

SEPTEMBER 2021

# ISSUE 03

Volume 15

# THE ASSET JOURNAL



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## ARTICLE 5 – Asset Performance Management – The Promise Versus Reality

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### ABSTRACT

TAsset Performance Management (APM) applications are heralded as the most disruptive technology to hit the Asset Management function since the advent of the humble Computerised Maintenance Management System (CMMS). While there is

much hype about the potential of APM, in my experience many businesses fail to realise full value during the initial implementation and it can take years to start to see value. In this paper I will discuss Asset Performance Management, describing the capabilities available from this family of applications, how they

interact with execution systems to provide a more holistic approach to asset management, and the value that they can deliver. I will then describe the common pitfalls that I have observed while helping several businesses to realise value from their systems post implementation.

I will then propose solutions to these challenges and present a simple checklist to gauge your organisations readiness for the move to an APM solution.

**Keywords:** Asset Performance Management, Reliability Engineering, Asset Information Systems

## 1. INTRODUCTION

My journey with Asset Performance Management (APM) systems started around 2004. At the time, I was working in the newly formed Asset Management Centre of Excellence at Rio Tinto, and the mining boom was in full swing. We found ourselves working across major projects and the operations, looking for ways to reduce time to market, and improve utilisation.

As a part of that approach, we identified the need for a tool to support reliability modelling, lifecycle costing, maintenance strategy development and optimisation, and spare parts optimisation. This resulted in selection and implementation of an APM system for Rio Tinto. While the intention was good, execution was not and nor was uptake, with the business still trying to get full value from the solution over a decade later.

I then joined Peabody Energy, just in time to observe the demise of its APM system across the Americas. Again, the intention had been good, execution was also good, but the business just wasn't ready nor did it have the appetite to properly resource the reliability function.

Moving on, I joined Anglo American, and worked with the technology team there to develop business requirements and test the market for an APM system. It became apparent through this process that while some pockets of the business were ready for an APM tool, the majority of the business was not. So rather than select an APM system, we would adopt niche point solutions at specific sites, with a view to migrating to an APM platform in years to come.

Which brings us to today, where I have been supporting BHPs journey down the APM path at various points over the last couple of years. Firstly, in developing requirements and supporting market testing, and more recently in supporting deployment planning for the implemented solution.

In this paper, I want to share with you my observations and perspectives on APM, and will cover what APM systems do, where they fit within the Asset Management information systems landscape, what businesses hope to achieve by implementing APM systems, the most common challenge I see to successful uptake, and how to avoid them.

## 2. WHAT IS AN APM SYSTEM?

Asking what an APM system can do is a lot like asking how long a piece of string is. There are several APM systems in the market, and each quite different in terms of the complete range of functionality offered.

So, it is probably easier to consider what they have in common.

APM systems all aim to provide tools to improve equipment availability and reliability while reducing risk and cost.

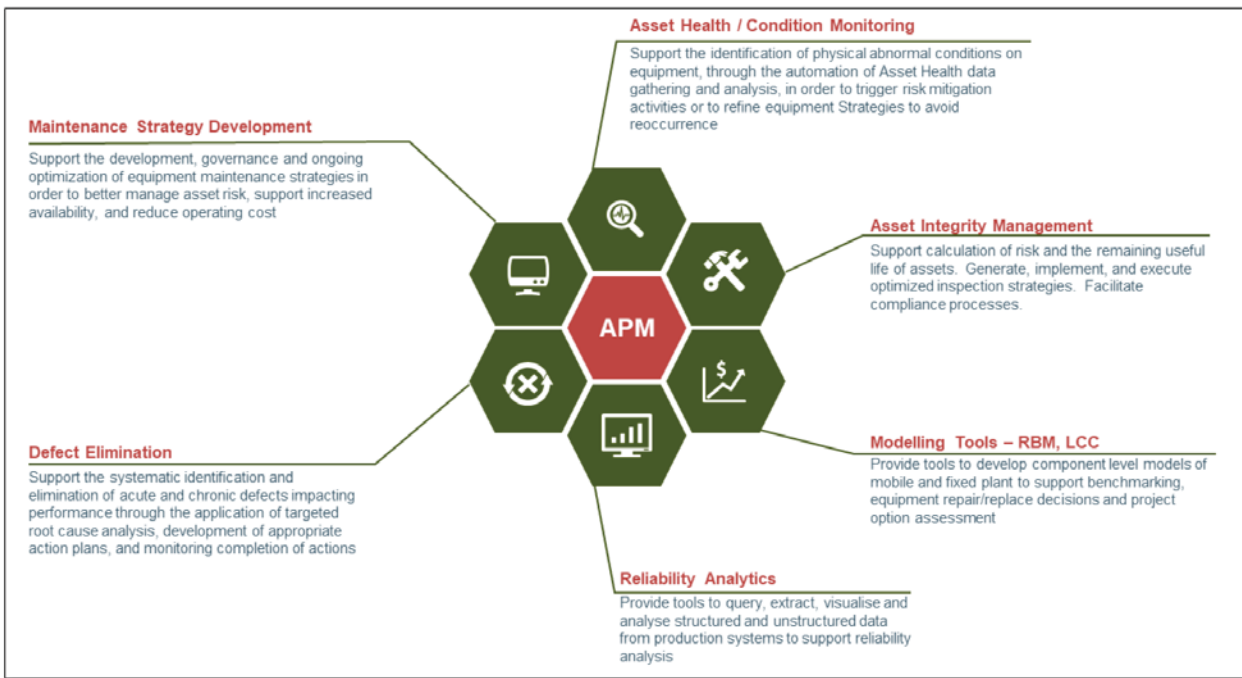
They typically capture data related to asset condition which includes work order history, delay and loss accounting, online condition data via plant historians, and batch condition data such as oil lab results and inspection results to provide a holistic view of the asset performance. This data is then able to be used for reliability analytics and asset health visualisation, to support development and fine tuning of various asset models including lifecycle costing and reliability modelling, and as the base data set to support the various APM capabilities shown in Figure 1.

From an asset health and condition monitoring perspective, APM systems provide the ability to develop relatively complex 'rules' based on available data to flag the requirement for maintenance or other interventions to the user, or to automatically trigger work order etc from within the system.

APM systems also provide tools to support key reliability engineering approaches including Defect Elimination, Maintenance Strategy Development, Asset Integrity Management.

In the Defect Elimination process, dashboard and reports flag to the user chronic and acute events worthy of further investigation, provide tools to support the root cause analysis process, and tools for capturing actions and defining an appropriate workflow and escalation process.

**Figure 1 – Asset performance management functions**



In some cases, this will require optimisation of existing maintenance strategies or changes to inspection programs.

For maintenance strategy development, APM systems typically provide tools to support criticality assessment, various strategy development approaches from FMEA to RCM, some tools are then able to optimise these strategies based on cost or risk using simulation tools, and they then provide the ability to package work for deployment in the EAM/ERP system.

Finally, most systems also support Asset Integrity Management providing tools to support integrity management, process safety management including functionality to develop and manage risk based inspection programs.

### 3. WHERE DOES APM FIT FROM A SYSTEM VIEW?

As described in the previous section, APM systems consume and produce a significant amount of data.

Figure 2 is a simple representation of where an APM system fits within the typical systems landscape.

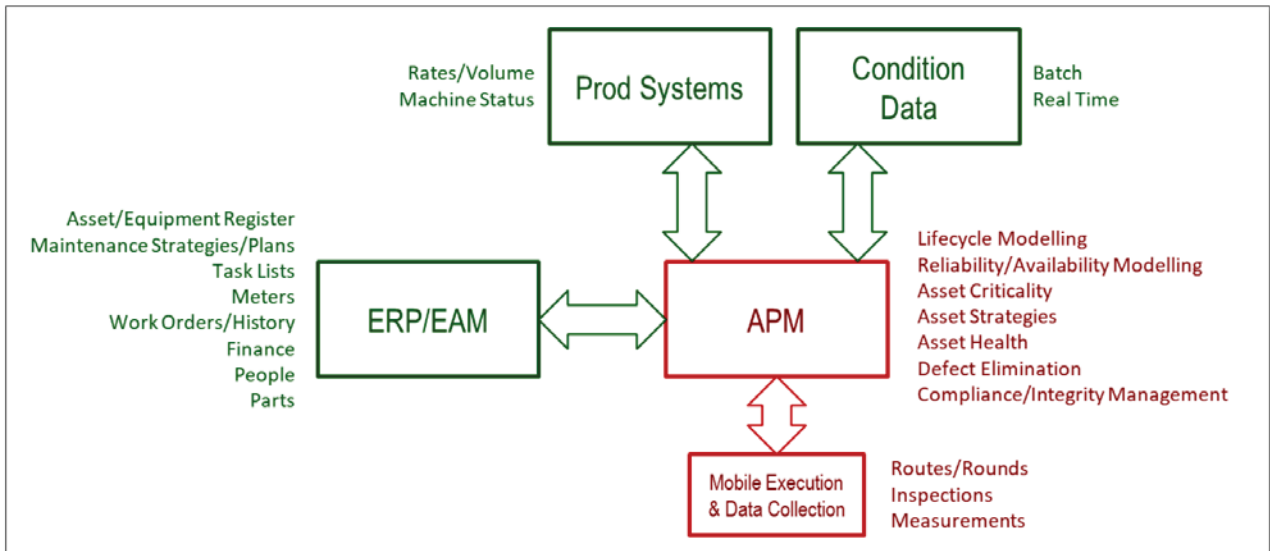
Where the ERP/EAM provide the transactional platform to support the work management process, APM sits beside it consuming work order history, changes to the asset hierarchy etc to enable optimisation of the maintenance strategies in the ERP, and these optimised strategies are then pushed back to the ERP/EAM for execution. Where asset health is used to trigger work orders, these are also pushed to the ERP/EAM for execution.

The APM system also ingests data from various production systems including production data, loss and delay data etc. It also ingests asset condition data.

This can range from batch data such as condition reports, oil sample results, through to inspection results from work orders, through to alarm and event data from production systems and even streaming sensor data from machines.

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**Figure 2 – Asset performance management system architecture**



Some APM systems even offer mobility tools to support data collection such as pushing out inspection routes and recording inspection results and photographs etc, and even provide tools for scheduling work to users.

#### 4. WHAT DO BUSINESSES HOPE TO ACHIEVE FROM APM?

Most businesses start on the APM journey because they are looking for a tool to support asset health monitoring, or a tool to develop and optimise maintenance strategies, or a tool to support asset integrity management. They have a reasonably mature maintenance execution toolset and see one of the above processes as their next step in the reliability journey, and APM as the tool to support this, and then they grow into the other capabilities offered.

However, some businesses that are reasonably mature in the

reliability domain are looking to consolidate the various tools they are using to provide a 'one stop shop' for their reliability engineers.

Most are looking for enterprise solutions capable of running a client/server or cloud architecture to support global access to a central data repository, and all the other features that come with an enterprise solution including security models, multi-language, high levels of responsiveness, intuitive user interface etc.

There is generally an expectation of seamless integration to and from the ERP/EAM and with production systems.

Finally, businesses usually expect to streamline and simplify their reliability engineering processes.

#### 5. WHAT ARE THE KEY CHALLENGES THEY FACE?

As mentioned at the start of the paper, I have been through several implementations, and they have

never gone smoothly. While far from a complete list, some of the more common challenges I have observed are described below.

Overspecification in design. APM is a tool for engineers, and engineers love to gold plate things. In one case, the APM system was to be used to support fleet replacement decision using life cycle costing, and experts from within the business were engaged to specify business requirements. The APM tools was modified to deliver the required solution, and the tool was deployed. The result ... zero up-take of the LCC tool by the sites as it was seen as too complicated.

Sorting out the overlaps. APM tools provide a wide range of capabilities that often overlap with other tools. For example, they provide visualisation tool and dashboards, but many businesses are using other tools for this purpose – Spotfire, Tableau, PowerBI to name a few.

Similarly, many of the APM tools provide rules engines to trigger events based on live streams of machine data etc. Again, there is an increasing array of tools capable of filling this space, some of which may already exist in the business. Finally, some APM systems provide mobility tools for dispatching work generated by the APM system, and collecting results – these tools need to be considered in the broader context of other mobility solutions linked direct to the ERP/EAM to support maintenance execution.

Reality of integration. There is often an expectation of seamless integration – particularly between the strategy development/optimisation modules and the ERP/EAM. The reality is that the complexity of sequencing data build within the ERP requires complex interfaces, and given that each business structures its data quite differently, ‘out of the box’ interfaces do not exist. So, in many cases, businesses are left moving data between ERP/EAM and APM using load sheets. Similarly, the sheer volumes of online condition data generated by machines will drown most APM systems. So, this data is likely to require pre-processing to simplify ingestion, meaning that it’s not just a matter of integrating, but rather developing a complete data strategy.

#### Introducing new processes.

Introduction of the APM typically introduces new processes into the business. In some cases, these will be processes that have not been performed in the past and will require additional

resourcing, in other cases processes will be simplified and require less resources. Sometimes these processes will have been performed using other tools, and so there will be the challenge migrating users to use APM. Change Management is therefore a key challenge for any implementation.

Implementation timeframes. A final challenge is implementation timeframes. The gestation period for a large implementation can be anywhere up to two years – with the technical implementation component taking anywhere up to nine months. Having got the business excited at the prospect of a holistic reliability toolset, and then taking two years to deliver leaves the door open for niche solutions to fill the gap, and these are then often well entrenched by APM go-live and complicate the change management process.

## 6. CONCLUSION

Despite the challenges, the benefits are there. APM systems bring together asset related information in a way that support enhanced asset related decision making and provide the tools to optimise asset performance. However, they can be expensive and time consuming to implement, and slow to deliver value. But there are some things you can do to realise value sooner. Be clear what you want. Beware of gold-plating, and sensitive to the maturity of your business processes and readiness for deployment and tune your requirement accordingly.

Don’t get stuck in the ‘one stop shop’ mindset. APM systems can cover a range of functionality. But you may have existing systems or tools that overlap and meet your requirements better. Beware the ‘one stop shop’ approach as it may yield a poorer outcome. Start to think about your data today. One of the biggest challenges I have observed relates to data. I want work order, failure codes, and costs in APM, but I don’t book time to work orders and only occasionally complete failure codes. I want historian data in my APM system, but each plant structures its data differently. I expect to deploy central strategies across global fleets, but they all use different equipment structures. Start to work on these data challenges today.

Remember it is your people that will make the difference. John Mowbray, the author of RCMII, used to say RCM is about ‘thought-ware’ not software. The best tools without the right people supported by appropriate change management and training will not deliver change in your business. So, focus on organisational capability first, and software second.

It doesn’t all have to happen today. Finally, don’t be forced into a ‘big bang’ implementation. Select a tool that will support the change you are trying to make today, but that can grow with you over time to meet your future aspirations.

Good luck with your journey!