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Implementing & using an AIMS to better support Asset Management processes & decisions.

What's inside.

Abstract

Underpinning an organisation's Asset Management System (AMS) is a well-defined and structured Asset Information Management System (AIMS).

The organisation's capability to implement and maintain an AMS will largely depend on the competence of the AIMS and its ability to collect and store the required data to support asset lifecycle decisions and business outcomes. It should provide a single-source-of-the-truth for all asset activities and must assist the organisation in achieving its Asset Management objectives.

When planning, implementing and using an AIMS, an organisation must observe fundamental principles to ensure the desired asset management processes and business outcomes are achieved. While not meant to be exhaustive, this paper will focus on the following principles:

The principle of value
An AIMS must deliver value to the organisation by supporting the AMS and delivery of business outcomes

The principle of requisite complexity and progressive maturity
Complexity of the system is tailored to the organisational capability and maturity

The principle of enabling and empowering its people
A people-centric system that encourages user adoption to confidently make informed asset life cycle decisions with a high degree of reliability

The principle of data capture, storage, maintenance, and security
To collect and store the required data that the organisation will monitor, manage, evaluate, and analyse to construct information, knowledge, and wisdom about the asset base's past performance and future needs

The principle of an integrated system
The AIMS must promote a single source of the truth, eliminate data silos and duplication, promote data re-use, and support data transactions seamlessly across the system

The principle of continual improvement
To remain relevant, consistent, and aligned with the organisational objectives and the desired outcomes of the AMS, the AIMS must evolve and improve over time

Background.

What is an AIMS?

Delivering the intended asset management outcomes requires an accurate, consistent, and valid set of data that helps identify, operate, maintain, and manage assets. Stakeholders use this information to make lifecycle decisions that best support the required business outcomes. AIMS is an asset management enabling tool that assists the organisation in collecting, storing, analysing, evaluating, and reporting asset-related data to support a timely, efficient, and evidence-based decision framework.

Why implement an AIMS

Asset management assures that the assets will fulfil their essential purpose relative to the stated value. Therefore, asset management can be defined as a coordinated set of activities of an organisation to realise value from its assets (Wikoff, 2015). AIMS enables the organisation to evaluate the performance of asset management by measuring value through activities such as:

- Cost performance
- Risk and Condition analysis
- Defect and Failure Management
- Strategic planning and optimising capital investments
- Resource requirements, utilisation, and optimisation

Further, the coordinated set of activities required to realise value can include processes such as asset planning, commissioning, support & operation, asset performance evaluation, and continuous improvement (Wikoff, 2015).

An AIMS is critical to the capture, storage, control, and management of data required to support the outcomes of these activities and processes. Additionally, a competent AIMS is needed to support alignment or compliance with the IS55000 Standards.

Haider (2007) contends that an organisation can advance its asset management capability by employing an AIMS in the roles of:

- The collection, storage, and analysis of information
- Providing information and knowledge to support an evidenced-based decision framework
- Providing functional integration across asset management processes

This enables business users to collect and store asset data at the asset level and synthesise this data at a higher level to provide a consolidated view of asset performance across the asset base.

Therefore, implementing, managing, and operating an AIMS is vital to achieving the intended asset management objectives and realising value from the asset base. Further, noting that an AIMS alone cannot provide certification of compliance with the ISO55000 series standards, organisations wanting to achieve an Asset Management System that is aligned with or certified against the ISO55000 series standards will require an appropriately designed and implemented AIMS to support the collection, storage, evaluation, and analysis of asset data.

AIMS and its relationship with the Asset Management System

The AMS is a management framework for which the AIMS is a crucial enabler. The drivers and outcomes of the AMS rely heavily on a timely, unique, accurate, consistent, and valid set of data. The collection, storage, control, and management of this data occurs within the AIMS.

Key principles for planning, implementing and using AIMS to support asset management.

The degree to which an organisation's AMS is effective and efficient in delivering the intended asset management outcomes will largely depend on the competence and suitability of the implemented AIMS. Considering that 70% of asset management data is never used (Woodall, P, Parlikad, AK, Lebrun, L 2012), the design, implementation, and maintenance of the AIMS must be carefully considered to ensure it delivers business value.

The AIMS underpins and supports an organisation's AMS and, therefore must ensure alignment with the organisation's desired outcomes. To that extent, when planning, implementing and using an AIMS, some key principles must be observed to ensure that it serves the organisation's purpose and requirements. Working within these principles will deliver a data-centric system to support asset management processes and decisions. An AMS that is underpinned by an AIMS that espouses these principles will elevate the reliability, repeatability, and trust in the decision-making processes and the associated outcomes.

The principles outlined herein are not exhaustive. However, experience suggests that the following principles must form part of the considerations when planning, implementing, and using an AIMS.

The principle of value

If the purpose of an AMS is to realise value from an organisation's asset base, then the AIMS is the necessary tool used to help measure the value delivered. While there are many reasons why an organisation will decide to design and implement an AIMS, the fundamental purpose is to collect, evaluate, and analyse data used to assess lifecycle performance and the value delivered.

The value of an AIMS is realised when the data collected in the system is analysed to garner information from which strategic asset management opinions and decisions are, through planning and management actions, translated to operational measures - a top-down-approach (Haider, A 2013). For example, a change in stakeholder needs requires a change in the asset strategy, which will impact the operational and maintenance parameters of the asset base.

Figure 1 - AIMS Scope of implementation matched against Intended Value Statements - adopted from Haider, A (2012)

Similarly, using the data collected in the AIMS, a bottom-up approach can support decision-making processes to effectively assess lifecycle processes and controls (Haider, A 2013). For example, asset defect, condition, and failure data can be used to refine Preventive Maintenance (PM) strategies to ensure maximum performance is achieved within acceptable risk, cost, and time envelopes. This information can also be used to analyse asset renewal and replacement profiles.

In both the stated examples, the AIMS ensures that the resources (funds, labour, equipment, and contractors) are allocated and utilised efficiently across the asset base to assure maximum value is derived.

A well designed and structured set of asset information can deliver cost efficiencies to the magnitude of 1-5% of the total business expense. Institute of Asset Management

It is important to note that the AIMS is not just a database and workflow engine that business users interact with to perform their work activities. When designed and implemented correctly and used to its full design intent, these systems will help inform asset and business outcomes by enabling timely, accurate, consistent, reliable, repeatable, and evidence-based decision-making processes.

The AIMS should not and cannot be treated as a passive tool with minimal interaction or integration with the broader business landscape. Nor should it be a tool that is so data-hungry that it enslaves the end user. In terms of value generation, the system should be implemented, designed, operated, and maintained so that it is passive enough to be operational in the background yet active in delivering value-based technologies and data analysis to support business outcomes. In other words, a balanced system that delivers capability with an acceptable level of complexity.

The AIMS is a tool that enables the organisation to realise value from its asset base. Implemented and used correctly, it will inform and support the organisation to make timely and effective decisions. The AIMS will enable the organisation to optimise investments and resources across the asset base to realise maximum benefits. According to the IAM (2009), a well-designed and structured set of asset information can deliver cost efficiencies to the magnitude of 1-5% of the total business expense.

The principle of requisite complexity and progressive maturity

> More data does not mean better information or more effective decisions. Koronios (in Haider, A 2005) found that 70% of generated data is never used by asset managers. Furthermore, collecting, storing, controlling, and managing data in an AIMS is costly and directly proportional to the volume of data captured. In my personal experience and observation, both as an end-user and an Asset Management Business Consultant, the most effective AIMS is one that has a scope that is aligned with the organisational and AMS objectives, its complexity is congruent with the asset management requirements and outcomes, and has a planned approach to a progressive improvement in maturity.

It is unrealistic to expect an organisation to move from an Asset Register and Maintenance Program managed in a spreadsheet to a fully configured AIMS functioning in the Strategic, Tactical, and Operational domains of asset management. The delta between the starting point and the end state is too great, and even a more sophisticated organisation may have trouble bridging this gap, given all the resources required.

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Koronios (in Haider, A 2005)

To necessitate success, the design and implementation of the AIMS must achieve the minimum level of complexity to deliver the information requirements to support the desired level of maturity in the first instance. It must also be scalable to allow the organisation to expand and grow in process and capability, building on the previously achieved levels of complexity and maturity.

Need minimum mandatory standard to achieve given level of maturity

Information maturity is tightly aligned with cultural (people), technological, and process maturity. Together, these advance the maturity of an organisation's AMS. Therefore, when considering the maturity of the AIMS and the progression of its maturity over time, it must be viewed within the context and timelines of the maturity progression of the AMS. Figure 2 illustrates the levels of information maturity and their characteristics. These maturity levels must be achieved in conjunction with the maturity level of the AMS.

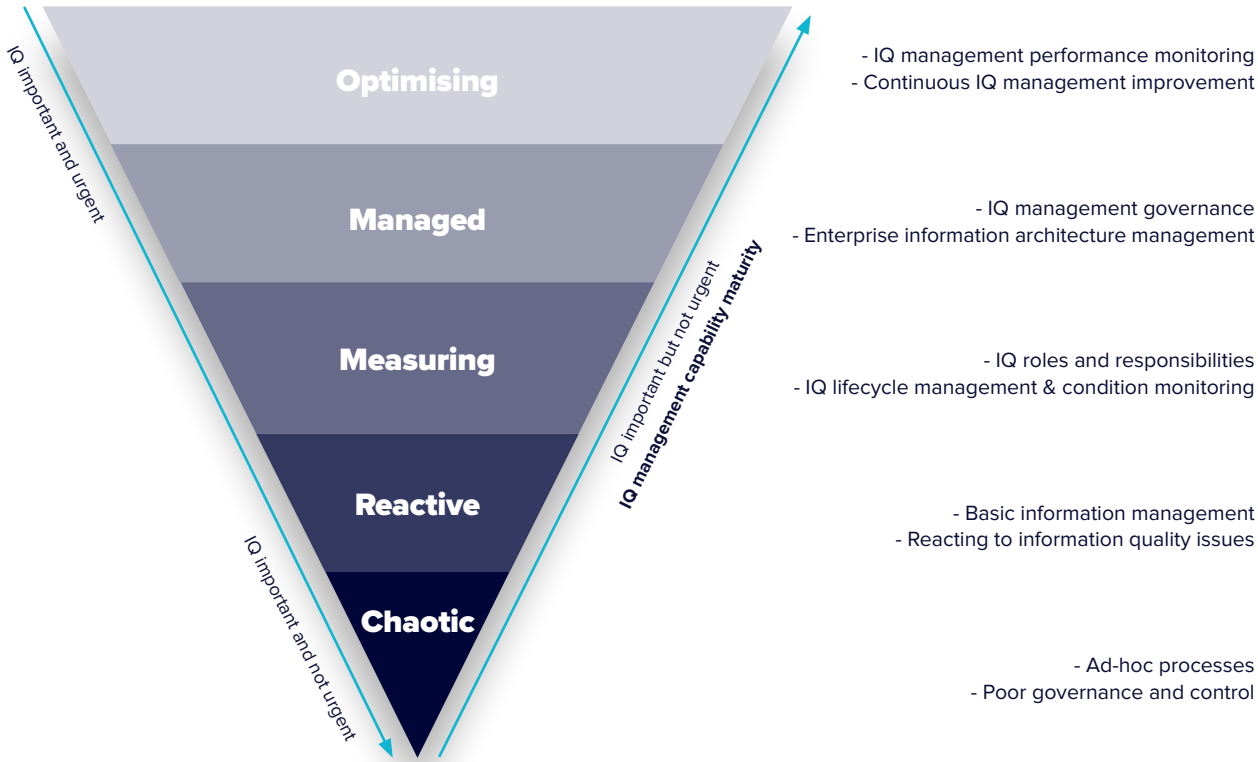

Figure 2 - Information Maturity Index – adopted and modified from Haider (2013)

The principle of enabling and empowering people

According to Walsham (in Woodall, P, Parlikad, AK, Lebrun, L 2012), implementation of an AIMS is defined as the diffusion of information technology within the organisational user base. This definition implies a significant contribution by the human element of the organisation in the selection, design, implementation, management, and operation of an AIMS. Therefore, the AIMS must be people-centric, designed by the people and for the people. It must encourage the user base to interact with the system to analyse and interpret information to make decisions with confidence and reliability. They must see the AIMS as a value-add tool that supports and enhances their business activity instead of a hindrance and a burden.

> Engaging and empowering the user base is a function of organisational culture and leadership. In the right cultural atmosphere and with good leadership, the user base will be empowered to contribute to the design and implementation of the AIMS and the continued and appropriate use of the system. In these environments, the business user becomes the advocate and promoter of the AIMS, which drives success.

An AIMS, like any other information system, is a social system that must constantly evolve with the organisation and asset management outcomes. The evolution of the system is a direct result of user interaction and is directly proportional to the level of interaction. Where the AIMS is perceived as a value-added companion to the user base, this evolution will result in continuous improvement and deliver significant value to the organisation. However, when the AIMS is perceived negatively, the system will fail to evolve with the organisation. This could significantly impact an organisation's ability to manage and report asset management outcomes.

Too often, though, the AIMS is perceived as something that is forced upon the business user. It is seen as an additional step/s in completing the work activity instead of an active partner that supports the process. This is generally the case when there has been poor consultation with the user group, resulting in little to no buy-in. If an organisation wants to realise value from their assets and the AIMS is one of the key tools that help realise this value, then engaging with the user base at all stages of the design and implementation and promoting its use is paramount.

Culture and leadership wrapped in change management are vital to the success of the AIMS. The user base is the most prolific data collector of asset information. This data is used to analyse, form opinions, and make asset lifecycle decisions. To that extent, the user base must feel included and empowered in the design, implementation, and operation of the AIMS. They must acknowledge that the AIMS is an enabling tool that adds value and delivers efficiencies in performing their business activities. Engaging and empowering the user base is a function of organisational culture and leadership. In the right cultural atmosphere and with good leadership, the user base will be empowered to contribute to the design and implementation of the AIMS and the continued and appropriate use of the system. In these environments, the business user becomes the advocate and promoter of the AIMS, which drives success.

The principle of data capture, storage, maintenance, and security

The AIMS must be designed to collect and store the required data that the organisation will monitor, manage, evaluate, and analyse to construct information, knowledge, and wisdom about past performance and future needs. Therefore, the organisation must invest the necessary time and effort to identify the requirements and the application and use of such information to ensure the required data is collected.

Collecting more data does not necessarily mean better information or more effective decisions. The cost of collecting, storing, and maintaining data is directly proportional to the collected volume. Therefore, before defining what data is collected and stored, the answer to why the data is collected and who will be using this data must be understood. At a minimum, the AIMS must be designed to collect and store information to be able to answer questions such as:

- What assets do I have?
- Where are they?
- What is its function/purpose?
- What is its criticality to the network and organisation?
- Who owns the asset/who is the custodian?
- What are its maintenance, inspection, and defect history?
- How much has it cost the organisation to operate and maintain the asset?
- How much will it cost to renew or replace an asset? When should we renew or replace the asset?
- What is its health and remaining useful life, both in the context of financial and engineering useful life?
- Is the asset meeting the required service levels?
- What is its failure history?
- When is the next maintenance due, who will be doing it, when was the last maintenance performed and by whom?

When collecting, storing, and maintaining the data within the AIMS, it is essential to assess and maintain the quality of information (IAM, 2009). Quality of information is defined as information that is fit for purpose. When determing the quality of information, the data must be evaluated for the following criteria (IAM, 2009):

Clarity
Eliminate ambiguous data interpretations

Completeness
A complete set of data is available for each record, and only once

Consistency
Data is the same in its definition, format, value at any time or place

Correctness
Data is accurate and up to date

Integrity
The structure and relationships between data entities and attributes are defined and maintained

Uniqueness
Single source of the truth. Data is collected once but used across many functions

Timeliness
Timely collection of data to support analysis

To maintain data governance and control, an organisation must take necessary action to manage what data can be accessed, by whom, for what purpose, and what they could do with it. Such security control enhances data integrity, assures privacy, and maintains reliability and confidence. Data associated security breaches can be very costly and, in some cases, can result in damage to organisational reputation. To that extent, the organisation must invest the time and effort required to identify, define, document, and apply the necessary security protocols to control access to view, create, update, and delete data. A full audit trail must also be stored and made accessible when required.

The principle of an integrated system

Asset Management is a cross-functional whole of business activity that involves several people across multiple roles. Consider the process of generating preventive maintenance (PM) work order to perform an Inspection.

The maintenance and engineering (M&E) team would have agreed on the PM strategy before generating the work order. The Finance team would have engaged with the M&E team to negotiate and agree on funding for the PM strategy. Human Resource Management teams would have been involved to ensure the M&E team is adequately staffed, skilled, and trained to perform the work. If external parties (contractors) are required to complete the work, the Procurement team may have been involved with the M&E team to establish contracts and Schedule of Rates with a suitable vendor. Once the work is done, for internal staff, wages must be paid and, for external parties, invoices must be processed.

Yet, this working example is commonly viewed as an activity that is solely in the domain of the M&E team. Clearly, the actors involved in this common business process span across multiple business functions. In an environment where a significant majority of the processes cross-business functions and multiple roles, working within an integrated platform where data is re-used instead of duplicated and data transactions flow freely across business processes is paramount to enable the successful execution of business processes and assurance of desired business outcomes.

In the context of this paper, an integrated system is defined as the ability to use and transact data in intra-system and inter-system. Intra-system is where data is shared and transacted within the AIMS across the Operational, Tactical and Strategic levels of asset management. For example, a maintenance inspection process results in the asset condition being updated. This change in condition is picked up at the strategic level and is used to predict the asset's replacement/renewal profile based on a predefined deterioration index. The cost of the replacement/renewal is calculated based on the Model Category and Unit Rates Tables held in the AIMS. In this case, the data is collected and shared within the AIMS function.

Achieving an organisational integration across business functions will eliminate data silos and promote a concept of a single source of the truth.

The inter-system integration is where data is shared and transacted across the various information systems such as the AIMS, Financial Information Management System, Human Resource Information Management System, and Supply Chain Information Management System. For example, linking a contractor service item to the work order for an inspection activity based on a unit rate consumed from an agreed Schedule of Rates table, generating the Purchase Order and performing the Goods Receipt on work completion, and Accounts Payable processing the Invoice which is posted to the relevant Ledger. The cost is viewable against the asset and the appropriate work order. In this example, data is required to flow across the many corporate business functions to achieve a single continuous business process.

To be successful for core corporate business functions such as Financials, Supply Chain, Contract Management, Project Management, Asset Management, Human Resources and Payroll, and Customer Management, an organisation must strive to achieve the intra and inter-system functions within a single integrated platform. Achieving an organisational integration across business functions will eliminate data silos and promote a concept of a single source of the truth. In promoting this concept, the organisation can expect to:

- Enhance data control and security
- Improve data clarity, completeness, consistency, correctness, integrity, uniqueness, and timeliness
- Eliminate data duplication and manual processing
- Elevate user adoption and confidence
- Enhance evidence-based and timely decisions
- Reduce the cost of ownership and management` (information systems).

Without a fully integrated single-system platform, the organisation will rely on an ever-increasing tapestry of systems to manage the core business functions. In the context of asset management, this can extend to the management of Operational, Tactical, and Strategic functions across several systems. In such an operating environment, an organisation will be required to design, build, operate and maintain the critical integration points to deliver the intra and inter-system data sharing and transactions. Where the organisation's primary objective is to deliver a service to the customer, is it appropriate and cost-effective for an organisation to undertake the function of designing, implementing, operating, and maintaining such complex integrations?

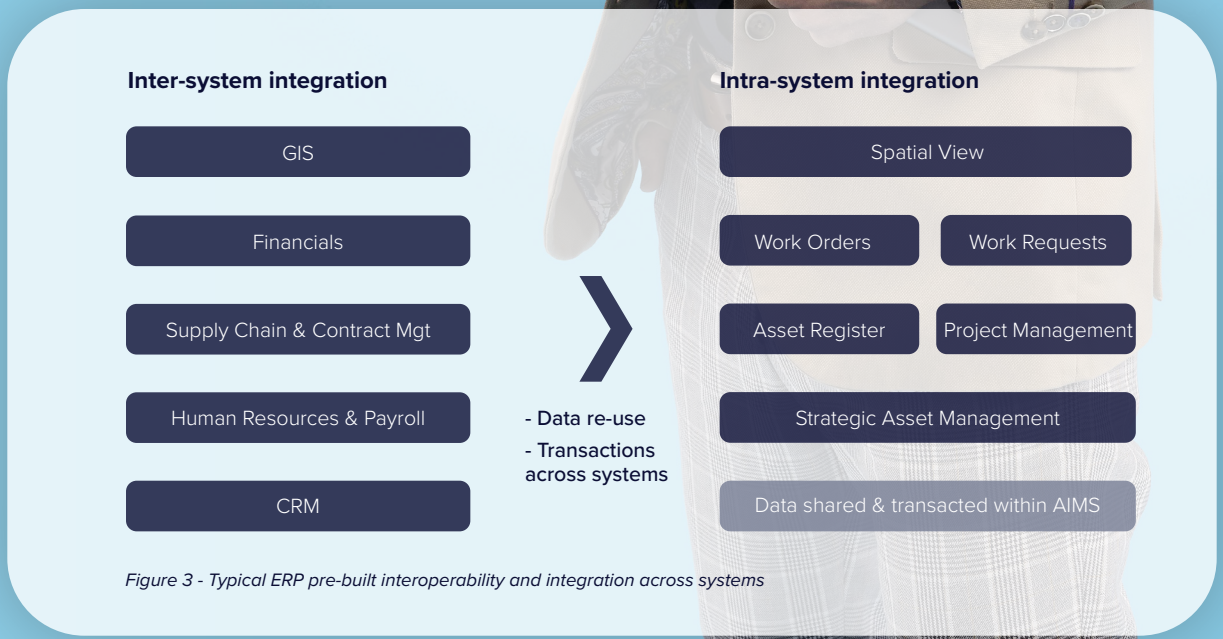

Figure 3 - Typical ERP pre-built interoperability and integration across systems

Typically, Enterprise-tier Resource Planning (ERPs) tools provide sufficient pre-built interoperability and integration capability across core corporate business functions to support desired requirements and outcomes. In doing so, the requirements for an organisation to design, implement, operate, and maintain integration and interfaces across these functions have been minimised, leading to diminished system complexity, reduced risk, and total cost of ownership.

A responsive, evolving, and maturing AIMS is required to enable the organisation to evaluate, learn, optimise and change based on internal and external factors.

The principle of continual improvement

Organisations are not static, and their goals and objectives change over time based on the challenges and opportunities in the environment they operate. As these goals and objectives change and evolve, so will the asset management objectives and requirements. It then stands to reason that the implemented AIMS, as an asset management enabling tool, must evolve with the increasing complexity and maturity of the AMS.

The objective of continual improvement is to increase the probability and assurance of the AIMS ability to consistently and persistently deliver the desired outcomes throughout its operation. Continual Improvement is essential for ensuring the AIMS maintains relevance within the organisational context. It is also an integral component of the evolution and maturity of the AMS.

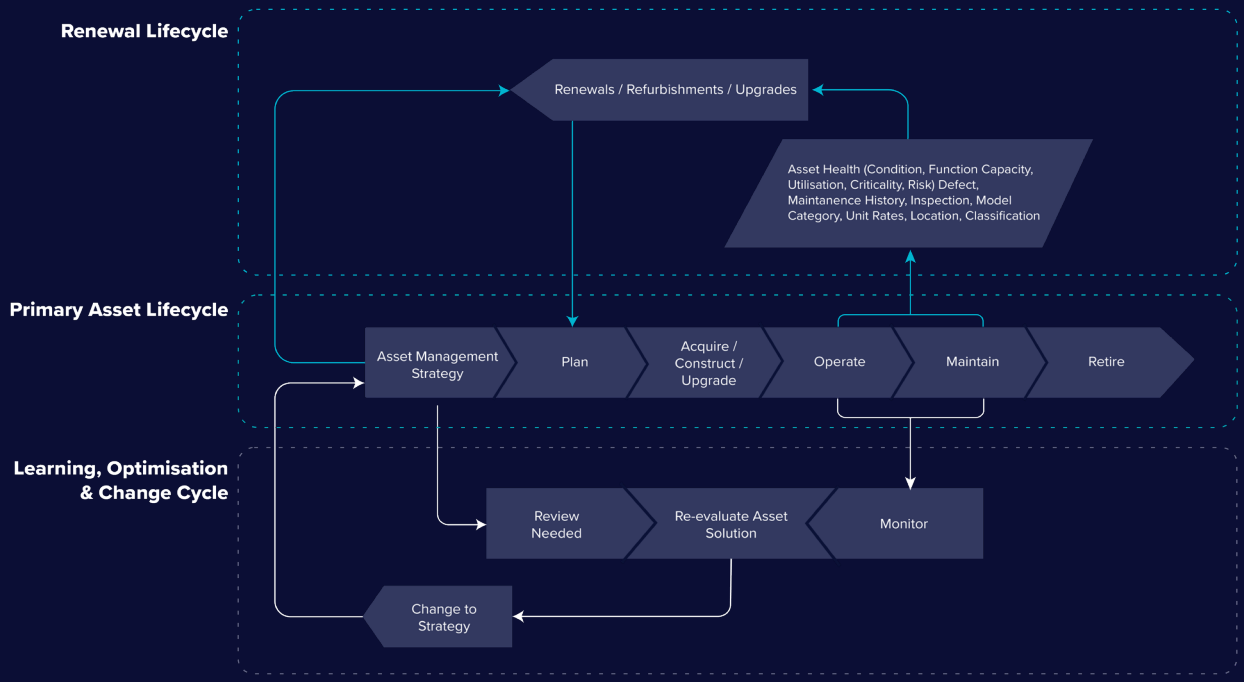

Figure 4 – Core-Asset Lifecycle Management Processes - Adopted and modified from Haider (2013)

Figure 4 illustrates how the core Asset Lifecycle Management (ALM) processes are derived from the asset strategy and associated procedures and plans. The core ALM process consists of the Primary Asset Management Cycle, the Renewal Cycle, and the Learning, Optimisation, and Change Cycle (Haider, A 2013). Figure 4 explains that the asset strategy is not static and is influenced and changed by the Renewal and the Learning, Optimisation, and Change Cycles. As needs change, so does the strategy. A responsive, evolving, and maturing AIMS is required to enable the organisation to evaluate, learn, optimise, and change based on internal and external factors. Therefore, to add value and help deliver on outcomes, the AIMS must be a live system that is scalable and adaptable to the organisation's changing needs.

Thus, to be effective, the continual improvement of an AIMS must focus on the following key areas:

- Continual improvement of the configuration: the configuration must develop with the changing requirements of the AMS, and it cannot remain static. There is an interrelationship between the configuration maturity and the overall AMS maturity. The configuration of the AIMS must be reviewed, monitored, and updated periodically to enable the required asset data to be collected to support reporting, analysis, and decision frameworks.
- Continual improvement of system interaction, data collection, and quality: the quality, consistency, and level of user engagement must be monitored and measured. Active user involvement with the AIMS is essential to ensure the continual evolution of the system. Unapproved data sources (i.e., excel spreadsheets) are generally symptomatic of poor user engagement with the AIMS.

  The reason for these must be identified and rectified. Further, the changing nature of technology will impact how data is collected. This must be assessed in line with the capability of the AIMS to ensure that data is collected in the most efficient way that promotes user interaction and data quality. It is also necessary that audits be performed periodically to ensure data meets the prescribed information quality criteria of Clarity, Completeness, Consistency, Correctness, Integrity, Uniqueness, and Timeliness.
- Continual improvement of data security: data security is paramount to maintaining data integrity and confidence in reporting. Regular audits must be performed to ensure that data is accessed, created, and changed by the appropriately authorised users.
- Continual improvement of data utilisation: the organisation must assess if the data collected in the AIMS continues to meet the requirements of the AMS. Are the business users able to use the AIMS to learn, optimise, and identify changes to the asset strategy? Does the system enable the business user to make reliable, accurate, and timely decisions to support the asset management process?

In an environment where change is inevitable, an appropriate continual improvement program must be implemented to ensure that AIMS maintains relevance and consistency with the desired AMS requirements and outcomes. The program should indicate areas of improvement through which actionable plans can be undertaken to enhance and optimise the AIMS.

Conclusion.

This paper has discussed the importance of an AIMS in supporting an organisation's asset management capability. The AIMS is an essential tool that enables good asset management practices and supports an evidenced-based decision framework. An important point is that the AIMS is not the same as an AMS. The AMS is a management framework that is implemented to ensure an organisation derives value from its assets. The AIMS is an essential tool that supports the AMS by collecting and storing data to support the analysis and evaluation of asset performance.

The paper notes that the following key principles must be followed to assure the AIMS will deliver the desired business outcomes:

The principle of value
An AIMS must deliver value to the organisation by supporting the AMS and delivery of business outcomes

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The principle of continual improvement
To remain relevant, consistent, and aligned with the organisational objectives and the desired outcomes of the AMS, the AIMS must evolve and improve over time.

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Gladstone Brohier is the Strategic Product Sales Director at TechnologyOne. His focus is on helping our customers get the most of their investment in TechnologyOne software so they can transform their business.

Gladstone has 20+ years of experience working in complex asset and maintenance management environments.

He has worked with organisations across multiple industries, including aviation, oil and gas, ports and airports, and government and local government sectors. Gladstone is a Certified Asset Management Assessor for ISO55000 compliance assessment and Certified Practitioner in Asset Management. He is also a member of the Asset Management Council.

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