates a strategy review to occur.
- **Limited or no formal process** in place to manage the review and evolution of strategies and content.
- **Lack of metrics** to successfully review or benchmark strategy performance and identify key areas for review.
- **A belief that following OEM recommendations** is the best strategy. Where OEM recommendations are likely suboptimal, as they are not tailored for your operating context.
- **A reactive maintenance culture** can hinder strategy review because the focus is on fixing failures rather than identifying areas of improvement.
- **False perceptions** that strategy review can be lengthy and arduous, and so a perceived lack of time and resources means the process is never started.

2. Informal Approach to Strategy Development

If you follow an informal approach to maintenance strategy development, the changes made are ad hoc and generally subjective. There tends to be little structure, consistency or justification. Over time, strategies can “wander”, often being modified and then changed back to the original several times.

However, the worst part about an informal approach is the inability to leverage sound strategy improvements across the entire asset base for any similar equipment types.

Basically, sound changes are only implemented on the specific asset involved and the communication of the change and the benefit does not translate to the rest of the organization.

In this environment the ability for the organization to capitalize on the true subject matter experts on specific asset types is significantly limited.

Common Setbacks:

Why is the approach informal?

- **A lack of Reliability skills** and expertise within the organization that then leads to an informal approach to strategy changes.
- **Limited technical system** or lack of tools to effectively conduct and record Reliability Study and Decision data
- **There is no agreed defined structure** for strategy review and change within the organization. The structure should include process, systems and required capabilities.

3. Subjective Strategies

In the absence of agreed structure for strategy review, many times changes are based on claimed “expert opinion”. While expert opinion is a valuable input to strategy decisions, there are also other equally valid inputs for that specific operating context and history with the specific asset. The real danger is that strategies are changed based on peoples experience with similar assets, not that specific asset, based on previous roles, sites and organizations.

Subjective decision making can lead to difficulty in justifying strategies and therefore they are constantly being challenged and as a result adjusted or changed based on competing opinions.

Common Setbacks:

Why are strategies subjective?

- **Inability to conduct data-driven analysis** to justify tasks and associated intervals, usually because of a disconnect between EAM systems and any reliability analysis solution.
- **A lack of governance** and review of strategy changes leading to localized experienced based strategy changes at times based solely on opinion.



4. Poor Master Data

Generally, Master Data is not complete or structured consistently, which leads to enormous difficulty in reviewing current plans and making sense of strategies, let alone being able to compare and benchmark against other assets. In the absence of an Asset Strategy Management process, the build of master data is typically manual or based on formulas and queries in multiple excel files or disparate applications.

It is tempting to try and fix master data first and then embark on strategy. If you take this approach, the likelihood is that you'll never get there. Starting with strategy ensures you are generating the content that you want to correctly compile into Master Data.

Common Setbacks:

Why is the Master Data poor?

- There is typically a lack of, or **inefficient data governance** procedures to mandate the capture and recording of specific data
- **Lack of Master Data guidelines** and requirements that support consistent master data
- **Inconsistent asset hierarchy** driving different maintenance plan structures for like equipment
- Any strategy development or **review process is disconnected** from the master data generation process and implementation



5. Strategy work has a disregard for Specific Operating Context

It is natural to look for fast track ways to generate or review a maintenance strategy. On the surface, the use of libraries seems logical and as a starting point they often are. The problem however, is that it is critical to review any library or template strategy for specific operating context, and if that is done, the connection point to the library information is now out of date.

If the process you are using cannot account for modification to the generic content, to allow for specific operating context changes, whilst still maintaining the connection, you are heading for a one-off review rather than a continuous process of improvement.

Common Setbacks:

Why don't we account for specific operating context?

- **Lack of systems or tools** to support effective strategy management and decision data on a continuous basis.



6. Varied Strategies Across Like Assets

If you have similar assets in similar duties across your organization, and you have different strategies of each (or worse, you don't know if they are dissimilar) you can't possibly have the optimal strategy on each asset.

The opportunity to rapidly make a change to an asset type strategy, based on new information, is also lost if you have dissimilar strategies on like assets. This translates to lost opportunity, as any improvement initiative is deployed on only one asset, instead of the entire asset base.

Common Setbacks:

Why do we have inconsistent strategies on like assets?

- **A decentralized strategy management** approach across sites. In the absence of a technical solution to support this approach, the true value of strategy improvement work cannot be realized.
- **Lack of generic strategy templates** available for like assets, leading to effort spent recreating the same strategies over and over.
- **Disconnected systems.** If you have no technical solution to connect strategy work across the organisation with your EAM system, it is difficult to get consistency.
- The **typical authorities for EAM** & strategy systems means that Work management (planners) have the ability to change strategy with little or no oversight, meaning that even if a sound strategy is implemented it can be changed and altered.

7. Lack of Governance

We've seen it all too often. New, optimized maintenance strategies are created and entered into the system, then months later the strategy has been changed back. Why?

People who were not involved in the strategy decision tend to turn it back to how it was and how they are used to doing things. The problem is there is no management around that decision. People can go into the system, change the strategy, which has a significant impact on the performance, without governance.

When your management team at a head office are laying down the maintenance strategies for physical assets at the company's various sites around the country and world, confusion can reign.

The corporate group has an agenda and often, the on-site maintenance manager has a different one. If a physical asset is on the brink of break-down on-site, then of course the on-site manager is going to do what they can to fix it – whether it's in the corporate rulebook or not.

The confusion arises when there is no way to track what's happening on site compared to the maintenance strategy set down by the corporate group or site strategy owners.

Common Setbacks:

Why does the strategy get changed without review?

- **Lack of formalized processes** (Accountability, change management, workflows, consistent methodology)
- **No restrictions on ERP & Strategy accessibility.** Work management (planners) have the ability to change strategy
- Maintenance **tasks are individual** and lack business / grouping rules to enable ease of execution
- **Lack of visibility** and inability to track strategy execution and compliance

8. Using an EAM System or Excel to Manage Maintenance Strategy Decisions

Creating and deploying generic content cannot be done effectively within an organization's EAM system. These systems are designed to support the execution of strategy, they are not designed to develop, maintain and manage good strategy.

The secret of successful strategy management lies in looking beyond the SAPs and Maximo's of the world to try to deliver Reliability. You can try to standardize these systems for a "generate once, use many times" approach, but it will not work.

An EAM system is designed to support efficient execution. To be effective it needs to be continually populated with appropriate Master Data and optimal strategies. By their very nature, they cannot truly utilize generic content in a continuously deployable and connected way.

Because EAM systems are not equipped, organizations fall back on spreadsheets to manage things like predictive failure analysis, failure mode effects criticality analysis, and reliability simulations.

If you're using spreadsheets to manage maintenance strategies, it's common to have a different spreadsheet at each site. A change that needs to be deployed globally requires a huge effort and carries the risk of error. When data is consolidated into one ASM system, changes can be made

singularly and globally. Reliability studies seamlessly interact with the EAM system without version issues and/or loss of data.

We have seen it take almost three years to develop a maintenance strategy using Excel spreadsheets. Using an enterprise ASM system, complex maintenance strategies were up and running in six months.

Common Setbacks:

Why do we try and use our EAM system to manage strategy?

- **Lack of systems** or tools to support effective Strategy Management and Decision data so we try and support the requirement with what we have.
- **No restrictions on EAM & Strategy Master Data accessibility.** Work management contributors (eg planners) have the ability to change strategy related data.

In the following section we'll guide you through the process of implementing Asset Strategy Management.

Part 3

How to Get Started With Asset Strategy Management?

Organizations at any reliability maturity level can start taking the necessary steps towards building a world-class Asset Strategy Management program. Here, we'll walk you through the process from start to finish.

Benchmarking – Understanding the Current State

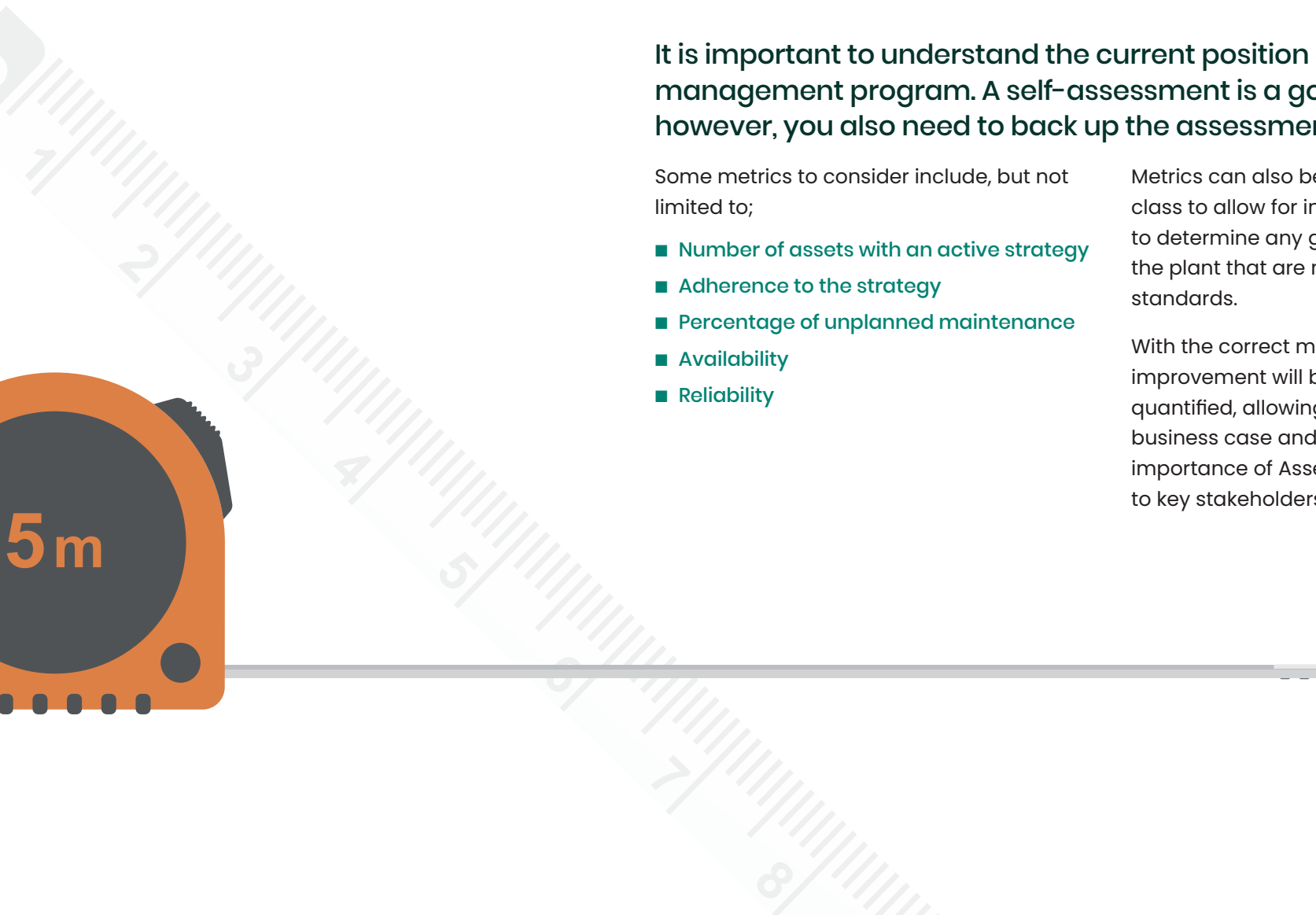
It is important to understand the current position of your strategy management program. A self-assessment is a good starting point; however, you also need to back up the assessment with data.

Some metrics to consider include, but not limited to;

- Number of assets with an active strategy
- Adherence to the strategy
- Percentage of unplanned maintenance
- Availability
- Reliability

Metrics can also be determined by asset class to allow for industry benchmarking to determine any gaps, issues or areas of the plant that are not in line with industry standards.

With the correct metrics, areas for improvement will be identified and quantified, allowing you to build the business case and emphasize the importance of Asset Strategy Management to key stakeholders.



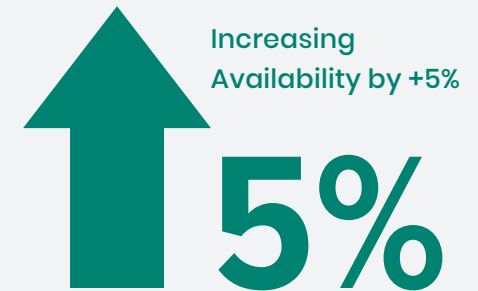


Targets for Improvement

Use the data to understand the current health of your assets and then set targets to be able to measure improvements and effectiveness once ASM is implemented.

There are many simulation methods that can predict the amount of cost savings, however without a benchmark, the information is useless. Setting clear objectives allows for improvements to be tracked and justifies the effort.

Targets can be as simple as;



Improvement goals must be measurable and attainable. Having a clear understanding of industry benchmarking will provide insight into targets and help you to understand what achievable targets may be. Please note that these can only provide a guide though for, as always, to set realistic and attainable goals, you must take into account your current state, what is a realistic improvement and does it take into account operating context and capacity.

As an example, targeting an availability of 95% in some instances is not achievable. A plant that operates 24/7 and has a 3-week shut-down every year can only achieve a maximum of 94.2% availability. That means in an entire year there can be no unplanned outages. A target of 92% availability would be more reasonable as this allows for 7 days of unplanned outages per year which is a marked improvement from the current 15 days of unplanned outages.

Blueprinting – Laying the Foundation

Blueprinting is the foundation that helps you map out the business needs and identify gaps in your current process. During the blueprinting phase it's time to define the direction at a high level. It is important not to overlook this step, as a software configuration will focus on delivering functionality, rather than addressing business needs and direction.

Process

Business process mapping should be completed by first reviewing the current process and identifying challenges, issues and shortcomings. From those learnings, a “future state” process should be defined to pinpoint improvements and efficiency gains that meet the objectives of the process. This will also inform the functional requirements for software tools that may be required to drive the new business process.

People

Clearly defined roles and responsibilities should be a major consideration as you map out an Asset Strategy Management process. Make sure that your entire team has a solid understanding of the expectations and skills or tools required to complete the job. A common outcome is a RACI (Responsible, Accountable, Consulted and Informed) matrix.

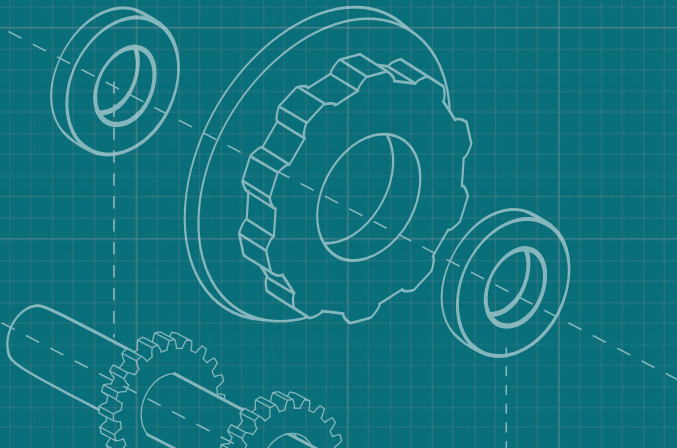
A process without the right people will not be effective. Skilled, motivated and dedicated people will be the difference between success or failure when adopting a new process.

Strategy Development

While ASM describes the entire process for managing multiple asset strategies, there are many methods that can be used to determine effective strategy at an asset level. It is important to understand the available methods and which ones will deliver the most value to your organization.

For example:

Reliability Centered Maintenance is very effective when paired with Monte Carlo simulation and can deliver huge returns, however, this may not be applicable to every asset. A low-critical asset may only require a task-based approach or a template/generic strategy and save you time and effort.



Planning & Gap Analysis

As the blueprint ends, a gap analysis between the current and future state process will assist with identifying the actions needed to embed an Asset Strategy Management process within your organization. It is time to put together the project to achieve the vision.

The following items should be considered to ensure success:

- Establish the core project team, project charter, and project controls
- Develop a detailed implementation plan, including scope, activities, milestones, and resources
- Conduct an organizational readiness assessment to gauge employees' ability to adapt to the new system
- Conduct a risk assessment and risk mitigation plan
- Define a business benefits realization plan, including KPIs and performance improvements

Standardization and Governance

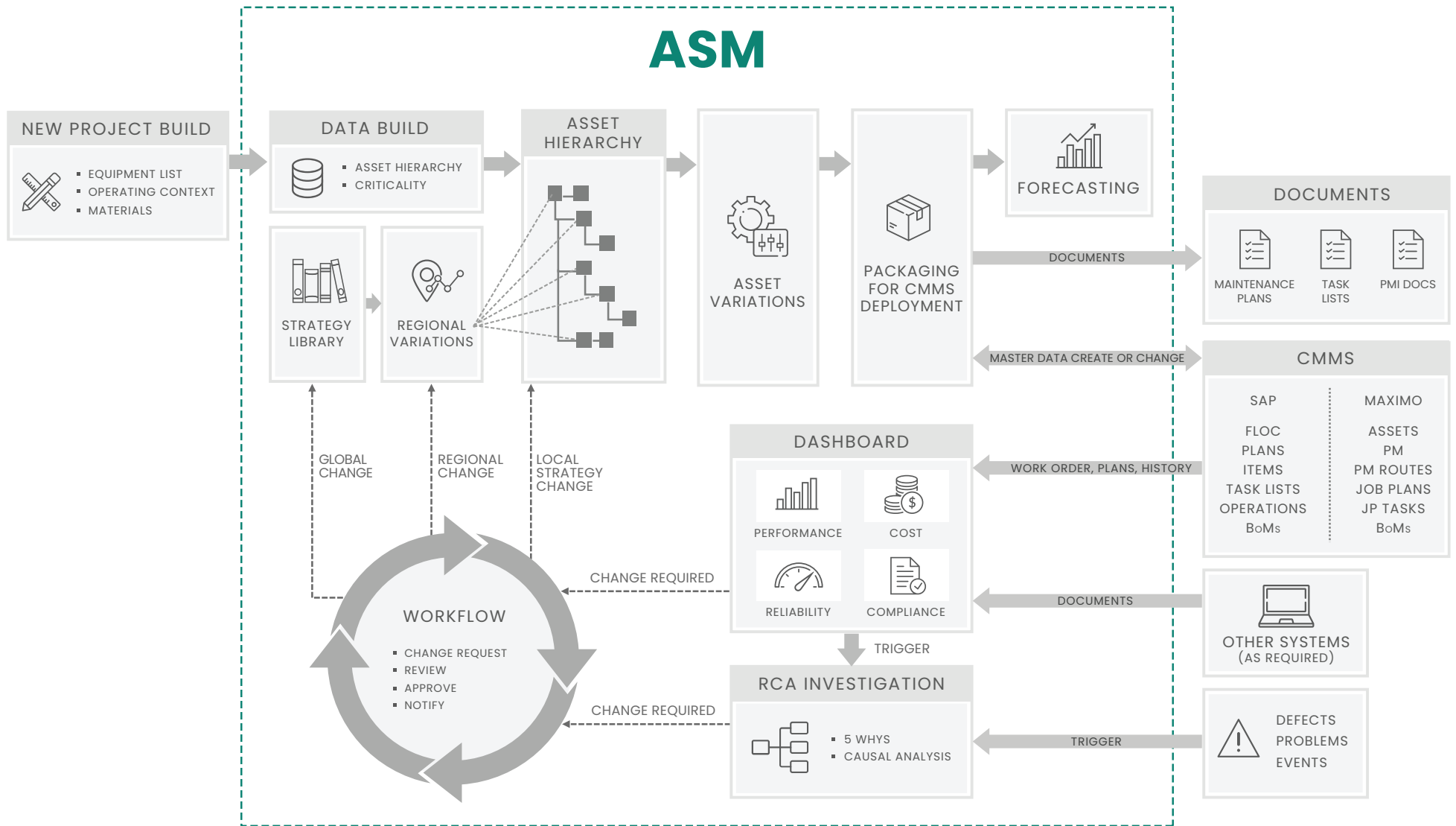
Building Out the Framework

Until this step there has been no mention of software or enterprise systems, and for good reason, as the process should be defined without the consideration of software. Theoretically speaking, developing a new process could still be achieved with pen and paper (though very inefficient and will likely suffer from quality issues).

Software or enterprise systems are tools that enable the user, deliver the required functionality, remove any potential avenues for the introduction of errors and allow for an organization to achieve their goals in the most efficient manner possible.

When you move on to building out the framework to achieve your desired business outcomes, as defined in the blueprinting phase, you should look for technology that enables you to make informed decisions in an efficient manner. In Asset Strategy Management that means determining the best method to manage asset strategies focused on lowering costs, mitigating risks and reducing unplanned downtime.

Here's an example of how ASM might fit into your current systems:



Connecting Enterprise Systems

Connecting to an enterprise level system that allows for collaboration, data management and centralized data across the organization is the best method for delivering on business goals. Not only will it allow an organization to align all areas of the business, but it delivers on process efficiencies and data standardization that can't be achieved with desktop applications.

When selecting a tool to support the process, it is important that the functional requirements are aligned to the business requirements as outlined in the blueprinting process. This can be achieved through a Traceability Matrix..

REQUIREMENT TRACEABILITY MATRIX

Test Case ID	TC_1	TC_2	TC_3	TC_4	TC_5	TC_6	TC_7	TC_8	TC_9	TC_10	# Test Cases for respective Requirement
Req. ID											
Req_1	x		x			x					3
Req_2		x			x						2
Req_3			x								1
Req_4				x		x					2
Req_5					x		x				2
Req_6						x					1
Req_7					x		x				2
Req_8								x			1
Req_9									x		1
Req_10										x	1

In the world of ASM, some elements to consider are:

- Ability to create global component strategies
- Ability to apply global component strategies to physical assets and maintain the connection
- Ability to create local variations per physical asset based on operations context or other reasons for changes to the global strategy
- Ability to provide analysis feedback for decision making
- Ability to apply strategy updates globally
- Ability to see information/decision metrics across the organization
- And most importantly, is the analysis method best in practice or aligned with your business requirements?

Note, there are other considerations that align with any enterprise system, such as;

- Security permissions and control
- Workflow and workflow management
- Dashboard and reporting
- Data and system integrations
- Ability to configure and align with your process
- Implementation and ongoing support
- Onboarding and training

It is highly recommended to avoid customization. When customization is introduced, it becomes hard to improve and adapt as future changes are required. Customization not only costs more, but it will also make it difficult to upgrade systems as new technology, methods and functionality become available. Instead you should aim for an off the shelf solution that allows for flexible configuration.

Data Standardization and Migration

Poor data in means a poor decision out. Data standardization is the process of bringing data into a common format that allows for collaborative analysis, large-scale analytics, and sharing of sophisticated tools and methodologies.

This applies to data migration as well as methods for capturing data. Whether it is a work order failure code, condition monitoring result, or data classification of strategies for work planning, there should always be a corresponding data standard which describes the need, standard, and format. Applying data standards results in a more accurate analysis and allows you to make informed decisions that lead to the best outcomes for your organization.

As part of defining an ASM process, data migration plans, and data standards should be put in place before any data is moved. You need to consider why the data is needed and how it will be used.



Visibility

When building out the framework, visibility within the system is paramount. Users, supervisors, and managers need to quickly and easily see the relevant data to make informed decisions. With today's technology, this can be in the form of KPI's, automated reports and data analytics, or role-based dashboards.

Defining the key report requirements up front will help guide data standards, tool selection and more important alignment to the business process.

Some examples of reporting may include:

■ Local Variation Comparison Report

- Showing the differences from global component strategies to the strategies actually deployed.
- Allows for visibility into differences in strategies and sharing of learnings.

■ KPI Dashboards

- Align to the metrics and goals that were used to define the process, it is important to continually monitor and track.

■ Prediction vs Actual Dashboards

- Decisions in Asset Strategy Management are made based on predicting likely outcomes, plotting those against actual can provide the user more information to determine if the strategy is effective.

■ Pareto Charts

- High contribution to downtime/cost can be effective to determine where to focus effort to reduce downtime and lower costs downtime and lower costs.

Execution and Change Management

Enabling People and Processes

A business process has been put in place, an implementation plan determined, systems and tools selected. It is now time to actually do the work to make it all happen.

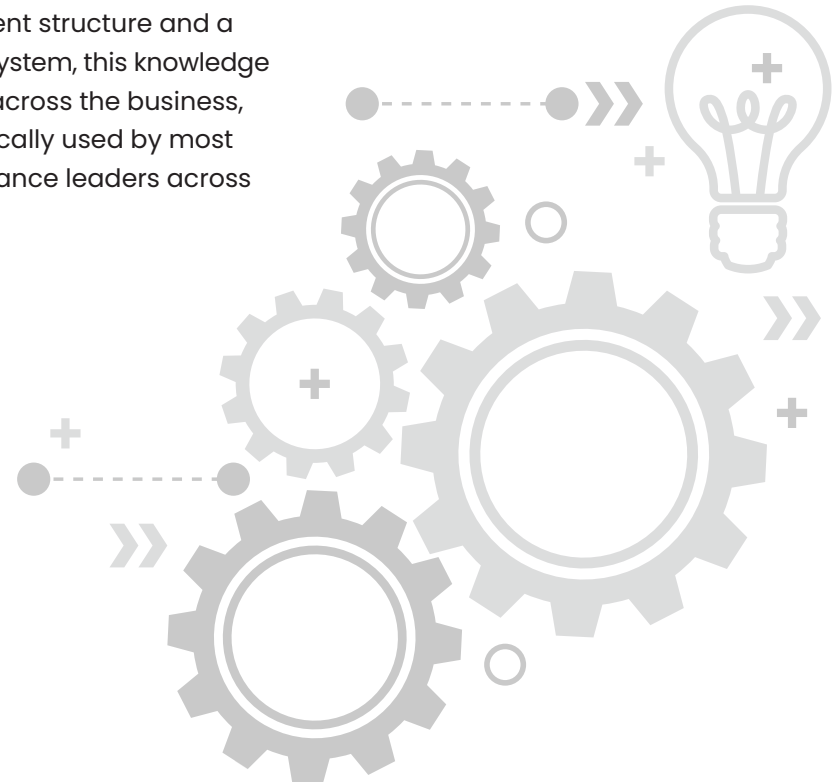
Developing Strategies

A common concern that arises at the start of establishing an Asset Strategy Management program is a lack of quality data to support the process and the data requirements, however, that is not the case.

When developing strategies, you should capture the knowledge of your best subject-matter experts and make that knowledge available for all to view and use. Optimal approaches can be leveraged to build out maintenance strategies to be used for all your assets across the organization rather than in silos. Applying the best work from individual sites to the entire organization is the path towards a truly world-class reliability program.

Start by reviewing the current strategies being executed within the organization and engage all subject matter experts to determine what the best practice strategies are for your organization. In addition, data can be sourced from OEM and from similar industries.

With a global component structure and a connected enterprise system, this knowledge will be easy to deploy across the business, across sites and is typically used by most reliability and maintenance leaders across multiple industries.



Training

A chain is only as strong as its weakest link. It is critical that everyone involved in the process is on-board and well equipped with the necessary knowledge and skills to succeed. Proper training in Asset Strategy Management could be structured as follows:

Process

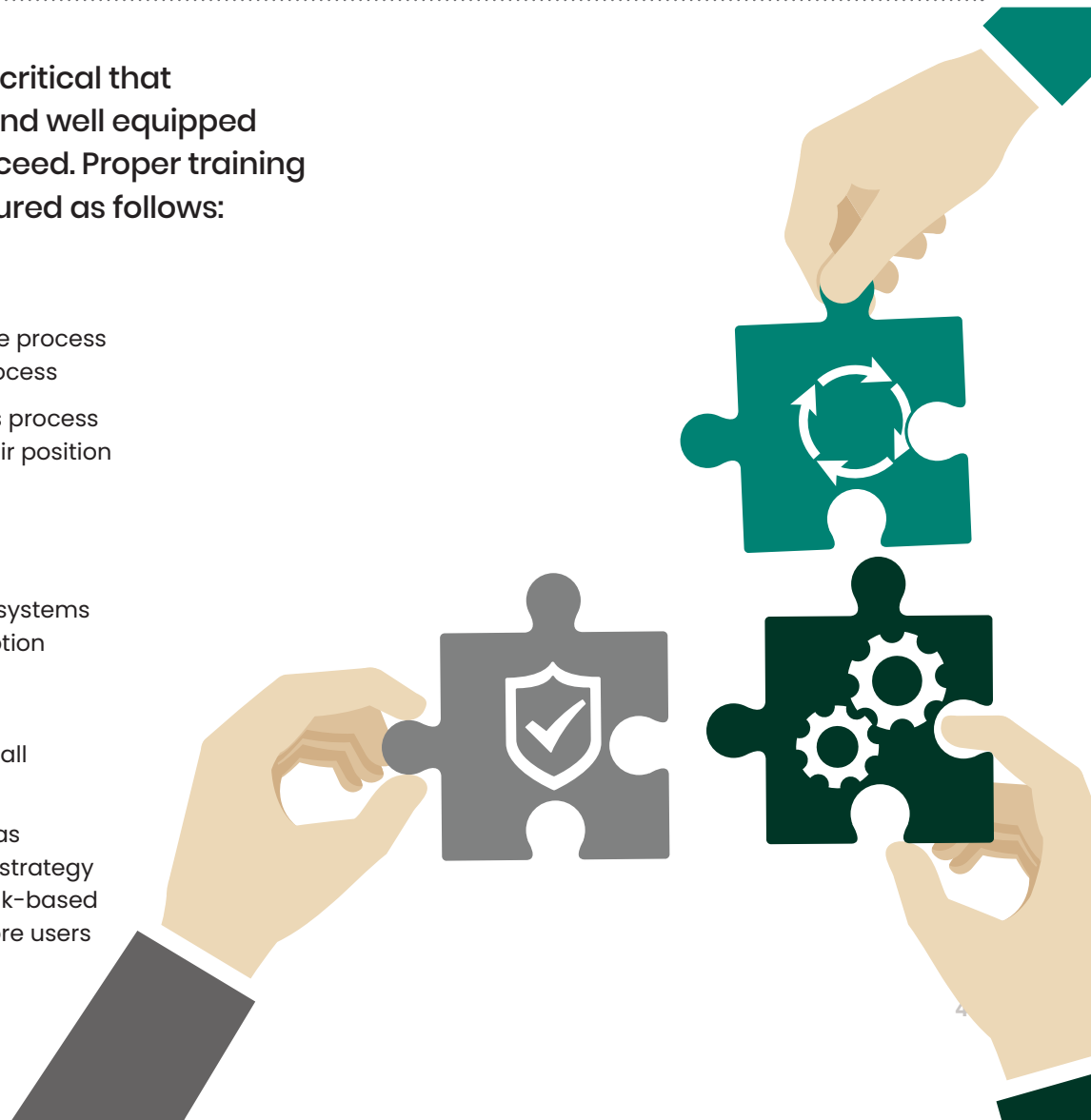
- Everyone involved should receive an introduction to how the process fits into the business as well as an overview of the entire process
- Role-specific training to introduce each role in the business process so they are familiar with the roles and responsibilities of their position

Systems

- Training in all the systems based on roles is very important
- Enabling people to have knowledge of how to best use the systems in line with the business process Will ensure seamless adoption

Reliability

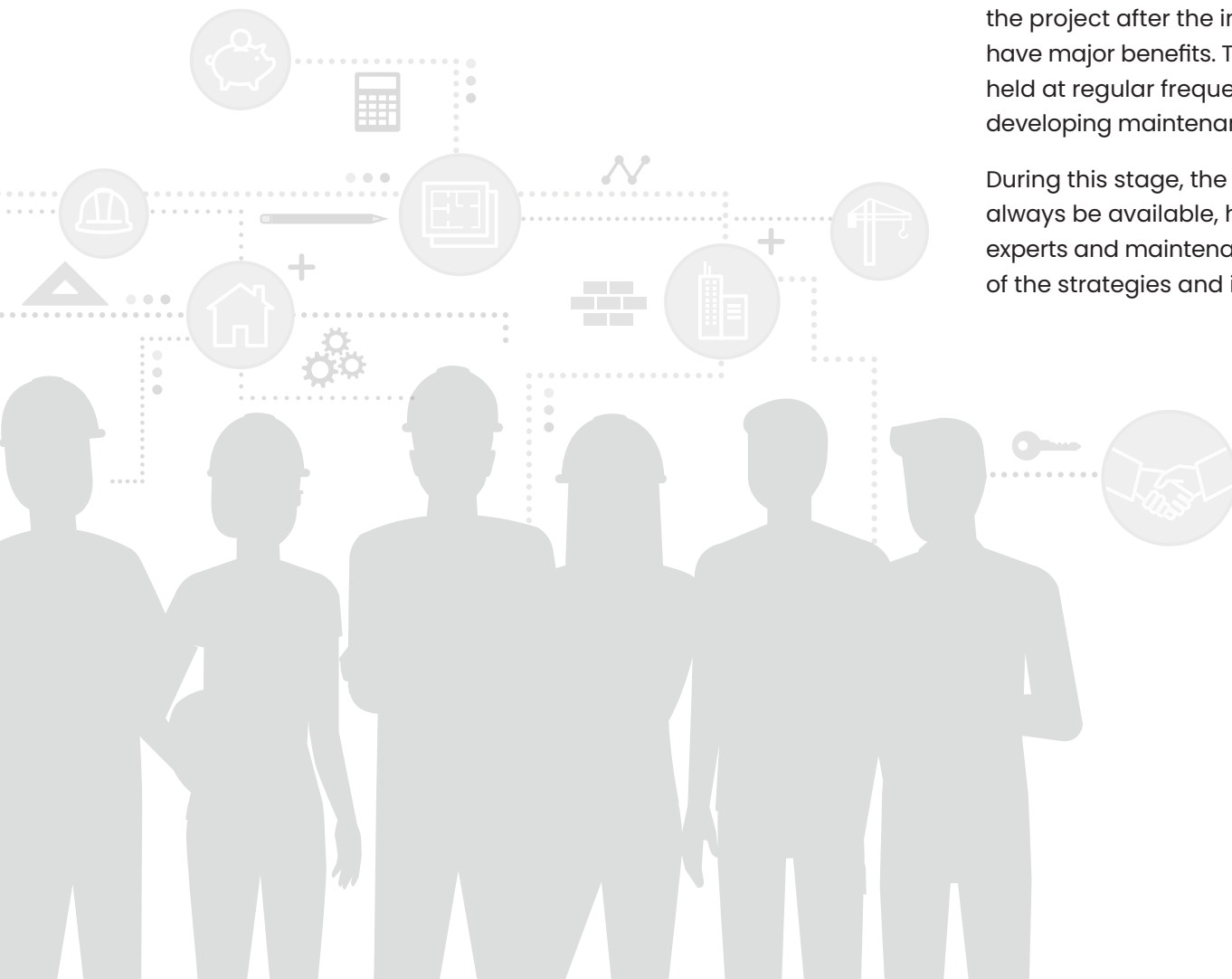
- An "Introduction to reliability" training course would benefit all persons involved
- An advanced reliability course, introducing elements such as failure analysis methods, reliability centered maintenance, strategy optimization, defect elimination and root cause analysis, risk-based inspections, and reliability block diagrams would benefit core users



Execution


It cannot be stressed enough, having the people, that will be owning the project after the implementation, involved in the process will have major benefits. This can be as simple as an information session held at regular frequencies or scheduling a workshop aimed at developing maintenance strategies. Either way, involvement is key.

During this stage, the knowledge of current asset strategy may not always be available, however involvement from subject matter experts and maintenance technicians will greatly increase the quality of the strategies and improve the embedding of the process.



Part 4

Building Your Asset Strategy Management Program

The background of the slide is a dark teal color with a faint, semi-transparent image of an industrial facility. The image shows large pipes, metal structures, and what appears to be a large cylindrical tank or silo. The overall aesthetic is technical and industrial.

Now that you've laid the foundation and established the framework, it's time to develop the key elements of an Asset Strategy Management program that will allow you to deploy the best strategies to all your assets, efficiently and effectively, by leveraging the knowledge of your entire organization.

Build Generic Strategies

Generic strategies are a great starting point for developing an asset strategy.

Here's what you'll need:

Component Strategies

At the core of an asset strategy management solution sits an asset strategy library which houses reliability-based tactics and execution know-how. Component based maintenance strategy development allows for rapid development, review and optimization of an entire asset base. The Component based library reflects best practice strategies for all components that form part of the asset base. These FMECA (Failure mode, effects and criticality analysis) based strategies are deployed to all relevant assets and support regional or local variations to cater for different operational or environmental conditions.

The fundamental aspect here is that the strategies utilize a failure model analysis approach to determine the optimal strategy at a generic level. By having an optimal starting point, deploying strategies becomes easier and operational context can be applied to make those strategies specific to any physical asset.

Capturing key data such as;

- Functions, Functional Failures, and Failure Modes
- Failure coding aligned to a ERP/CMMS system
- Failure Rates
- Impact of Failure
- MTTR
- Operation Context

Component Strategies (cont'd)

Before building generic strategies, you must define your component types. These can include categories such as pumps, motors, transmitters, switches, breakers, etc.

Sometimes it is ideal to break out equipment classes beyond just basic equipment types. Component types could be further broken down into size, such as small motor (e.g. <50HP), medium motor (e.g. 50-150HP), and large motor (e.g. >150HP).

Creating generic strategies raises the question: how generic is generic? For this methodology, a generic strategy is defined by failure modes and maintenance tasks that are common among that asset class. For example, when it comes to motors, generic strategies would include tasks such as lubrication and vibration analysis tasks.

> 50HP



50 - 150 HP



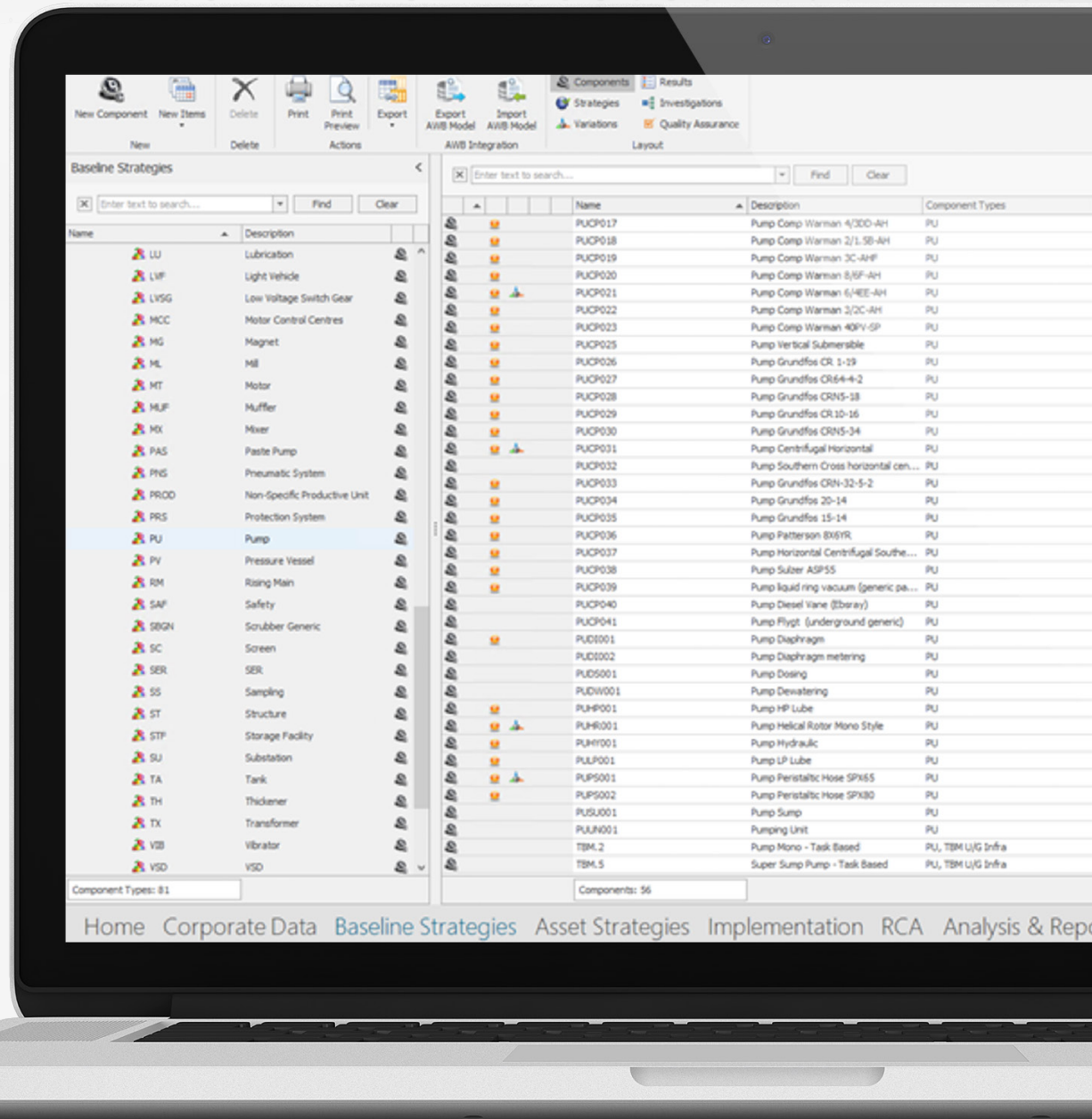
> 150 HP



Build Generic Strategies

Nomenclature is important when defining component types, as these terms will later be applied to specific assets. A good practice is to abbreviate types into four characters, e.g. the ID for a pump can be PUGN, specifying it is a general (GN) pump (PU).

Note that the abbreviation of PUMP was not used here as there are several types of pumps (hydraulic, diaphragm, submersible, etc.). This practice should be considered for all other equipment classes.



Cost and Risk Justified Strategies

As part of the tasks optimization process, cost and risk benefit ratios should be calculated. These benefit ratios can be used to identify which tasks mitigate the least amount of risk. These are the tasks to be turned off in order to meet the maintenance budget. The analysis will then identify the increase in risk that will occur with the reduction in the maintenance budget.

Task Phrase Library

With each strategy, it is important to be consistent with task instruction. In this guide, we refer to the task instruction as the information that tells us what to do. By introducing a task instruction library, we can ensure that when a task is applied that the terminology is consistent and understood, organization wide.

These types of libraries mean that it is easy to build-up strategies as the best-in-class task instructions are available and again can be modified to suit local context or language.

Deploying Strategies

How do you develop a strategy for a specific piece of equipment?

Deploy to Physical Assets

With generic component-based strategies, developing an entire strategy for an asset can be completed quickly. More importantly, by leveraging an enterprise system, you can find similar equipment and apply strategies by reviewing similar assets.

Local Variations

After the generic strategies are deployed to their corresponding physical assets, the next step is to generate variations on the maintenance strategies. This means that failure and repair data previously established in the generic strategy can be modified to reflect the physical asset's operating context.

In addition to varying failure and repair data, other data such as functions, functional failures, failure modes, and consequences can be modified. It is important to keep track of what was changed and who has changed it.

The centralized database then becomes a great tool for change management, as it will notify the user when variations are made on their strategies.

A sense of governance of the maintenance strategy will begin to emerge from inception to implementation as the maintenance and reliability program becomes increasingly more collaborative.

Deploying Strategies

The screenshot displays a software interface for managing physical assets and their variations. The interface is divided into several sections:

- Top Bar:** Contains various utility icons such as Print, Export, Launch Dashboard, Convert To Production, Open Component, Refresh, Lock Filter For Editing, Bulk Edit, and Open Column Chooser. It also includes navigation tabs for Physical Assets, Analytics, Strategies, Investigations, Troubleshooting Guides, and Quality Assurance.
- Left Panel (Physical Assets):** A list of assets with columns for Name, Description, and Comments. The list is filtered to show assets starting with '322...'.
- Main Panel (Variations):** A detailed view of a selected asset's variations. It shows a tree structure of properties for a 'Scheduled Task Equipment' asset. The properties include Duration, Equipment, and Quantity, with their respective values and descriptions. The variations are categorized as 'New'.

Entity Type	Name	Description	Variation Type
Physical Asset	7259.10.01.BLGN05-BLCO01.1	Fan Assembly	
Scheduled Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Scheduled Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Scheduled Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Scheduled Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Corrective Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Corrective Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Corrective Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	
Corrective Task Equipment	50 Tonne Crane + Driver	50 Tonne Crane + Driver	New
Property	Duration	Duration new value set to 0	
Property	Equipment	Equipment new value set to 50 Tonne Crane + Driver	
Property	Quantity	Quantity new value set to 1	
Property	Set To Task Duration	Set To Task Duration new value set to Y	

Task Effectiveness Analysis

It is important to understand what impact variations have on strategy. These changes can just as easily improve the performance of an asset as well as hinder. That is why it is important to document information that supports any changes.

This can come in the form of asset-specific failure analysis, applying factors to key parameters to increase the effect of production downtime or by performing optimization to determine optimal task intervals..

If you combine this analysis with a review and approval process, you can be sure that the best and optimal strategy is applied to every asset, every time.



Implementing Strategies

Once a change has been made, you need it to easily flow through to the ERP / CMMS.

Packaging Rules

A work plan is a collection of tasks and activities that are completed by a work management or maintenance function. When developing work plans, you may find it difficult to answer the question, “How do we execute maintenance?” However, when the layers of data are pulled back, there are usually a few simple rules that govern how a work plan is packaged together.

Once you understand this, rules can be put in place to assist and automate the work plan packaging, overcoming one of the biggest challenges to implementing an Asset Strategy Management program.

Implementing Strategies

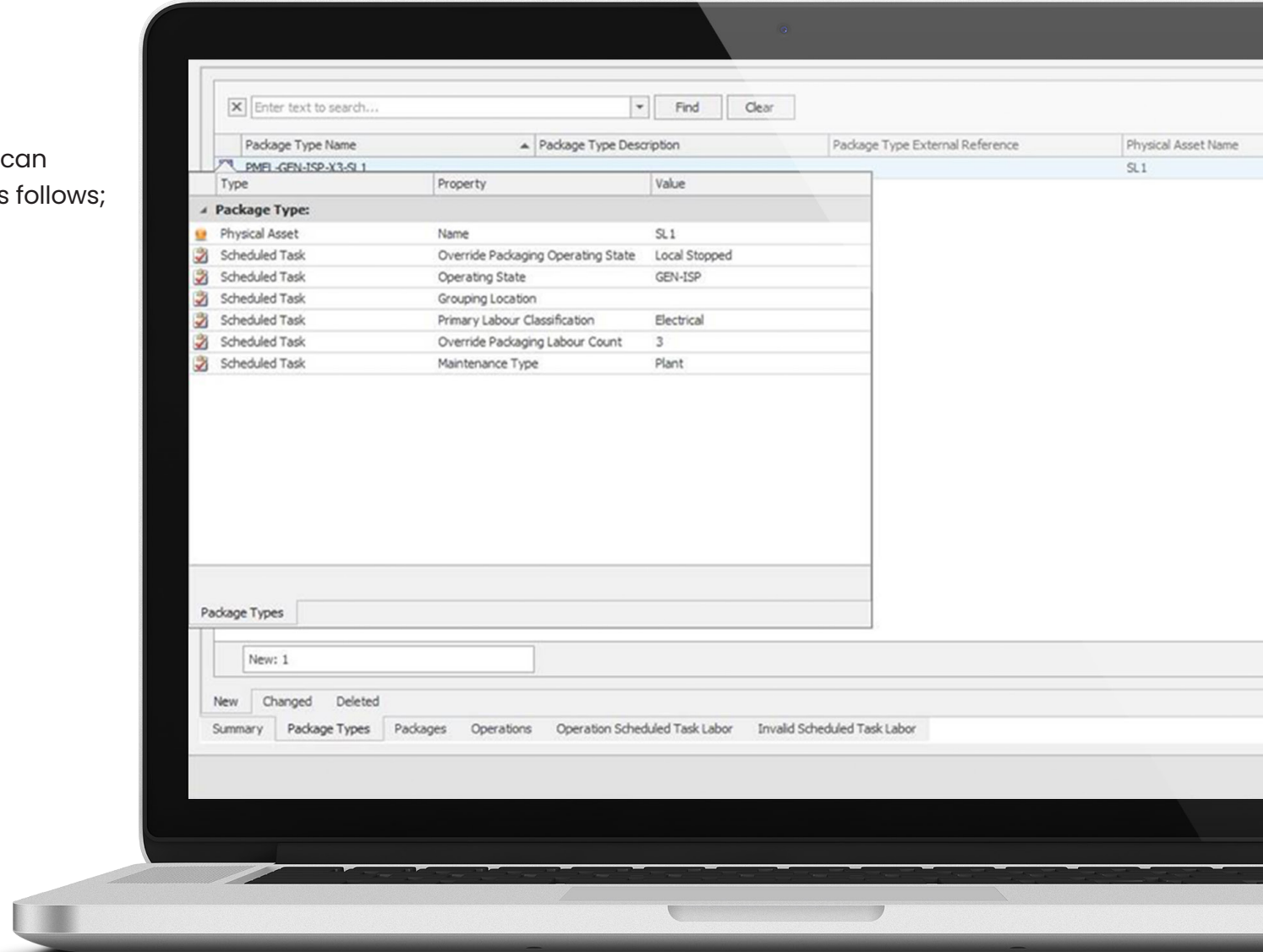
Work plan packaging rules can typically be broken down as follows;

■ Asset/System

- Route
 - Labor
 - Interval
 - Operation Condition
- Planned
 - Labor
 - Interval
 - Operation Condition
- Inspection
 - Labor
 - Interval
 - Operation Condition

■ Statutory/Safety

- Interval

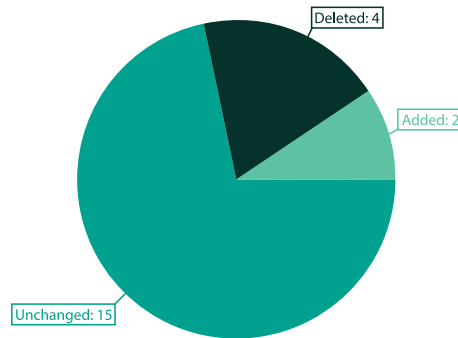


This is only one example, we have implemented many systems that are as simple as four key characteristics and some that involve up to 20 rules sets and site-based variations. The important thing to keep in mind is that it can and should be defined to remove any roadblocks.

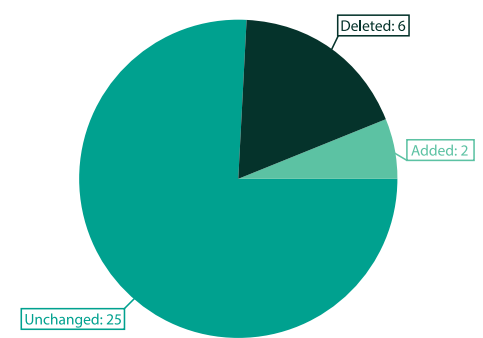
Lastly, most strategy development exercises live and die within the reliability and maintenance team, not often involving the planners and schedulers. By broadening the borders of these teams, maintenance planning becomes a part of the reliability framework.

This stage can help alleviate data migration pains, as an enterprise solution can integrate directly with any ERP/CMMS. Having a link between the enterprise solution and the ERP/CMMS bridges the common gap between reliability strategy and implementation.

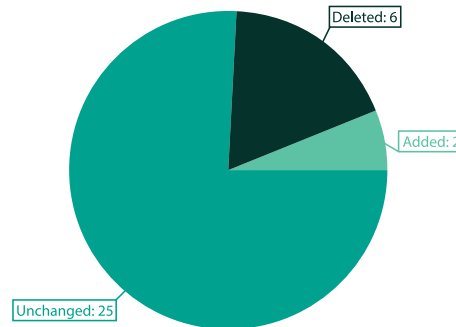
Package Types



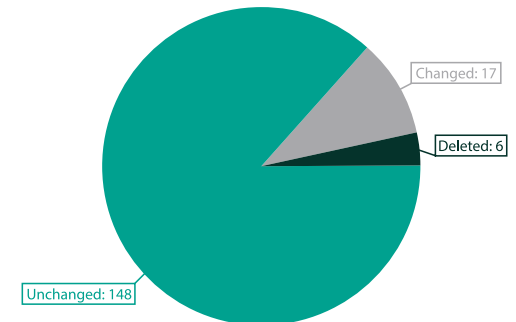
Packages



Operations



Operation Scheduled Task Labor



Part 5

Leveraging Excellence and Continuous Improvement



Continuous Improvement

As with any scientific method approach, we identify and track continuous improvement by what we can measure.

Work orders will provide feedback on the maintenance strategy to help determine whether it is indeed optimum or if it still needs modification.

An enterprise solution eases process improvement and makes everything more visible to stakeholders. It allows management to measure progress on strategy development in real time and allows them to act as gatekeepers, authorizing changes that might affect different areas of the organization.

Global Updates

Leveraging excellence from an entire organization should be a simple process. If a new failure mode is seen on one site, then it stands to reason that all similar assets would need to be protected as well.

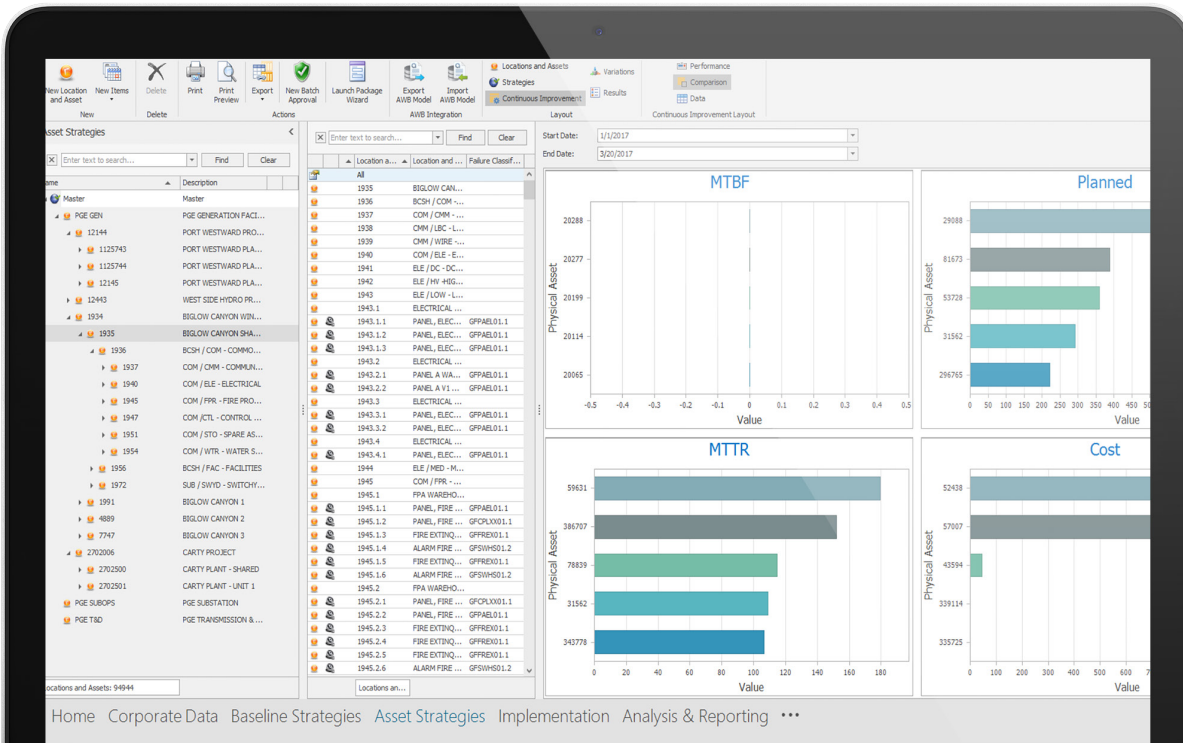
By leveraging a connected ASM system, pushing out global updates, updating the physical asset strategy and combining it into a work plan through packaging rules is a simple process, completed in minutes rather than months.

When you couple this with the visibility of the asset strategy across an entire organization, down to the specific variations, learnings can be found in multiple places. This is the key for your organization to learn, rapidly deploy, and make reliability a reality.



Failure Analysis

Using a FMECA based approach to optimizing maintenance, utilizes cost and risk analysis to evaluate potential maintenance tasks. The process identifies potential failure modes, effects of failure, failure likelihoods (using failure distributions), and corrective task details. Potential maintenance tasks are then evaluated to determine the optimal task and task interval.



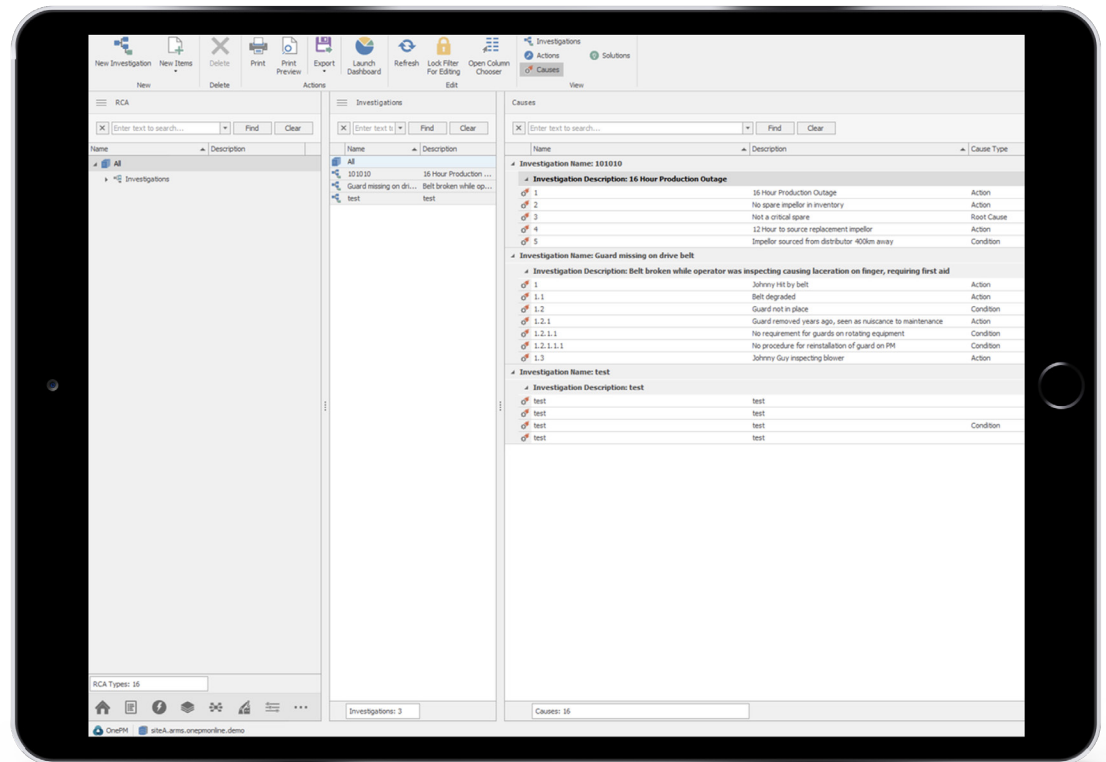
If available, use real work order data to generate the likely distribution of failure modes. If a strategy is changed, and as data becomes available over time, a comparison can be made between the original performance and the new performance related to the strategy change.

Defect Elimination

The identification of defects through obvious breakdowns, undesirable availability and/or reoccurring problems can be achieved through RAMS studies, CMMS notifications and/ or Process Reliability studies. These studies will prioritize the defects that have the biggest impact on the business.

Root Cause Analysis (RCA) is the foundation of a Defect Elimination process. RCA should identify causes, using input from all stakeholders to produce an evidence-based understanding of the problem which ensures selected solutions prevent recurrence of the problem. The defect elimination program should include:

- Cause and effect charting
- Action and solution tracking
- Visibility of systemic issues across the entire organization
- Integrated RCA methodology with Maintenance Strategy Development



Integrations

As described in the introduction, Strategy Management and Work Management should go hand in hand. Integrations to CMMS and ERP systems are the first point of call. Passing strategy information from an Asset Strategy Management solution to your CMMS means changes to a strategy are driven by an informed decision.

Geospatial system for asset-intensive industries can also yield benefits as operational context data can be automated to the strategy system to assist with determining the optimal strategy, again enabling people to make better-informed decisions.

The key consideration for any direct integrations is that the data movement is required for the process and the result delivers either an efficiency and/or quality improvement.



Continuing to evolve the process

If the implementation of Asset Strategy Management was completed, what are the next steps?

How can the process be improved?

Management and Control

Not only is it important to understand the condition of your strategies through reporting, KPI's and dashboards. It is also important to understand the health of your systems and process. It is important to review the process to ensure it is meeting your requirements, any bottlenecks are removed/addressed and if any new technologies or methods exist to increase process efficiencies.

A successful Asset Strategy Management program is not only about determining the optimal strategy but also about determining the optimal process to achieve those outcomes. Keep improving and keep striving for world class.

Conclusion

Conclusion

It is critical to note that Asset Strategy Management is not:

- Just an FMECA library
- Just a maintenance tactic library
- Just a project to review or develop maintenance tactics

Rather, it is a process that continually manages asset strategies over time. It supports delivery of your target performance and allows you to effectively manage and deploy generic maintenance plans at a speed that matches the decision making.

Of course, for the process to work, Asset Strategy Management allows for local variations of content to account for different operating contexts or duties, environments, local workforces or regulations – while maintaining the link to generic content for rapid deployment of the latest thinking in the future.

No matter what your current maturity level, an effective Asset Strategy Management can be put into motion. To begin, you need to understand where you are and establish a clear path forward. If you haven't already completed it, the results of our self-assessment will let you know where you currently stand and provide clear steps forward on how to proceed.

BEGIN SELF ASSESSMENT



Cordant™ Asset Strategy

Cordant™ Asset Strategy is the next evolution of ARMS Reliability's solution formerly known as OnePM. It acts as a thread across all systems and allows organizations to capture and review data from all sources. This enables you to leverage learnings and enhance asset strategies by identifying areas of high-performance and deploying those strategies across the organization wherever they are relevant.



ARMS Reliability is a leading global provider of reliability solutions to some of the world's largest resource, power and utility companies. Through a unique blend of innovative technology, advisory services and decades of reliability engineering experience, we are transforming the way companies manage the reliability of their assets. ARMS Reliability was acquired by Baker Hughes in April 2021.

Ready to get started transforming asset performance with ASM? We can help.

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