The Institute of Asset Management

Strategy and Planning

Asset Management Decision-Making

Life cycle Delivery

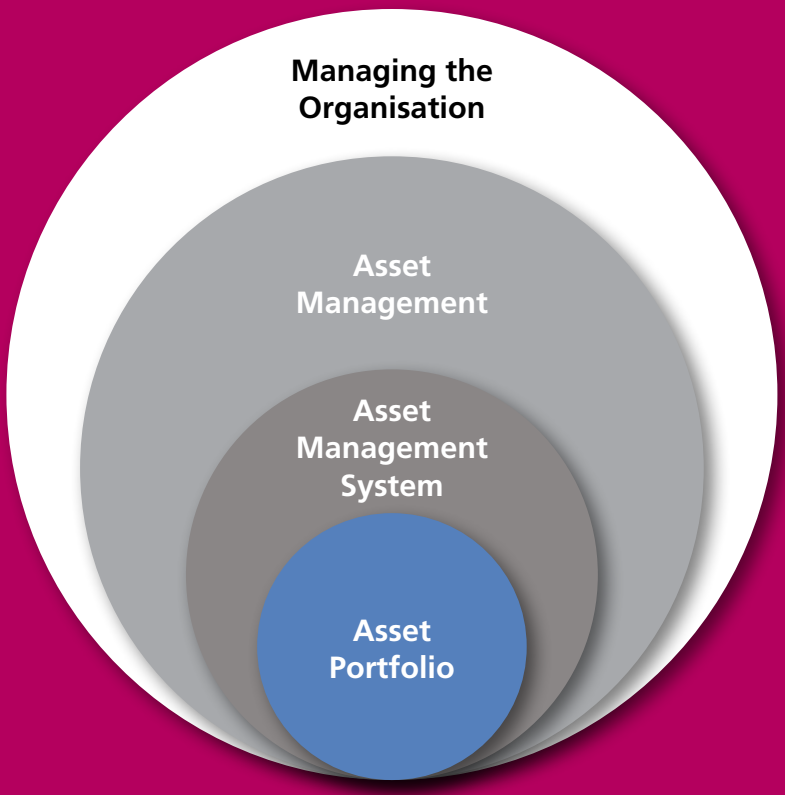
Maintenance Delivery and Asset Operations

Asset Information

Organisation and People

Risk and Review

Version 1 April 2019



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About the IAM

The Institute of Asset Management (the IAM) is a not-for-profit, professional body. We are owned and controlled by our Members and committed to remaining independent from commercial and trade associations. We exist to advance the discipline of Asset Management, not only for people and organisations involved in the acquisition, operation and care of physical assets but also for the benefit of the general public. Our priorities are to promote the generation and application of knowledge, training and good practice and to help individuals become demonstrably competent.

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Development Team

JD Solomon (PM) – CH2M
Steve Finnie – AECOM
Rodolfo Kramer
Kundan Patel
Adam Lea-Bischinger
Harry Sellers – CH2M
Steve Jones – Skanska
Mick Saltzer –Accenture
Georgia Smart
Ibrahim Albalushi – Oman Electricity Transmission
Peter Lucas –Frazer-Nash

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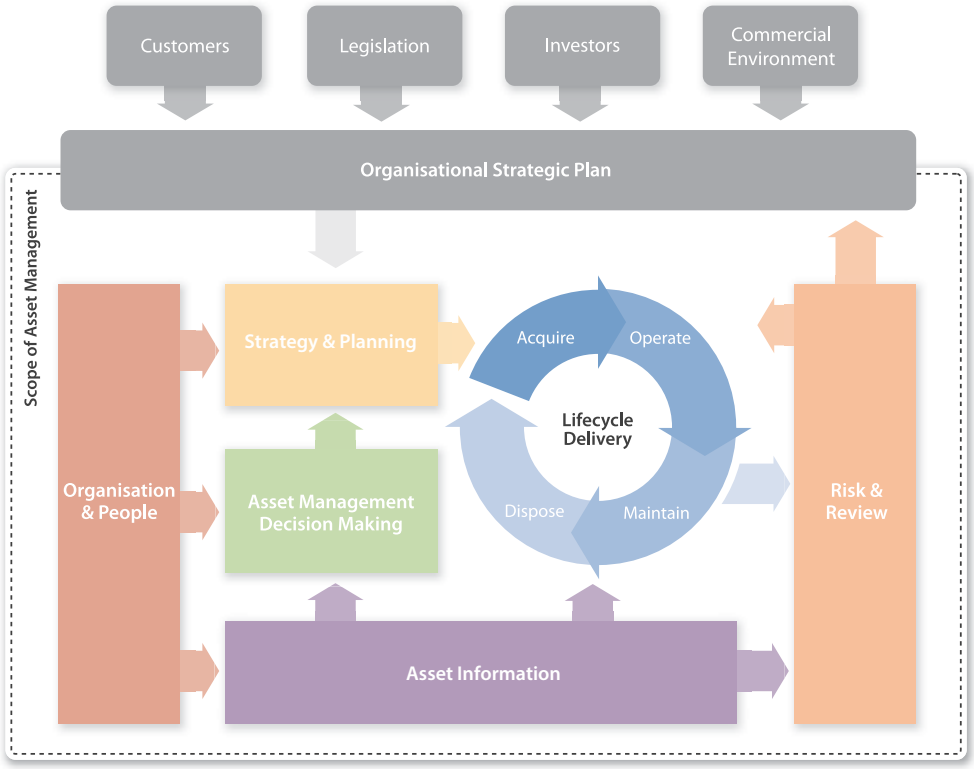
Acknowledgments

This Subject Specific Guidance (SSG) has been produced by the Institute of Asset Management (IAM) through the significant efforts of many individuals and organisations. The Institute would like to thank the following in particular for their contributions.

The scope of Asset Management



Group 1

1. Asset Management Policy
2. Asset Management Strategy & Objectives
3. Demand Analysis
4. Strategic Planning
5. Asset Management Planning

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6. Capital Investment Decision-Making
7. Operations & Maintenance Decision-Making
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Contents

1 Introduction

This Subject Specific Guidance (SSG) is part of a suite of documents designed to expand and enrich the description of the Asset Management discipline as summarised in the IAM's document 'Asset Management – an anatomy' (referred to throughout this document as 'the Anatomy').

1.1 Purpose of the SSGs

This document provides guidance for good practice asset management. It is part of a suite of Subject Specific Guidance documents that explains the 39 subject areas identified in "Asset Management – an Anatomy", also published by the Institute of Asset Management. These subject areas are also acknowledged by the Global Forum for Maintenance and Asset Management as the "Asset Management Landscape".

PAS55 and ISO 55001 set out requirements which describe ***what*** is be done to be competent in asset management, however they don't offer advice on ***how*** it should be done. The SSGs are intended to develop the next level of detail for each subject in the Anatomy. They should therefore be read as guidance; they are not prescriptive, but rather intended to help organisations by providing a consolidated view of good practice, drawn from experienced practitioners across many sectors.

The SSGs include simple as well as complex solutions, together with real examples from different industries to support the explanatory text because it is understood that industries and organisations differ in scale and sophistication. In addition, they are at different stages of asset management; some may be relatively mature while others are at the beginning of the journey. Accordingly, there is flexibility for each organisation to adopt their own 'fit for purpose' alternative practical approaches and solutions that are economic, viable, understandable and usable. The underlying requirement for continual improvement should drive progress.

1.2 The SSGs in context

The SSGs are a core element within the IAM Body of Knowledge and they have been peer reviewed and assessed by the IAM Expert Panel. They align fully with the IAM's values and beliefs that relate to both the development of excellence in the asset management discipline and provision of support to those who seek to achieve that level of excellence.

1.3 SSGs and the issue of Complexity versus Maturity

It is important to understand and contrast these terms. Put simply:

- The complexity of the business will drive the complexity of the solution required; and
- The maturity of the organisation will determine its ability to recognise and implement an appropriate solution.

A very mature organisation may choose a simple solution where a developing organisation may think that a complex solution will solve all its problems. In truth, there is no universal best practice in Asset Management – only good practice that is appropriate for the operating context of any particular organisation. What is good practice for one organisation may not be good practice for another.

For example, an organisation that is responsible for managing 100 assets, all in the same location, could use a spread sheet-based solution for an Asset Register and work management system. This is arguably good practice for that organisation. However, for a utility business with thousands of distributed assets, this is unlikely to represent a good practice solution.

When reading the SSGs, the reader should have a view of the complexity and maturity of the organisation and interpret the guidance that is offered in that context.

1.4 Further reading

The Anatomy provides a starting point for development and understanding of an Asset Management capability and the SSGs follow on to support that further. However, the opportunity doesn't end there; the IAM provides a range of expert and general opinion and knowledge which is easily accessed by members through the IAM website.

2 Scope of this SSG

2.1 Navigating this document

3.0 What Does "Maintenance Delivery" and "Asset Operations" Mean?	Overview of scope and key terminology
4.0 Maintenance Delivery - Concepts, Principles and Key Factors	High level summary of the important considerations, concepts and principles
5.0 Guidance for Maintenance Delivery	Builds on the previous section; provides specific approaches
6.0 Asset Operations - Key Elements	High level summary of the important considerations, concepts and principles
7.0 Asset Operations - Strategies and Approaches	Builds on the previous section; provides specific approaches

2.2. Purpose of this SSG in particular, with reference to its 'Group'

The management of maintenance activities including both preventive and corrective maintenance management methodologies. It includes definition of maintenance specifications and schedules, maintenance execution procedures, procedures for missed maintenance and the capture and utilisation of maintenance and inspection measurements and results. Asset operations refers to the processes used by an organisation to operate its assets to achieve the business objectives. It includes the processes that provide instructions to operators about how to operate the assets within the appropriate design, maintenance and operational parameters.

2.3 The purpose, intended use and intended audience of this SSG

PAS55 and ISO55000 are the formal specifications and standards for the implementation of an Asset Management System, setting out the minimal requirements an organisation would need to meet to gain accreditation to that specification or standard. For any organisation or individual wanting to master the discipline, knowledge of PAS55 and ISO55000 is not the whole picture. As well as the standard and management system aspects, they need to understand the full breadth and depth of the component parts that make up the landscape of Asset Management and this is supported through the SSGs.

Standards could therefore be regarded as 'what' is required for an Asset Management System. This SSG, as one of many being developed by the IAM, supports the 'how' to deliver the component parts and in its development has tried to cover the range of industry sectors currently associated with the IAM and recognise that differences in levels of maturity and operating contexts exist within those sectors and the organisations within them. To provide additional context this SSG provides case study examples from different sectors to demonstrate the key points of guidance. However, any document generic enough to be applied to multiple industry sectors must be at a relatively high level of detail.

Those familiar with BSI PAS55:2008 will be aware that this specification itemises 28 requirements for organisations seeking to demonstrate good Asset Management practices. These requirements are a clear foundation for implementing and operating an Asset Management System. They are, however, distinct from the capabilities such organisations need – these are the 39 Subjects described in the Anatomy.

The Asset Management Anatomy has been built around 6 Subject Groups and 39 Subjects and now provides a stable platform on which the IAM can develop SSGs. These six subject groups and 39 Subjects are also aligned with The Asset Management Landscape (published by The Global Forum on Maintenance and Asset Management) to facilitate the exchange and alignment of maintenance and asset management knowledge and practices.

The six Subject Groups are:
- Strategy and Planning.
- Asset Management Decision-Making.
- Life cycle Delivery.
- Asset Information.
- Organisation and People.
- Risk & Review.

This SSG specifically pertains to Maintenance Delivery and Asset Operations which sits within the Life cycle Delivery area of the Asset Management Subject Groups. These are not designed as text books or course material but as reference documents for professionals working in or requiring guidance in this field. We would expect everybody involved in asset management to have a working knowledge of the 39 Subjects, but the degree to which they might need deep or specialist knowledge will depend on the job or task they perform.

Operations and Maintenance has a broad scope and as such, the group developing this SSG considers life cycle as a central component of this document, and this document is based on the assumption that most people who read this SSG will be people who have existing assets and are looking at better ways to manage O&M associated with them. For this reason, this SSG focuses on the 'in service' phase of the asset life cycle.

Note that in ISO5500X the explicit identification of different life cycle activities (such as create/acquire, operate, maintain, renew/dispose) has been dropped and instead it accommodates more diverse life cycle stages of different asset types. The figure above shows some examples of life cycle variations.

We recognise that you will spend more time and money if you don't have the right assets in the first place, and we recognise that prior stages are also important by getting an asset design right in the first place. However, many of the earlier and later life cycle phases are covered by other areas within the Life cycle Delivery subject group of the Asset Management Landscape, as listed below.

Life cycle Delivery:
- Technical Standards & Legislation.
- Asset Creation & Acquisition.
- Systems Engineering.
- Configuration Management.
- **Maintenance Delivery (this SSG).**
- Reliability Engineering.
- **Asset Operations (this SSG).**
- Resource Management.
- Shutdown & Outage Management.
- Fault & Incident Response.
- Asset Decommissioning & Disposal.

2.4 Aligning this document

The authors have aligned this SSG with the key components of both PAS55 and ISO5500X, but the reader should note that there are several areas where the PAS55 specification and the ISO5500X standard(s) differ. As an international standard ISO5500X represents a good path for organisations interested in improving their asset management practices to follow but PAS55 remains a very complete and easy to read guide. However, there are many key areas where there is alignment, including:
- Alignment ('line of sight') of organisational objectives feeding clearly into asset management strategies, objectives, plans and day-to-day activities.
- Whole life cycle asset management planning and cross-disciplinary collaboration to achieve the best value combined outcome.
- Risk management and risk-based decision-making.
- The enablers for integration and sustainability; particularly leadership, consultation, communication, competency development and information management.

An in-depth comparison of these two publications is outside the scope of this document but some key differences are listed below:
- PAS55 primarily relates to the management of physical assets, whereas ISO 55001 is intended to be used for managing physical assets in particular, but it can also be applied to other asset types.
- In PAS55, asset management strategy was deemed to include both strategies for managing assets and strategies for improving asset management, but in ISO 55001, these are split out into discrete requirements.
- PAS55 defines explicit identification of different life cycle activities (such as create/acquire, operate, maintain, renew/dispose) but these have been dropped in ISO 55001 to accommodate more diverse life cycle stages of different asset types.
- Requirements for optimisation in planning and decision-making are retained in ISO 55001 but are described differently.

- ISO 55001 reflects stakeholder needs and uses 'value' to determine the best balance in achieving conflicting objectives.
- The required steps for risk management are reduced within ISO 55001 (already specified in ISO 31000).
- ISO 55001 requirements for audit and documented information have also been tightened.

2.5 Complexity versus maturity

It is important to understand and contrast the terms complexity and maturity and how they impact an organisation looking to improve its asset management performance, specifically within the area covered by this SSG. In simple terms:

- The complexity of the business will drive the complexity of the solution required.
- Organisational maturity will determine its ability to recognise and implement an appropriate solution.

A very mature organisation may choose a simple solution where a less mature organisation may incorrectly perceive that a complex solution will solve all its problems. In truth, there is no universal best practice in Asset Management or other areas – only good practice that is appropriate for the operating context of any particular organisation.

Part of gaining an understanding of an organisation's capabilities involves answering these questions:

- How can you tell if you are doing a good job of managing these assets and monitoring your progress on an ongoing basis?
- How do you manage the interactions of systems and processes that are continually evolving?
- How do poor processes impact interoperability, safety, reliability, efficiency, and effectiveness?

The most complex or sophisticated Asset Management solution does not necessarily represent a mature approach to Asset Management in all business contexts. What is good practice for one organisation may not be good practice for another. For example, an organisation that is responsible for managing 100 assets, all in the same location, could use a spreadsheet-based solution for an Asset Register and Work Management System. This is arguably good practice for that organisation. When reading the SSGs, understanding the complexity and maturity of the organisation must be considered and the guidance placed in that context.

Maturity models exist for many different challenge problems. They provide a way for organisations to approach problems and challenges in a structured way by providing both a benchmark against which to assess capabilities and a roadmap for improving them. In its simplest form, a maturity model is a set of characteristics, attributes, indicators or patterns that represent progression and achievement in a particular domain or discipline. The artefacts that make up the model are typically agreed upon by the domain or discipline and are validated through application and iterative recalibration.

A maturity model allows an organisation or industry to have its practices, processes, and methods evaluated against a clear set of artefacts that establish a benchmark. These artefacts typically represent best practice and may incorporate standards or other codes of practice that are important in a particular domain or discipline. While this SSG is not a maturity model it does borrow some of these concepts.

3 What does Maintenance Delivery and Asset Operations mean?

The delivery of effective maintenance is a key element in ensuring the reliability of an asset through its Life Cycle with optimal use of resources. The amount and type of maintenance and maintenance support depends on the asset needs, the nature of the maintainable item, its condition, its required availability and a range of other factors. As these components change over time, the level and type of maintenance support must be adjusted.

Accordingly selecting and applying the appropriate Maintenance Strategies is essential to optimise the availability of the asset and its business objective. It is also recognised that there will be a degree of emergent work will arise in operations. This emergent work will require those responsible in maintenance to make a suitable diagnosis and determine the most appropriate action, based on criticality with consideration to factors such as business priority, Health and Safety, Cost, availability of resources.

Asset operations is defined as the day-to-day activities to ensure value is delivered from your asset(s). These activities will focus on the varying demands placed on the assets and will vary based on industry and organisation context. For a manufacturing plant, operations are focused on ensuring assets produce the required product at the desired volume and quality. For a hospital or school, operations are focused on ensuring the asset condition and environment is at the optimum level for the users.

Historically asset operations were focused on delivery of the end product and/or service, with minimal consideration to the interrelationship between maintenance, skills and competency, business longer-term objectives and process optimisation. As industry has developed and with the advent of the ISO55000 group of standards, more focus has been placed on asset operations and its interaction with other key business elements. This SSG highlights a range of elements which should be considered during the asset operations phase, and their importance to the overall asset management process.

Collection of relevant asset data is common to both maintenance delivery and asset operations and supports decision-making throughout the life of the asset. This requires accurate asset information such as model number, serial number, vendor, spare part information, asset condition and run times. Collection of relevant data also requires due diligence of those conducting the work to complete not only the task in hand with both precision and accuracy but also the appropriate records such as maintenance work orders and operator log books. Recording details such as type of work, hours worked, spare parts used, faults found, changes in asset condition and corrective action taken will provide a solid foundation to both analyse failures but also to optimise execution of future tasks.

3.1 Operations & Maintenance Context and Vision (include Levels of Service)

Asset Managers and owners are faced with numerous challenges: having to deal with increased complexity, rapidly changing technology, ageing work forces, changing and demanding expectations of employees and a diverse asset base varying in age and complexity. They are also tasked to meet challenging revenue targets and optimise operational expenditure often in a background of increased compliance and operational risks.

Historically, Operations and Maintenance have existed as separate entities. In recent decades, there have been many attempts with different degrees of success at alignment through organisation changes, value stream models, shared services, outsourcing, centralisation and decentralisation or hybrid models and concepts to deliver improved performance.

Fundamentally, however, the key functional activities of the organisation should be defined to support asset operations and maintenance delivery that will create value and achieve desired business outcomes.

Guiding principles that will support this are:

- Consideration to safe operations
- Alignment with business priorities and required service levels

- Ensure effective and efficient support from all available resources
- Staff engagement and empowerment
- Cross-functional training of operations and maintenance staff
- Accurate capture and exchange of asset knowledge for effective decision-making
- Standardised and documented processes
- Common tools and terminology
- Monitoring and reporting framework to identify and action deviations
- Promote an embedded culture of continuous improvement

There should be a direct correlation between maintenance and operations with quality, reliability metrics and business performance. The direct link should be understood and requirements captured in an SLA (Service Level Agreement) to provide clarity on requirements and performance routinely monitored and communicated. This SLA will act as a reference point when decisions are to be made on financial adjustments to budgets, work prioritisation, or organisational changes. A balance must be struck in how this SLA is utilised and will require a high degree of cooperation and maturity for parties involved to avoid conflict.

Operations Excellence has become more than simply the efficient output of a quality product or service. Modern Operations Excellence also requires:

- The incorporation of the health, safety, and security of employees,
- The effectiveness of the organisation in delivering community objectives,
- Addressing issues such as energy efficiency, sustainability, and corporate stewardship.

Maintenance Excellence is often sighted as a visionary goal. Its elements include such aspects as:

- Creation of an environment for knowledge sharing.
- Assessing maintenance processes & procedures to identify gaps where value can be added.
- Adopting best practices and challenging the norm to accelerate performance improvement.
- Data driven failure reduction programmes with all staff engaged - Operations and Maintenance.
- Optimised levels of Planned and Predictive work.
- High levels of technical understanding of assets.
- Clearly defined, roles, responsibilities & accountabilities.
- Proactive skills management.
- Focus on early equipment management and life cycle costing.
- Application of technology for competitive advantage.

3.2 Connection to the Bottom Line, Value Drivers, Asset based Budget

Aligned maintenance and operations will create value for an organisation.

Working together, maintenance and operations can create synergies and value in addition to the sum of each working separately. Efficiencies, effectiveness, and combined synergies are dynamic and should be re-evaluated and continuously improved over time depending on external factors and business situation. It is important to understand the key value proposition for the business and adopt the appropriate practices and tools that will support creating the most value at a particular point in time.

- **Financial Management** – Improving control, visibility and allocation of expenditure and driving rigorous cost control measures can impact the bottom line of an organisation. Key influences being spent on parts, labour and contract services.
- **Asset Performance** – Increasing availability of assets will typically be a dominant means to create value for an organisation. The cost of downtime should be understood and improved through performance improvement or reliability measures to maintain or create additional capacity. Metrics can clearly define how well equipment and systems are delivering the desired uptime levels necessary to meet or exceed production targets. Systems and assets with high availability can lead to avoidance or deferment of capital expenditure and contribute to the overall value potential.
- **Compliance Management** – Ensuring all Safety, Health, Environmental and Quality,Statutory, Regulatory and in-house standards are met will ensure Licences to operate are maintained and Integrity of assets proactively managed.
- **Asset Based Budgeting** – Structured and documented processes should be in place to evaluate levels of performance and losses and a formal improvement plan established based on business opportunity and effort.