The Asset Management Landscape

Third Edition

English Version

GFMAM

Global Forum on Maintenance & Asset Management

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gfmam.org

The Global Forum on Maintenance and Asset Management

The Global Forum on Maintenance and Asset Management (GFMAM) has been established with the aim of collaboratively sharing advancements, knowledge and standards in maintenance and Asset Management.

The members of GFMAM (at the time of issue of this document) are:

- Asset Management Council (AMCouncil), Australia.
- Brazilian Maintenance and Asset Management Society (ABRAMAN).
- European Federation of National Maintenance Societies (EFNMS), Europe.
- French Institute of Asset Management and Infrastructures (IFRAMI), France.
- Gulf Society of Maintenance Professionals (GSMP), Arabian Gulf Region.
- Institute of Asset Management (IAM), UK.
- Institute of Public Works Engineering Australasia (IPWEA) Australia.
- Japanese Associate of Asset Management (JAAM).
- Japanese Institute of Plant Maintenance (JIPM).
- Moroccan Association of Reliability, Asset Management & Maintenance (MARAMM).
- Malaysian Asset and Project Management Association (MAPMA), Malaysia.
- PEMAC Asset Management Association of Canada, Canada.
- The Southern African Asset Management Association (SAAMA), South Africa.
- The Society for Maintenance and Reliability Professionals (SMRP), USA.

The enduring objectives of the GFMAM are:

1. To bring together the worldwide Asset Management community promoting and strengthening relationships.
2. To support the establishment and development of associations or institutions focused on the maintenance and management of assets.
3. To facilitate the exchange and alignment of knowledge and practices in maintenance and management of assets.
4. To raise the credibility of member organizations by raising the profile of the Global Forum.

This document describes the Asset Management Landscape Third Edition, English Version that supports three of these four enduring objectives. (1,3 & 4)

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Background

Over the past decades Asset Management standards, models, and principles have advanced significantly on a global scale. The Global Forum on Maintenance and Asset Management (GFMAM) has recognized the benefits of coordinating these advancements and collaborating to develop a collective perspective, especially for organizations that operate Asset Management systems in multiple countries.

To meet this goal, the GFMAM published the first edition of the GFMAM Asset Management Landscape in November 2011. The aim was to review it in 2014, considering the publication of ISO 5500x and incorporate new insights into Asset Management. The initial edition received more usage than anticipated, and the subject descriptions were considered too broad for specific projects such as ISO 55001 Auditor/Assessor competencies.

The Second Edition of the GFMAM Asset Management Landscape was released in 2014, leading to considerable progress and advances in the application of Asset Management within the global Asset Management community. It served as a reference framework for developing the Asset Management bodies of knowledge for GFMAM members. It also addressed the knowledge requirements for ISO 55001 assessors, certifications under the Global Certification Scheme, and Asset Management qualifications.

The global community faces a range of pressures that require a response. These include population growth, complex asset portfolios, technological advancements, increasing customer demands, evolving concepts of "value," sustainable development needs, climate change adaptation, resilience, and emerging risks and opportunities. Given the compelling evidence in the Intergovernmental Panel on Climate Change (IPCC) reports, there is a need for a sense of urgency in the planning for, and management of, Asset Management systems to ensure resilient and sustainable approaches that address climate change risk.

This sense of urgency must be addressed given potential vulnerability of asset base, supply chain, customer base, and shareholder expectations.

This document presents the Third Edition of the GFMAM Asset Management Landscape, which outlines the subjects and fundamentals that define the discipline of Asset Management. In response to the societal pressures mentioned above, this edition includes updates to all subjects, their logical organization, and the introduction of new ones. Notably, Governance and Value Realization are now included as subject areas, aiding in aligning Asset Management frameworks with modern governance requirements and the ultimate objective of Asset Management, which is to achieve value.

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Purpose of the Landscape, Third Edition

The aim of the GFMAM Landscape is to explain our shared understanding of Asset Management, emphasizing its wide-ranging nature and breadth of scope. As well, it aims to establish a globally accepted set of subjects that enables the alignment, comparison, and contrast of knowledge bases, practices, maturity assessments, competency schemes and qualifications in this field.

The Landscape publication is designed to complement the ISO 5500x suite series of standards and related materials which primarily focus on the implementation and use of a Management System. The document will provide an explanation of the relationship between the Landscape and the ISO5500x standards.

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Overview of the Landscape

The Asset Management Landscape is a framework designed to enable Asset Management knowledge and practices so that they can be compared, contrasted, and aligned around a common understanding of the discipline of Asset Management. The Asset Management Landscape is represented in diagram 1 below:

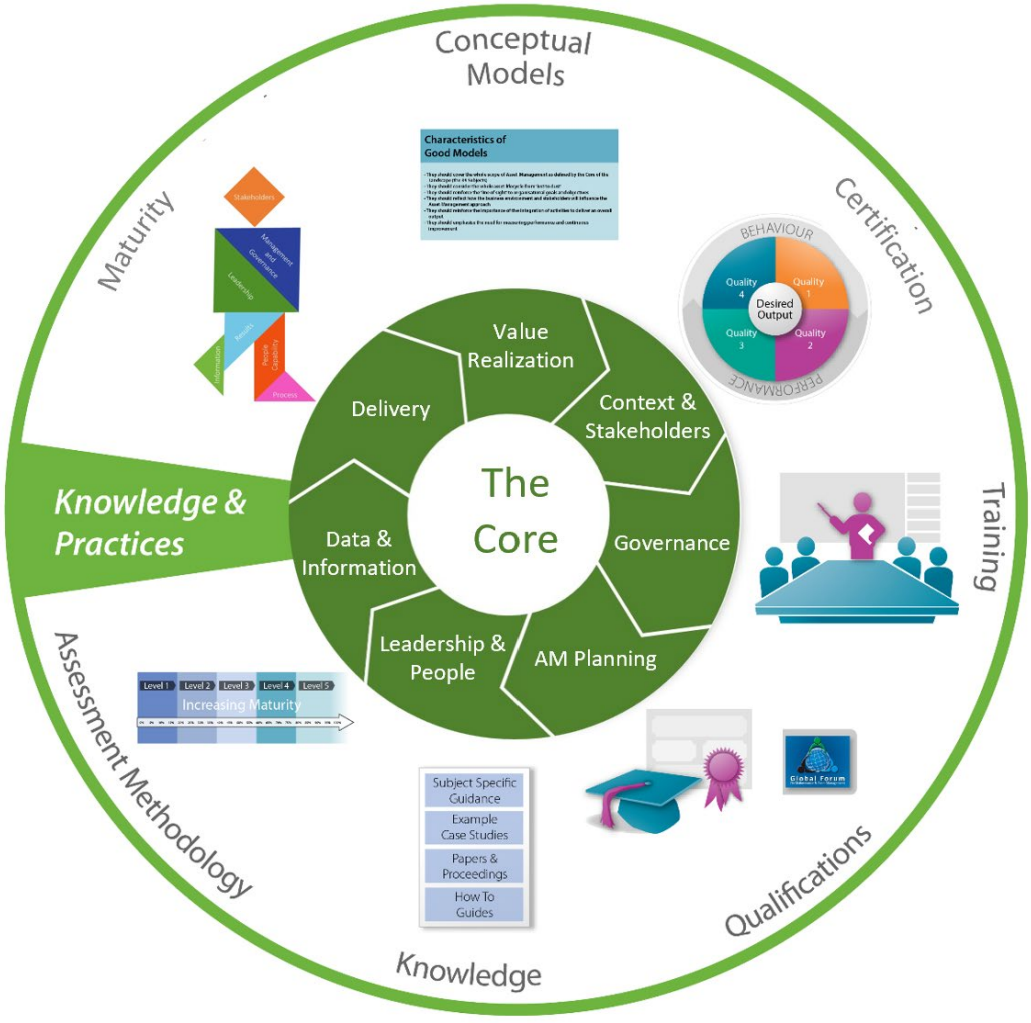

Diagram 1: Asset Management Landscape

The Asset Management Landscape comprises two essential components:

1. The Core: This is the central part of the Asset Management Landscape and representing the fundamental principles and concepts that are universally applicable to Asset Management.

2. The Knowledge and Practices Area: This section includes the specific knowledge and practices of each GFMAM member society within their own Asset Management Frameworks. It is recognized that different GFMAM Member societies will / may adopt unique approaches and methodologies to manage their assets that are reflective of the local Organisational environment, the nature of the assets, the industry sector and the organizational goals and objectives.

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Asset Management Maturity

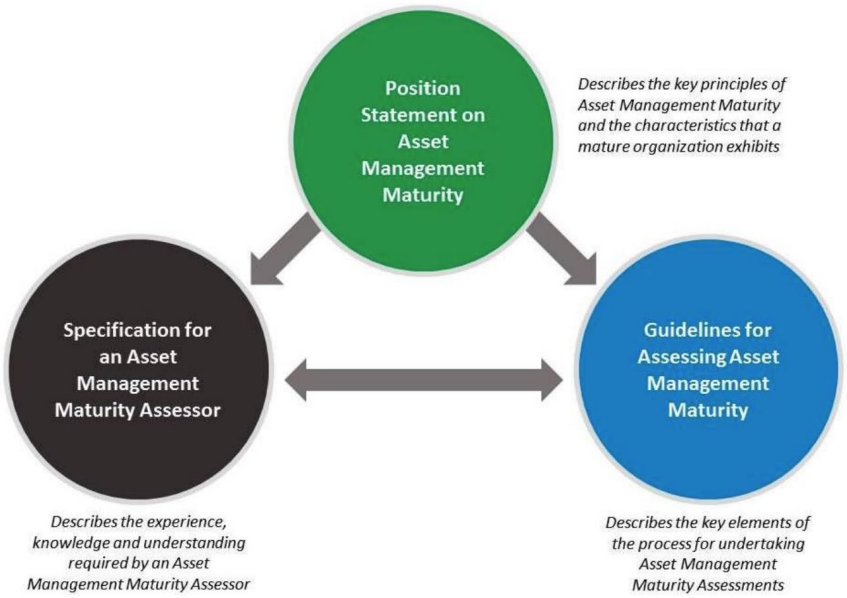
Asset Management maturity is the extent to which the capabilities, performance and ongoing assurance of an organization are fit for purpose to meet the current and future needs of its stakeholders, including the ability of an organization to anticipate and respond to its operating context.

As organizations seek to build on and improve their Asset Management capability, they will need to assess their performance against the GFMAM AM Landscape and further develop these capabilities to an appropriate level of maturity. Asset Management maturity is not limited to the stages achieved in meeting ISO 55001 requirements – it looks beyond compliance with ISO 55001 and considers the characteristics that organizations would exhibit at higher levels of maturity.

Asset Management Maturity Assessment

The GFMAM have published three documents on Asset Management Maturity

1. Position Statement on Asset Management Maturity
2. Guidelines for Assessing Asset Management Maturity
3. Specification for an Asset Management Maturity Assessor



Each GFMAM member society should develop their own detailed guidance on Asset Management Maturity assessments that are consistent with these guidelines but tailored to their specific needs.

The assessment is designed to cover all relevant requirements and guidance within the GFMAM Asset Management Landscape and ISO 55000 suite of documents.

As well, the assessment should consider the performance and governance of the organization being assessed and the degree to which is meets the Principles of Asset Management and other principles related to maturity such as adaptability, resilience, and business continuity.

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Asset Management Competency

Asset Management is an organizational process that, while dependent on a range of other professional skills, needs recognition of the knowledge, skills and capabilities required to manage the concept of coordinated activities to drive value for the organization. The scope of Asset Management practice is aligned to the recognition that Asset Management practitioners may build their specific competencies through various technical and professional pathways.

Practitioners in the relevant technical or professional disciplines are an essential part of the success of Asset Management within an organization. The addition of capabilities, knowledge, and skills in Asset Management enhances the Asset Management performance of the organization.

The power of Asset Management typically resides in the integration of a broad range of disciplines (logistics, engineering, management and data sciences, planning, maintenance, operations, and finance), determined by the assets employed, to meet the objectives of an organization. The mix can vary considerably from one organization to another. Teamwork is at the core of Asset Management with each member performing an essential role.

Competency[1] in Asset Management can be demonstrated via three key elements.

Asset Management Knowledge

Asset Management Knowledge can be demonstrated by gaining a recognized qualification[2] or completion of education or training that includes a tested demonstration of knowledge (e.g., exam or assignment) in Asset Management that incorporates the content of the GFMAM AM Landscape and the ISO 5500x suite of Standards.

Asset Management Skills

Asset Management Skills[3] can be demonstrated by achieving a recognized level of application of skills for a particular role or experience level. These skills will demonstrate application against the GFMAM AM Landscape subject areas and subjects.

Asset Management Experience

Asset Management Experience can be demonstrated by a statement of career time in applying Asset Management skills & knowledge through involvement and exposure to Asset Management in business and industry.

[1] ability to apply knowledge and skills to achieve intended results (ISO 17024)

[2] demonstrated education, training, and work experience where applicable (ISO 17024)

[3] ability acquired through education, training, experience, or other means to perform a task or activity with a specific intended outcome (ISO 17027)

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GFMAM Asset Management Landscape Subjects, Third Edition

The Asset Management Landscape subjects are given in the list below.

One	Two	Three	Four	Five	Six	Seven
Context and stakeholders	**Governance**	**AM Planning**	**Leadership and people**	**Information**	**Delivery**	**Value realization**
The organization context and stakeholder subjects. These set the boundary conditions that inform the approach to AM within an organization.	The subjects relating to Governance and management of AM within an organization. Including the AM system approach taken by the organization.	The subjects relating to the AM planning and approach taken by the organization.	The people-related subjects, including AM leadership, resourcing, and competence, that inform an organization's culture.	The information related subjects applicable to AM. Including the way information is managed as an asset and the importance to AM decision making.	The subjects relating to Life cycle delivery of AM.	The subjects relating to how value is created through doing AM. Subjects related to measuring outcomes and continual improvement, not just performance of assets

1.0 Context and stakeholders	2.0 Governance	3.0 AM Planning	4.0 Leadership and people	5.0 Data & Information	6.0 Delivery	7.0 Value realization
1. Organizational Purpose & Context 2. Stakeholder Management 3. Asset Costing & Valuation	1. Asset Management Policy 2. Asset Management System 3. Asset Management Assurance & Audit 4. Technical Standards & Legislation 5. Management of change 6. Risk	1. AM Strategy & Objectives 2. Demand Analysis 3. Sustainable Development 4. Planning 5. Decision-Making 6. Lifecycle Value Realisation 7. Resourcing Strategy & Management 8. Shutdown and Outage Strategy and Planning 9. Contingency Planning & Resilience	1. Asset Management Leadership 2. Organizational Arrangements 3. Organizational Culture 4. Competence Management 5. Organisational Change Management 6. Knowledge Management	1. Asset Management Data & Information Strategy 2. Asset Data & Information Standards 3. Asset Management Data & Information Management 4. Asset Management Data & Information Systems 5. Configuration Management	1. Systems Engineering 2. Asset Creation & Acquisition 3. Integrated Reliability 4. Asset Operations 5. Maintenance Delivery 6. Incident Management & Response 7. Asset Repurposing & Disposal 8. Supply Chain Management	1. Outcomes & Impacts 2. Monitoring 3. Continuous Improvement

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AM Landscape Subject areas

Each Subject has a dedicated descriptor page which includes the definition and scope of the subject. Subject descriptors cover the following:

- The definition of each Subject.
- A context statement for each Subject.
- The artefacts that would typically be produced for each Subject.
- Key relationships with other Subjects.
- Any relevant international standards (note that the landscape does not attempt to reflect all local standards).

1 Context & Stakeholders

The organization context and stakeholder subjects. These set the boundary conditions that inform the approach to AM within an organization.

1.1 Organisational Purpose and Context

Definition

The processes and activities used to design, implement, and sustain an approach to Asset Management should be aligned with the organisation's purpose.

This includes activities associated with defining the scope and boundaries of Asset Management and the organizational objectives that Asset Management needs to deliver and contribute to. These activities may make use of value from financial and non-financial assets.

Context

The Organisation's purpose influences the scope of its activities and objectives. The organizational purpose and its operating context define the success criteria and influence the decision-making criteria used in Asset Management. It guides the Asset Management capabilities required. The operating context relates to internal and external factors that influence the risks and opportunities of the organization. Organisational context has several dimensions and includes social, cultural, regulatory, political, financial, economic, environmental aspects in local, national, and international context. It encompasses:

- mission and vision.
- identification and assessment of internal and external stakeholders and their requirements.
- products and/or services.
- governance, enterprise risk, compliance, and policy frameworks.
- Strategic/business plan and objectives.

Organisational context includes identification of its legal obligations and compliance requirements with respect to governing Acts and Regulations. It also outlines the organisation's commitment to its stakeholders and defines how Asset Management contributes to its objectives. The scope and the boundaries of Asset Management, the Asset Management system and other management systems are set, and their interfaces are defined.

The purpose and context of the organization should be continually reviewed for relevance, and changes should shape the Asset Management System as it adapts. The triggers and timeframe for undertaking these reviews depend on the

dynamics of the operating context and on the organisation's Management of Change process.

Artefacts

- Organisational vision, mission, strategic/business plan.
- Corporate governance, risk, and compliance framework.
- Organisational objectives including its commitment to Environmental and Sustainability goals.
- Organisational Culture.
- Organization Structure.
- Technical Standards & Legislation.

Related Subjects

- Stakeholder Management (1.2).
- Asset Management Policy (2.1).
- Asset Management System (2.2).
- Planning (3.4).
- Asset Management Strategy & Objectives (3.1).
- Sustainable Development (3.3).

Relevant Standards

- ISO 5500x Series – Asset Management.

1.2 Stakeholder Management

Definition

The structured and documented approach that organizations use to identify, engage, and manage all relevant needs and requirements of internal and external stakeholders, that drive value from and are affected by the organization.

Context

Stakeholder management describes all policies, processes, and activities used for scenario development, identifying, communicating, and interacting with stakeholders. Understanding the value that stakeholders receive from the organization is essential. The approach to Asset Management and Asset Management risks or opportunities needs to consider stakeholders and actively manage how Asset Management influences them.

The organisation's approach to Asset Management should be based on operational context, the strategic/business plan, and stakeholder management plan. Each organization should document internal and external stakeholders according to its purpose and context. This is often summarized in the strategic/business plan.

Stakeholder management is a collaborative activity across the organization.

The Management Review process should ensure that all significant internal and external stakeholders are managed proactively. Stakeholder satisfaction should be monitored, risks and conflicts resolved, and desired stakeholder outcomes delivered in line with the organizational objectives.

Management activities within scope of this subject include:

- Identifying key stakeholders, their level of influence and impact, and their needs and requirements.
- Development of stakeholder strategies and plans (including consultation and communication).
- Planning and Execution of stakeholder processes.
- Analyzing and understanding, monitoring, and evaluating the effectiveness of stakeholder management.

Artefacts

- Documented stakeholder analysis.
- Stakeholder management plan.
- Register of stakeholders.
- Documented feedback from stakeholders.
- Records of stakeholder engagement.

- Communication and Engagement Strategy.
- Communication Management Plan.
- Strategic Asset Management Plan (SAMP).

Related Subjects

- Organisational Purpose & Context (1.1).
- Asset Management Policy (2.1).
- Asset Management Strategy and Objectives (3.1).
- Demand Analysis (3.2).
- Planning (3.4).
- Decision-making (3.5).

Relevant Standards

- ISO 5500x Series – Asset Management.
- IAP2 (International Association for Public Participation).

1.3 Asset Costing and Valuation

Definition

Asset Costing is the organisation's end to end process for defining, capturing, and utilizing the TOTEX (Total Expenditure) of physical assets or systems of assets throughout their life cycle. This includes the costs associated with planning, design, acquisition, construction, operation, maintenance, renewal, and disposal.

Asset Valuation is the organisation's end-to-end process for quantifying the financial value of assets in accordance with accounting standards.

The application of cost and valuation methodologies generates information and intelligence that supports decision-making in areas such as asset investments, asset life cycle optimization, improvements in return on investment, and to exercise management control to balance risk, cost, and performance.

Context

It is important to create and maintain a close link between accounting systems and Asset Management systems. These should have consistent mechanisms, definitions, and processes for determining asset costs and asset valuation. This alignment can produce a range of benefits including:

- Stronger understanding of the costs and revenue within an organization generated by assets and their subsequent drivers.
- Compliance with financial accounting standards.
- A holistic and consistent view of value that assets and the organization deliver to its stakeholders.

Asset costing requires a structure and /or framework that defines the composition of all costs related to an asset, including systems of assets. This needs to consider the Total Expenditure [TOTEX], including the Capital Expenditure [CAPEX] and Operating and Maintenance Expenditure [OPEX] of the asset through its life cycle (including end of life activities). This would typically be defined in a work or activity breakdown structure to ensure costs are defined and captured in a way that supports Asset Management decision-making.

Asset Valuation refers to accounting practices or rules that allow the value estimation and value forecasting for assets over their life cycle. The processes for defining Asset Valuation are typically the responsibility of the organisation's internal financial department.

Consideration should be given to alignment of financial and non-financial functions of the organization to ensure consistency of asset cost and valuation information.

Artefacts

- Expenditure reports.
- Asset valuation register.
- Documented valuation methodology.
- Life cycle Costing.
- Financial Depreciation Policy.
- Asset Transaction Data and Documentation.
- Unit cost definitions & standards.

Related Subjects

- Planning (3.4).
- Decision-Making (3.5).
- Life cycle Value Realization (3.6).
- Asset Management Data and Information Systems (5.4).

Relevant Standards

- International Financial Reporting Standards (IFRS).
- ISO 5500x Series – Asset Management.

2 Governance

The subjects relating to Governance and management of AM within an organization. This includes the AM system approach taken by the organization.

2.1 Asset Management Policy

Definition

The Asset Management Policy formalizes the organisation's commitment to Asset Management, aligns its Asset Management principles with the organisation's strategic vision, mission, strategic goals, and objectives.

Further it provides a directional framework for all stakeholders in the development and implementation of the Asset Management strategic plan and the establishment of Asset Management objectives.

Context

The Asset Management Policy provides a set of principles for the development and implementation of an organisation's approach to Asset Management, Asset Management system, Asset Management strategy and objectives.

The Asset Management Policy should be consistent with stakeholder requirements and organizational objectives and constraints. It should also be aligned with, and consistent with, other organizational policies.

The Asset Management Policy should be supported by senior management, effectively communicated, and periodically reviewed with a commitment to continual improvement of the Asset Management system.

Artefacts

- Organisational Vision and Mission.
- Organisational Objectives.
- Stakeholder identification and analysis.
- Reference and leverage established policies (e.g. or i.e. Continuous Improvement, Quality Assurance).

Related Subjects

- Organisational Purpose and Context (1.1).
- Stakeholder Management (1.2).

Relevant Standards

- ISO 5500x Series – Asset Management.
- Any legislative requirement applicable to organization.

2.2 Asset Management System

Definition

A set of interrelated or interacting elements within an organization to establish, update, and sustain Asset Management, Asset Management policies, Asset Management objectives and processes to achieve those objectives. The processes and measures used by an organization to assess the on-going fitness and performance of its Asset Management System, including continuous improvement initiatives. The Asset Management System should recognize and integrate with other formal management systems.

Context

The Asset Management System is the management system used to manage an organisation's assets and asset-related capabilities. An Asset Management System typically includes the following elements:

- An integrated set of tools that include people, processes, Asset Management policy, Asset Management strategy and objectives, plans and Asset Management data and the information systems that define and guide the delivery of Asset Management in the organization.
- Delivery of a structured and holistic approach for the development, coordination, and efficient control of the activities that an organization undertakes to realize value in alignment with its Asset Management objectives.

The Asset Management System should be monitored to ensure that it:

- Fits the context of the organization and assets within its scope.
- extracts expected Asset Management value and benefits.
- has capabilities that properly support delivery of the Asset Management objectives.
- Monitors performance in meeting Asset Management objectives.
- Can improve to better deliver Asset Management objectives.

These aspects are typically assessed by a combination of assurance processes, such as maturity assessments, peer review, benchmarking, and audits.

Artefacts

- Asset Management System Manual.
- Strategic Asset Management Plan (SAMP).
- Asset Management Plan.
- Asset Management Governance Group meeting minutes.
- Management Review Meeting minutes.

- Maturity Assessment Outputs (Current State, Gaps, etc.).
- Performance Monitoring and Measures.
- Asset Management System Improvement Plan.

Related Subjects

- Asset Management Policy (2.1).
- Asset Management Assurance & Audit (2.3).
- Asset Management Strategy & Objectives (3.1).
- Planning (3.4).
- Asset Management Data & Information Systems (5.5).

Relevant Standards:

- ISO 5500x Series – Asset Management.

2.3 Asset Management Assurance and Audit

Definition

An organisation's structured processes for assuring and auditing the effectiveness of its assets, Asset Management and Asset Management system to ensure organizational and Asset Management objectives are being achieved and its assets fulfil their required purpose.

Context

Asset Management Assurance and Audit describes internal assurance processes, audit policies and procedures, internal and external audits, processes for reviewing audit findings and corrective actions as well as the use of external benchmarking.

Asset Management assurance is important for achieving desired organizational outcomes. Multiple levels of assurance are used to ensure that the intended outcomes are achieved. Multiple levels of assurance are used to assure different aspects of Asset Management activities including:

- Assurance that services are delivered as required.
- Assurance that technical and contractual obligations are met.
- Assurance that internal and/or external auditors have complied with appropriate standards and outcomes have been achieved.

The purpose of the organisation's internal audit function is to enhance and protect organizational value by providing risk-based and objective assurance, advice, and insights. For example, following the completion of an audit, recommendations for improvement are provided to organizational areas and actions are then taken to address the recommendations after they are agreed by the organizational area. Actions generally represent initiatives to strengthen existing controls or fill a control gap.

Management activities within the scope of this subject include:

- Development of audit policies.
- Development of audit processes.
- Development of assurance framework and assurance program.
- Execution of audit processes.
- Findings Management.

Artefacts

- Audit policy.
- Documented audit procedures.
- Audit schedule.

- Documented audit methodologies.
- Documented audit results.
- Audit reporting.
- Assurance Framework.

Related Subjects

- Asset Management Policy (2.1).
- Risk (2.6).
- Management of Change (2.5).
- Continuous Improvement (7.3).
- Life cycle Value Realization (3.6).

Relevant Standards:

- ISO 19011
- ISO 5500x Series – Asset Management.

2.4 Technical Standards & Legislation

Definition

The process used by an organization to ensure all its activities, including Asset Management activities, are compliant with relevant technical standards, regulations, and legislation.

Context

Technical standards, regulations and legislation must be considered in the context of the Asset Management organisation's physical jurisdiction, business environment, industry and nature of the stakeholders serviced by the organization.

Artefacts:

Register of applicable technical standards, regulations, and legislation.

Related Subjects

- Asset Management Strategy and Objectives (3.1).
- Risk (2.6).
- Maintenance Delivery (6.5).
- Decision-Making (3.5).
- Life cycle Value Realization (3.6).

Relevant Standards

- ISO Standards.

2.5 Management of Change

Definition

Management of Change is the systematic approach to an organisation's processes for the identification, assessment, implementation, and communication of changes to processes and assets.

Context

Management of Change describes policies and processes for dealing with changes to physical assets, their management systems or supporting resources. This subject also includes elements related to mitigating the risks associated with the impact of change.

The management activities within the scope of this subject are:

- Development of Management of Change Policies.
- Development of Management of Change Processes.
- Execution of Management of Change Processes.
- Periodic review of Management of Change Policies and Processes.

Artefacts

- Documented Management of Change Process.
- Management of Change Register and matrix.
- Management of Change Plan.
- Management of Change Communication with use of RACI or similar method.
- Management of Change Models.

Related Subjects

- Risk (2.6).
- Organizational Change Management (4.5).
- Configuration Management (5.5).
- Maintenance Delivery (6.5).
- Asset Management System (2.2).
- Organizational Culture (4.3).
- Stakeholder Management (1.2).

Relevant Standards

- ISO 5500x Series – Asset Management
- ISO 27001 (change management in the context of information management systems).
- Local regulatory and jurisdictional requirements.

2.6 Risk

Definition

The management of uncertainties on Asset Management objectives through policies and processes for identifying, quantifying, mitigating risk and exploiting opportunities associated with existing and future organizational and Asset Management objectives.

Context

Risk Management describes policies and processes for the identification, assessment, quantification, analysis and treatment of risks and opportunities. Risk and criticality are not the same. Criticality is a function of the relative importance of an asset OR system to the organisation's overall mission. Critical assets are an organisation's essential assets that can impact on the organizational objects. Risk, on the other hand, is a function of criticality (impact of failure) and the likelihood of failure. Accurately identifying and understanding criticality and risk is foundational to the success of an organisation's approach to Asset Management and to securing its level of service.

The Asset Risk Management Framework should be aligned to the organizational (or Corporate) risk management framework, risk appetite and Risk Management standards (e.g., ISO 31000). ISO 31000 quantifies risk as the product of the Likelihood (or Probability) of an event occurring and the Consequence (or impact) on organizational and Asset Management objectives.

Risk level is assessed against the organisation's risk tolerance both at the individual level and at an aggregate level. Risk mitigation strategies can be developed to ensure that the resulting Residual Risk is at tolerable levels based on the organisation's appetite for risk. Assessing residual risk involves considering trade-offs with cost and performance, and impact on the achievement of organizational and Asset Management objectives. Comprehensive Risk Management is the foundation for developing capital plans related to growth, rationalization, upgrades, enhancements, renewals, and updates to operations as well as maintenance strategies.

Risk Management is common to all subjects within the Asset Management Landscape. Risk management activities must be clearly aligned with activities at an operational and project level such as risk treatment and Asset Management Assurance and Audit. An organization should establish processes to identify, gather, collect, or capture opportunities and decide on the opportunities to be addressed to improve performance of the organization.

Artefacts

- Risk Management Policy.
- Risk Management Strategy.
- Risk Management Framework.
- Risk Management Procedures.
- Risk Registers.
- Risk Criteria.
- Risk Profile.
- Risk Action Requests.
- Risk Profile Reports.
- Risk Measures.
- Risk Costs.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Life cycle Value Realization (3.6).
- Decision-making (3.5).
- Contingency Planning and Resilience (3.9).
- Risk (2.6).
- Asset Management Assurance and Audit (2.3).
- Stakeholder Management (1.2).
- Organizational Change Management (4.5).

Standards

- ISO 5500x Series – Asset Management.
- ISO 31000 - Risk management — Principles and guidelines.
- IEC/ISO 31010 - Risk management – Risk assessment techniques.
- ALARP/SFAIRP (asset integrity issues with large safety/environmental consequences).

3 Asset Management Planning

The subjects relating to the AM planning and approach taken by the organization.

3.1 Asset Management Strategy and Objectives

Definition

The Asset Management Strategy is contained in the Strategic Asset Management Plan (SAMP). It translates organizational objectives into Asset Management objectives, defines the organisation's Asset Management system and the approach to Asset Management and the organisation's assets, and describes the strategies and actions to deliver on Asset Management objectives.

Context

The SAMP describes the organisation's whole life cycle approach to the management of the assets defined by the organization within the scope of their Asset Management system. It would typically include a set of strategic statements that describe current and future Asset Management objectives, the organisation's intent, and the current and future Asset Management capabilities (Asset Management system, people, process, and technologies) required for the organization to deliver these outcomes predictably and sustainably.

The SAMP would typically include:

- Statements aligning Asset Management with the delivery of strategic organizational objectives.
- Asset Management objectives formulated in accordance with the Asset Management Policy, using Asset Management decision criteria that are responsive and aligned to organizational objectives and stakeholder requirements including measurable objectives to deliver on the expected economic, environmental, and social performance of an organisation's asset portfolios and Asset Management activities.
- A description of the role, scope and boundaries of the Asset Management system, the asset portfolios included in the scope of the Asset Management system, and interaction with other management systems.
- The methods and decision-making criteria used to undertake life cycle performance, cost, and risk analyses that determine the optimum asset interventions (including the methodology for determining asset criticality).
- The approach, strategy, and actions used to achieve Asset Management objectives and the realization of value including the approach used to balance performance, risk, and cost objectives to achieve sustainable value from assets.
- Key accountabilities for the activities defined in the Asset Management Strategy including the implementation, monitoring, review and updating of the Asset Management Strategy.

The timeframe for a SAMP typically corresponds to the life cycle of asset portfolios or has a sufficient horizon to accommodate planning for assets, Asset Management and Asset Management systems. The planning horizon typically extends beyond an organisation's normal budgetary cycle.

Artefacts

- Asset Management Objectives.
- Scope of the Asset Management System.
- Stakeholders' Analysis.
- Asset Portfolio Summary.
- Current Asset Performance Summary.
- Strategic-level Asset Management Key Performance Indicators (KPIs) and Improvement Targets.
- Future asset portfolio requirements.
- AM Maturity assessment and improvement plan.
- Asset Management Strategic Initiatives.
- Asset risk appetite and management.

Related Subjects

- Organizational Purpose & Context (1.1).
- Stakeholder Management (1.2).
- Demand Analysis (3.2).
- Asset Management Policy (2.1).
- Life cycle Value Realization (3.6).
- Sustainable Development (3.3).

Relevant Standards

- ISO 5500x Series – Asset Management.

3.2 Demand Analysis

Definition

Demand analysis consists of knowing and understanding the variables that make up the requirements of interested parties and the economic, social, and environmental scenarios where the organization operates, to establish a forecast for Asset Management that generates value for the organization.

Demand analysis consists of the processes that an organization uses to evaluate, analyze, and influence demands and to perform the evaluation and analysis of the capability of assets to meet demand.

Context

Demand analysis typically includes assessing future demand for products or services. This demand will impact on the portfolio and asset availability.

When carrying out demand analysis the following should be considered (in no particular order):

- Stakeholder expectations.
- Climate change.
- Sustainability.
- Historical demand and the context that drives demand.
- Current and future demand, as well as changes over time.
- New products or services required by the organization.
- Changes in the performance levels required to provide products and services.
- Current and future asset utilization and capacity.
- Impact on future performance, condition, and capability.
- Technological issues and trends in new technologies.
- The need for new skills.

Demand analysis involves identifying scenarios, understanding the factors that influence them, as well as their likelihood of occurring. Strategies should be developed that consider the capacity of the organization and its assets as well as in relation to the expected demand scenarios. The strategies should also consider the use of non-asset solutions where demand may exceed supply. Revised levels of performance should be reflected in the Asset Management Objectives.

The outcome of demand analysis should be considered in strategic objectives as it influences the expected economic, environmental, and social performance of an organisation's asset portfolios.

Demand analysis contributes to the decision-making criteria, which are used to calculate the cost of the life cycle of assets, complete risk analysis, determine environmental impacts of product disposal and impact on the supply chain value. These considerations should be included in a methodology to determine their criticality.

Artefacts

- Historical Demand Analysis.
- Demand Scenarios.
- Demand Forecasts.
- Demand Management Strategy.
- Service Level Strategy.
- Asset performance forecast.

Related Subjects

- Stakeholder Management (1.2).
- Asset Management Strategy & Objectives (3.1).
- Planning (3.4).
- Decision-Making (3.5).
- Organizational Purpose and Context (1.1).
- Life cycle Value Realization (3.6).

Relevant Standards

- None.

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3.3 Sustainable Development

Definition

The holistic, interdisciplinary, collaborative method, including processes, used to ensure an enduring, balanced approach to economic activity, environmental responsibility, social governance, and progress to ensure all activities are sustainable over multiple timeframes while supporting the organisation's purpose.

Context

Sustainability is a continually evolving concept, which includes sustainable economic development, environmental protection, and enhancement as well as social inclusion, progress, and governance. More recently, progressive organizations have added cultural vitality as a dimension to sustainability, focusing on the culture and core values of the organization. Sustainability objectives are also very closely tied with the concept of "value" (created through use of its tangible and non-tangible assets) as defined by stakeholders.

Sustainable Development requires that Asset Management processes, decision making, Asset Management objectives and Asset Management activities are consistent with the organisation's sustainability framework.

Factors to be considered in these processes include:

- Environmental Impact of Asset Management.
- Social Impact of Asset Management.
- Economic Impact of Asset Management Plans.
- Optimizing environmental, social, governance and financial impacts.

To achieve sustainability in Asset Management all activities, including asset life cycle activities, undertaken to achieve the organisation's environmental, social and governance objectives should support this goal.

This is critically important at the closure stage of the asset life cycle. Resiliency may be considered part of an organisation's strategy to support sustainability; however, this only represents the organisation's ability to overcome challenges and adversity.

Sustainable development is enhanced when it acknowledges the local knowledge, cultural and heritage significance, and engages with local communities, especially Indigenous communities, in the areas where it functions.

Artefacts

- The organisation's Strategic Plan, Mission, and Vision.
- Environmental Impact Plan.

- Social Development Plan.
- Skills Development Plan.
- Financial Plan.
- Asset Management Strategy and Policy.
- Analysis for high level view of factors impacting the organisation's current and planned activities such as PESTLE (Political, Economic, Social, Technological, Legal, and Environmental).
- Business Continuity Plan.

Related Subjects

- Organizational Purpose and Context (1.1).
- Asset Management Policy (2.1).
- Asset Management Strategy & Objectives (3.1).
- Decision-Making (3.5).
- Life cycle Value Realization (3.6).
- Risk (2.6).
- Asset Management Data & Information Management (5.3).
- Outcomes & Impacts (7.1).
- Organizational Culture (4.3).

Relevant Standards

- ISO 14090 Climate Adaptation.

3.4 Planning

Definition

The activities involved in developing the relevant Asset Management planning artifacts that support strategic planning activities such as the Strategic Asset Management Plan. Asset Management planning specifies the detailed activities and resources, responsibilities, time horizon, and risks for the achievement of Asset Management objectives.

Context

Asset Management Planning is the process used to develop detailed Asset Management Plans that specify the asset life cycle activities an organization intends to undertake to achieve its Asset Management objectives and stakeholder needs in consideration with the resources, costs, time horizon required for their delivery.

Asset Management Planning includes the following:

- A review of previous Asset Management Plans and recovery plans where applicable.
- A demonstrated alignment with the Strategic Asset Management Plan.
- The asset life cycle activities the organization intends to undertake to deliver Asset Management objectives, stakeholder needs and level of service, in consideration of a range of intervention options for new, existing, and non-asset solutions.
- Evidence of social, economic, cultural, environmental, and economic evaluation to substantiate the asset life cycle activities.
- A consideration of the planning horizons across the immediate, short, medium, and the long term.
- The costs associated with delivering asset life cycle activities.
- The outputs, outcomes, and benefits (measured value) expected from the application of asset life cycle activities.
- Identification of relevant delivery models and resources (e.g., financial, asset and human) necessary to execute the Asset Management plans based on legal, regulatory, industry and technical standards.
- A scenario analysis to balance cost, risks and performance against any forward planning delivery, funding, and resourcing assumptions.
- Asset Management assurance requirements (e.g., technical assurance and investment gateway reviews).
- Details on how the plan will be approved monitored, reviewed, and updated including appropriate review period (periodic and systematic).
- An integration of Asset Management Plans with other organizational plans e.g. financial plans, health and safety plans and human resource plans.

- Details of maintenance and execution of plans in enterprise systems e.g., financial systems, resource management systems and Asset Management systems.

Artefacts

- Asset Management Plans.
- Approved capital and operating budget allocations over the planning period
- Work volumes and costs.
- Capital and operational expenditure investment over planning horizon and asset life cycle (with regular periodic update and review).
- Resource plans.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Demand Analysis (3.2).
- Decision-Making (3.5).
- Life cycle Value Realization (3.6).
- Shutdown and Outage Strategy and Planning (3.8).
- Risk (2.6).
- Contingency Planning & Resilience (3.9).
- Resourcing Strategy & Management (3.7).
- Asset Management Data and Information Management (5.3).

Relevant Standards

- ISO 5500x Series – Asset Management.

3.5 Decision-Making

Definition

Decisions are choices made under conditions of uncertainty, complexity, and constraint. Decisions are the primary means of allocating and reallocating the organisation's finite resources consistent with its value framework to achieve its strategic objectives. Investment decision-making comprises the policy, principles and criteria, decision-support techniques, information, and processes to address risks or opportunities through the development of alternatives and the selection of priority solutions across the full life cycle to deliver value to stakeholders.

Context

Decision-Making includes an evaluation approach of alternative investments with a medium to long-term vision of the asset life cycle cost benefits horizon based on investment (CAPEX and OPEX) from available funding sources, people, processes, and technology resources. This includes the business case development steps used for problem definition, as well as characterization, robust solution evaluation that drives sufficient quality alternatives allowing decision-makers to make the best life cycle choices across all time horizons.

Decision-making criteria should be aligned with Asset Management strategy, objectives and policy and value framework. Asset Management decisions should consider the trade-offs between risk, performance, and cost, while understanding competition for resources and other constraints. Decisions should be made by a capable multi-disciplinary team with appropriate experience and authority supported by technology. Decisions associated with action plans, and results should be tracked to assure the value delivered meets expectations.

Decision types in Asset Management include but are not limited to:

- Greenfield (new) or brownfield (existing) asset acquisition or build.
- Asset end-of-life, life extension, repurposing, and reclamation.
- Capacity increases, avoiding capacity constraints, quality efficiency and emissions improvements.
- Infrastructure system or network reconfiguration or optimization.
- New, expanded, or obsolete digital technology infrastructure enhancement.
- Environmental, Social and Corporate Governance & Sustainability investments.
- Sustaining asset life cycle operate, repair or replacement investments.
- Operating and maintenance strategies and actions.
- Improvements and innovations to processes and supporting technology systems.

Artefacts

- Corporate investment policy and process framework.
- Business Case Decisions.
- selection process for Investments.
- Life cycle costing.
- Post-investment appraisal reviews and audits.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Demand Analysis (3.2).
- Planning (3.4).
- Risk (2.6).
- Life cycle Value Realization (3.6).
- Asset Management Data and Information Management (5.3).
- Resourcing Strategy & Management (3.7).

Relevant Standards

- ISO 15686 - Buildings and constructed assets – Service life planning.
- Configuration Management Standard EIA649C.
- ISO 5500x Series – Asset Management.

3.6 Life cycle Value Realization

Definition

The activities undertaken by an organization to ensure the best total value from investments and benefits in different physical and non-physical asset acquisition, creation, operations, maintenance, improvements, renewals, and disposals across all asset life cycle stages.

Context

Life cycle Value Realization considers the interaction of life cycle activities to achieve the organisation's Asset Management objectives. The best value strategy often attempts to maximize future production or service levels at the lowest whole-of-life sustainable cost within risk tolerances, constraints, and stakeholder commitments.

Life cycle Value Realization would typically include:

- Identification and evaluation of options across asset life to support better investment decisions tailored for complexity of new, upgraded, repurposed, divestment and rationalization of owned or managed assets.
- A value framework containing measures of financial and non-financial value drivers aligned to stakeholder requirements, organizational values, and Asset Management objectives.
- Good stewardship to drive robust evaluation methods, modelling scenarios and constraints to determine whether the life cycle value solution will deliver the requirements expected by stakeholders while considering competition for resources across the organization.
- A multi-disciplinary approach with clear criteria across appropriate time horizon for qualifying and quantification value, direct and indirect intervention costs, risks, performance, customer service levels, sustainability and environment, social and corporate governance objectives, with financial investment and asset depreciation.
- A benefit tracking and monitoring system provides assurance that the activities execution and performance measures achieve the stated objectives of the life cycle strategies, objectives, and plans, or identify risks to be managed.

Artefacts

- Value Framework.
- Criteria for decision-making.
- Life cycle Value Analysis processes and application criteria.
- Life cycle Strategies (initiatives) and Objectives (measures).

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Demand Analysis (3.2).
- Planning (3.4).
- Decision-making (3.5).

Relevant Standards

- None.

3.7 Resourcing Strategy and Management

Definition

Determining the strategies, management of activities and processes to be undertaken by an organization to engage people (internal and external), acquire and use assets (e.g., tools, equipment), materials and services to deliver its Asset Management Objectives and Asset Management Plans.

Context

Resourcing strategy and management typically includes the analysis and planning necessary to determine the best way to establish, or procure, the resources required to deliver life cycle activities. These are necessary to create, manage, maintain, and enforce contract and supplier management over the entire life cycle of an asset, and take total cost of ownership into consideration. Resourcing strategy management considers the full supply chain including authoring, negotiations, adoption, definition of requirements, appraisal/selection of contractors, outsourcing-insourcing strategies, inventory and claim management. The processes used should be fair, equitable and legal and should also align with corporate standards, procedures, operating procedures, and legislation to ensure that negotiated savings reach the bottom line. Implementing resourcing strategy requires management of funds, personnel, facilities, tools, and materials in delivering Asset Management activities within a defined schedule.

Managing the resources required for the execution of each Asset Management activity includes:

- Financial budgeting and management.
- Pricing strategies, either price-based strategies such as lump sum, bill of quantities, pricelist/price schedule or activity schedule strategies, or cost-based strategies such as cost reimbursable or target cost strategies.
- Identification of critical spares, equipment, and materials.
- Spare parts, special tools, and equipment procurement, storing and warehouse management.
- Delivery arrangements that range from full internal provision, contracting for goods and services, partnerships, and shared services, to full outsourcing.
- Diversity, equity and inclusion considerations or requirements in selection of suppliers.
- Standardized contracted Asset Management, maintenance services.
- OEM & supplier commitment, partnering and management.
- External and internal audit controls and procedures.
- Application of risk assessment and management related to resources.
- People resource management.

An outcome of the Resourcing Strategy should be a fully developed and agreed plan for the necessary resources to deliver the life cycle strategies (both capital and operational) as defined in the Asset Management Plans.

Artefacts

- Procurement or supply chain management policy, procedures, and plans.
- Outsourcing- insourcing policy.
- Supplier management including selection and assessment criteria.
- Service Level Specifications.
- Supplier database and contracts.
- Materials management strategy (Stock and Non-Stock).
- Inventory records and materials/component catalogue.
- Resourced operations, maintenance, and project plans.
- Organisational structure, job specifications and labor agreements.
- Training matrix and competency record retention strategy.
- Management of Change (MoC).
- Internal and external audit assessment reports.

Related Subjects

- Planning (3.4).
- Asset Creation & Acquisition (6.2).
- Maintenance Delivery (6.5).
- Systems Engineering (6.1).
- Integrated Reliability (6.3).
- Asset Management Data & Information Management (5.3).
- Decision-Making (3.5).
- Configuration Management (5.5).
- Competence Management (4.4).
- Asset Management Leadership (4.1).

Relevant Standards

- ISO 5500x Series – Asset Management.
- ISO 10845:1-8 Construction Procurement Collection 2020.
- ISO 28000/1/2/3/4 - Specification for security management systems for the supply chain.
- ISO 10007 - Configuration Management.
- ISO 21500 series - Guidance on Project Management.
- GFMAM Maintenance Framework.

3.8 Shutdown and Outage Strategy and Planning

Definition

An organisation's processes for the identification, planning, scheduling, execution, and control of work related to shutdowns, turnarounds, or outages (STOs). Definitions vary across industries and organizations but generally involve lengthy planned production stoppages or reduction in operations to perform maintenance in the case of shutdowns, and refurbishment, refitting, rebuild, or upgrading in the case of turnarounds. Outages are generally unplanned interruptions of shorter duration due to factors such as power supply interruptions or equipment failures. An STO event is measured as the period commencing from safe system shut down, hand-over for maintenance, isolation, performing the required work, system hand back to operations, to safe system start-up and restoration of required service levels. In some industries, this may also require certification before hand-back to operation, and recalibration to a larger system or network.

Context

STO strategy and management involves an impact analysis, the development of strategy, policies, objectives, actions, processes, scope requirements, work packages, resourcing arrangements and approvals, and management of events that ensure effective management and alignment to the organisation's business continuity management. The strategy needs to find the optimum trade-off between the efficiencies of fewer but more extended shutdowns or outages that have a higher impact on production against more but shorter shutdowns or outages that have less impact on the organization but result in less efficient delivery of work.

The planning and management activities within the scope of this subject include:

- Impact analysis and planning for all stakeholders and the environment.
- Development of STO strategy, objectives, and policies.
- Risk and contingency planning for catastrophic or costly issues occurring during the process.
- Asset infrastructure and business continuity planning.
- Development of STO management processes.
- Project Management best practices, scope and work package formulation, and application of critical path planning.
- Approval processes to undertake the shutdown inclusive of internal approvals and regulatory approvals.
- Communications to internal and external stakeholders affected.
- Post STO-event appraisal and improvement planning.

Artifacts

- STO strategy, policies, procedures, and checklists.
- STO work breakdown structure, work packages, schedule, resource plans and budgets.
- Risk management plan.
- Communications plan.
- Level of authorities in the organization for every stage of the shutdown or outage.
- Documented acceptance criteria.
- Management of Change (MOC) documentation.
- Post-completion reports, and review and audit documentation.

Related Subjects

- Planning (3.4).
- Resourcing Strategy and Management (3.7).
- Maintenance Delivery (6.5).
- Configuration Management (5.5).

Relevant Standards

- ISO 21500 Series: Guidance on Project Management.
- ISO 10007: Configuration Management.
- GFMAM Maintenance Framework.
- ISO 10006 Guidelines for Quality Management in Projects.

3.9 Contingency Planning & Resilience Analysis

Definition

Contingency planning refers to the policies, plans, processes, and systems established by an organization to respond and recover from a hazard event, crisis, or disaster. This includes ensuring continuity of critical organizational functions, services, and assets during the crisis, as well as resumption of normal operations thereafter. Contingency planning is informed by the outcomes of both conventional risk management processes and resilience analysis.

Resilience analysis is a risk-based process that assesses the ability of organizations and assets to withstand disruption and disturbance, deal with crisis, adapt to changing conditions and to prosper in the longer term. There are two equally important dimensions of resilience. Asset resilience refers to the ability of the asset or physical system to perform to an acceptable level during an event. Organisational resilience refers to the ability of an organization to plan, manage, respond, and recover from an event to achieve the desired resilient outcomes.

Context

A hazard is a potential adverse natural or human-induced physical event or trend that may result in business closure, injury or other health impacts, loss of life, damage and loss to property, infrastructure, service provision, ecosystems, and environmental assets. Potential hazards both proliferate and become more complex and drive the need for improved resilience. They tend to be extreme events and may include, and be exacerbated by pandemics, disruptive technologies, increasing levels of interdependent infrastructure systems, terrorist attacks, cyber-attacks, climate change and more frequent natural disasters of greater severity, global financial shocks and large-scale disruption of supply chain systems, and higher levels of customer expectations.

Risk management approaches often overlook events that are unpredictable or that have a low probability of occurrence coupled with high consequence. Resilience analysis supplements standard risk management frameworks and aims to identify these unpredictable or low probability/high consequence events so that mitigation processes and measures can be implemented to deal with these.

Resilience analysis can include, depending on the nature of the hazard, the complexity of asset systems, operating environment, and other factors such as:

- Identification of critical customers, processes, and assets, to determine minimum levels of service requirements for these.
- Assessment of the consequences of hazards in terms of service disruption

and other economic, social, and environmental impacts. This could be done by assessing all the hazards or by assessing the consequences for a particular type of hazard.

- Determining current levels of vulnerability or resilience of assets or asset systems, considering factors such as assets' design parameters and ability to withstand shocks, asset redundancy, system modularity and the interconnectedness of infrastructure systems.
- Determining current levels of organizational resilience and ability to deal with and recover from shocks, whether the organisation's leadership and culture is suitably agile and adaptable to deal with hazards, and the systems, processes, and relationships in place to deal with contingencies.
- With consideration of the needs of critical customers, other customers, and assets, determine appropriate levels of resilience during the crisis or emergency response as well as asset system or business recovery phases.
- Develop strategies, actions, and plans to meet the requirements of resilient levels of services.

Contingency plans, also referred to as business continuity plans, include crisis management plans, disaster management plans or emergency response plans, and depending on context, other factors such as:

- Identification of critical services, functions, and assets.
- Identification and classification of hazardous events, crises, incidents and disasters by type and the strategies and actions for responding to these, based on prepared and tested scenarios.
- Strategies and planned actions that should, as appropriate, deal with emergency responses, crisis management, asset system recovery, business recovery, and business resumption.
- Establishing the level of command and the person in charge of each event type, inclusive of responsibilities and authorities, as well as escalation processes defining changes in structures, communication and reporting lines as an incident escalates.
- Identifying other support organizations with their specified responsibilities, needed for each type of event (or phase of an event).
- Reference to all needed contacts required during all scenarios.

Contingency plans should be formally approved by senior management and communicated and coordinated with stakeholders including customers, suppliers and other crisis or disaster management agencies as appropriate. Contingency planning is a continuous process of implementation, review, testing and updating or improvement. Personnel responsible for the management of contingencies must be periodically trained and responses tested to ensure preparedness. Contingency planning also requires identification and responses to new hazard types as the organisation's operating environment changes and evolves.

Following the realization of a hazard event, the organization should undertake an appraisal of the event, its impact, the effectiveness of the organisation's ability to adequately respond to the event, and improvement needs.

Artefacts

- Documentation of types of hazards.
- Documented asset criticality assessment, including assessment of asset vulnerability or resilience.
- Documentation on critical customers and minimum service requirements.
- Capital plans to reduce asset vulnerability.
- A documented and approved contingency plan.
- Approved and signed agreements between all parties and expectations during hazard events.
- A responsibility matrix and escalation policy.
- Reference to asset operating procedures.
- Evidence of implementation of contingency plans, including regular review, training of, and testing of preparedness of contingency response teams.
- Post hazard event appraisal and improvement plans.

Related Subjects

- Incident Management and Response (6.6).
- Risk (2.6).
- Decision-Making (3.5).
- Systems Engineering (6.1).

Relevant Standards

- ISO 5500x Series – Asset Management.
- ISO 22301: Business Continuity Management System.

4 Leadership and People

The people-related subjects, including AM leadership, resourcing, and competence, that inform an organization's culture. Asset Management Leadership

4.1 Asset Management Leadership

Definition

Asset Management leadership is required to promote a whole Life Asset Management approach to delivering Organisational Strategic Plans and Asset Management objectives.

Context

Leaders motivate their teams towards the successful completion of objectives by communicating established interpretations, sharing knowledge and skills to encouraging teamwork and leading by example.

Leadership competencies and skills include emotional intelligence, resilience, and effective communication. Asset Management leaders also need to take a transformation approach to encourage creativity and innovative thinking. Transformational leaders inspire and motivate people to embrace positive change and to continually improve the organisation’s Asset Management system.

Leadership can be assigned, via a role in an organization, or assumed, by an individual wanting to add value to their organization. On that basis, all members of an organization could have some degree of Asset Management leadership. However, people will naturally look to senior management for commitment in delivering Asset Management objectives that support and enhance their own leadership responsibilities.

Effective Asset Management leaders drive an Asset Management culture and supporting behaviors by engaging with people. They manage the continuity of competence and talent with a view to achieving Asset Management objectives. They also understand generational intelligence and recognize that there may be different approaches to work across the generations within their organization.

For Asset Management to be successfully established, operate, and continuously improve, employees need to understand the objectives, and their role in achieving them. This requires leadership commitment from all levels of the organisation’s management.

Leadership enables teamwork to be translated into planned results and the achievement of excellence. Sustainability of Asset Management has clear alignment between the organisation's strategic plans and the Asset Management activities delivered by employees. This alignment provides assurance that everybody understands how they contribute to achieve success in Asset Management.

Leadership commitment is required to develop the organization based on the effort and competencies required to meet the needs of the organization and remove the barriers to effective Asset Management.

Artefacts

- Asset Management Policy.
- Organization Chart.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Organizational Arrangements (4.2).
- Organizational Culture (4.3).
- Life Cycle Value realization (3.6).
- Asset Management Data & Information Management (5.3).
- Decision-Making (3.5).
- Organizational Change Management (4.5).
- Asset Management Policy (2.1).
- Competence Management (4.4).
- Knowledge Management (4.6).

Relevant Standards

- ISO 5500x Series – Asset Management.

4.2 Organisational Arrangements

Definition

Describes how an organization is arranged to facilitate an effective Asset Management culture and to acknowledge how Asset Management roles and responsibilities contribute to the achievement of Asset Management objectives.

Context

The ability of an organization to achieve its Asset Management objectives can be enhanced by leadership acknowledging and understanding how each role within the organization contributes to successful outcomes. The way the organization is then arranged, by way of structure, responsibilities, and lines of communication, will influence Asset Management culture, performance, and effectiveness.

Leadership may consider different types of organizational structures to achieve these outcomes. Organisational structures may look different depending on aspects such as:

- Cultural and social norms.
- Ownership structure – private, government, or listed company.
- Type of industry – products or services.
- Regulatory requirements.
- Maturity of the organization – startup or established.
- Global span – regional site, single country, or multinational.

Regardless of the organizational structure, the organizational arrangements should provide alignment to Asset Management objectives and clarity of purpose and responsibility for all roles and/or reporting lines. This should enable relevant information to flow through the organization to facilitate high performance outcomes and accountability.

The arrangements made should consider how they will affect the organisation's ability to shape Asset Management culture, manage competencies, capture, and share knowledge and manage change.

Artefacts

- Asset Management roles and responsibilities including organizational chart.
- Position or Job.
- Responsible, Accountable, Consulted and Informed Charts (RACI Charts).
- Organisational Values.
- Code of Conduct.

Related Subjects

- Asset Management Strategy and Objectives (3.1).
- Resourcing Strategy & Management (3.7).
- Asset Management Leadership (4.1).
- Organizational Culture (4.3).
- Competence Management (4.4).

Relevant Standards

- ISO 5500x Series – Asset Management.

4.3 Organisational Culture

Definition

Culture as it pertains to an organization is how its people think and behave in response to the organisation's vision, mission, values as well as the documented and undocumented rules, including social norms. Culture as it pertains to an organisation's Asset Management system is the processes that people follow to achieve Asset Management objectives.

Context

An organization with no clear vision, mission, and values, will likely result in an Asset Management system with no clear Asset Management objectives and will foster a reactive Asset Management culture. Consequently, organizations should establish and implement rules and processes to create a culture that supports the achievement of their Asset Management objectives.

Organisational culture is an indicator of Asset Management maturity and reflective of its leadership style. Understanding that culture is a factor which guides, influences, and shapes behavior and is crucial to achieving organizational and Asset Management objectives.

Leadership styles, demographic composition, Asset Management processes and various other factors influence the organizational culture. Measurements strongly influence behavior; therefore, a performance management system plays an important role in reinforcing the desired behaviors.

Culture should not be stagnant, it should evolve. The culture of the organization needs to be regenerative and to embrace the positives emerging from newer and less experienced employees as well as professionals coming from different technical backgrounds and with different vocational experiences. It is important to promote a lifelong learning culture that encourages diversity of thought, equity, and inclusion.

To facilitate Asset Management co-ordination, the organizations that are coming from a culture of silos to a regenerative and unified culture. Breaking down organizational silos facilitates a culture that assists the successful implementation of an Asset Management system. A unified culture allows for collaboration across all organizational units and disciplines to meet increasing, and changing demands, and to ensure sustainable Asset Management strategies.

There is more than one type of culture, what is important is that the culture aligns to organizational objectives and ensures that they are achieved. Fundamentally a culture of stewardship and collaboration has a positive impact on achievement of objectives.

Artefacts

- Organisational Strategy.
- Asset Management Maturity Assessment Reports.
- Audit Reports.
- Management Review Reports.
- Employee Surveys.
- Change Management Plan.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Asset Management System (2.2).
- Asset Management Leadership (4.1).
- Organizational Arrangements (4.2).
- Organizational Change Management (4.5).
- Asset Management Assurance and Audit (2.3).
- Outcomes & Impacts (7.1).

Relevant Standards

- None.

4.4 Competence management

Definition

The processes used by an organization to define, develop, and maintain an adequate supply of competent and motivated people who understand how to perform the activities needed to achieve its Asset Management objectives. This should include arrangements for managing competence from the boardroom to the workplace.

Context

Competence management is about managing the ability of individuals in Asset Management roles to ensure they perform their work activities effectively and as required. This calls for a mix of practical Asset Management experience and skills underpinned by knowledge and understanding relevant to the activity being carried out. These requirements are strongly influenced by the organizational arrangements and individual behaviors. Asset Management is multidisciplinary and cross functional, requiring people who can work effectively in multidisciplinary teams, and are open to evidence, methodologies and approaches used by people with different experiences and knowledge and to integrate and interpret these into decision-making.

A strategic approach to managing competence and behavior should cover the development of both individual and organizational competence. There are three central competencies (technical, behavioral, and work values) required that span a wide range of disciplines including engineering, finance, operations, maintenance, reliability, information systems, management, contract and supplier management, human resources, and organizational development.

The precise mix of competences that people and organizations need depends on their objectives, the context, and the circumstances they are operating in. Bringing these together to form coherent and effective Asset Management teams should be a central component of Asset Management strategy and planning.

Competencies can be gained through various means including but not limited to education, training, certification and on the job experience. A flexible organizational culture will embrace the increasingly diverse range of qualifications people are bringing to Asset Management, leveraging differences to positively influence achievement of Asset Management objectives.

As organizational Asset Management goals and objectives evolve, competencies must be managed to ensure alignment with the organisation's objectives. As such, individual competencies should be reassessed, and new competencies identified and gained. Typically, competencies are brought together in a human resources framework which is tailored to the organization or occupational group with consideration of progression path and career growth and budgeted appropriately.

Artefacts

- Competence Framework.
- Competence Assessment Processes.
- Training Needs Analysis.
- Training Course Specifications.
- Recognized qualifications.

Related Subjects

- Asset Management Leadership (4.1).
- Organizational Arrangements (4.2).
- Organizational Change Management (4.5).
- Asset Management Strategy & Objectives (3.1).
- Organizational Culture (4.3).
- Resourcing Strategy & Management (3.7).
- Knowledge Management (4.6).

Relevant Standards

- ISO 5500x Series – Asset Management.

4.5 Organisational change management

Definition

Organisational change management is a structured approach for managing the people side of change. It supports individuals through changes to Asset Management processes, technology, organizational alignment, and culture, with planning, implementation, communication, and sustainment of change to achieve the desired outcome.

Context

Increasing maturity of assessment management practices will involve changes that impact the wider organization. Organisational change management activities include change readiness, communications, training, resistance management, reinforcement, and feedback.

Successful organizational change management considers the following elements:

- An organizational change plan that considers known and unexpected events, including the documenting of objectives and the means to achieve them.
- An appropriate governance structure, with roles, responsibilities, and accountabilities.
- Ongoing commitment for organizational change by leadership across the organization to guide organizational behavior.
- Stakeholder participation should be encouraged through open, consultative, and continuous communication to create understanding of the organizational change.
- The human impacts of organizational change should be identified to align the workforce in support of change. Organisational culture should be considered when assessing the human impacts.

For individuals subject to change it is important that organizational change begins with understanding why it is occurring. Staff will likely engage and participate in organizational change when they understand the positive impacts of the changes.

Organisational change requires training and coaching for staff on new processes, tools, and skills to gain the knowledge required to adapt successfully. This enables staff to develop capabilities to implement change through demonstrated behaviors or performance.

Strategies may need to be developed to overcome resistance to change including identifying short term gains that can help accelerate change. Sustainable organizational change requires leadership commitment, effective communication, and reinforcement.

Artefacts

- Organisational change management plan.
- Stakeholder analysis.
- Stakeholder engagement plan.
- Communication plan.
- Training plan.
- Organisational change communications.

Related Subjects

- Asset Management Leadership (4.1).
- Asset Management Strategy & Objectives (3.1).
- Organizational Arrangements (4.2).
- Organizational Culture (4.3).
- Competence Management (4.4).
- Management of Change (2.5).
- Knowledge Management (4.6).

Relevant Standards

- ISO 5500x Series – Asset Management.

4.6 Knowledge Management

Definition

Knowledge management in Asset Management refers to the dynamic process of identifying, capturing, organizing, and retaining knowledge, transforming tacit knowledge into explicit knowledge through socialization, externalization, combination, and internalization.

Context

The shared explicit knowledge about assets and their management enables informed, evidence-based, and timely decisions, resulting in improvements in the overall efficiency of equipment and processes throughout their life cycle.

Treating knowledge management as a process promotes a culture of collaboration and sharing, facilitating the transfer of knowledge among leaders, teams, and other internal and external stakeholders. This reduces dependence on key individuals and mitigates risks associated with Asset Management and performance due to the loss of knowledge.

To implement knowledge management effectively, it is crucial to identify, and map critical knowledge related to assets, the management system, and Asset Management. Subsequently, it is important to identify the individuals who possess this knowledge, which should be externalized or shared, making it explicit through records or other documentation.

Once retained, this knowledge should be used to stimulate learning and innovation, enabling the conversion of individual explicit knowledge into shared explicit knowledge. Knowledge is dynamic, and as assets and technologies evolve and people and structures change, it is essential to establish regular practices for reviewing and updating knowledge and keeping it relevant.

The effectiveness of knowledge management in Asset Management can be assessed through relevant indicators that demonstrate how retained knowledge is being used in decision-making to ensure sustainable Asset Management and its results over time, mitigating associated risks and costs.

Leadership plays a crucial role in promoting the importance of knowledge management, which is interconnected with various other organizational features including culture, competency management and change management. Organisational culture should support and encourage knowledge sharing, creating an environment conducive to learning and collaboration.

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Artefacts

- Knowledge Management Strategy.
- Knowledge Management Processes.
- Critical Knowledge List.
- Succession Plan.
- Change Management Plan.

Related Subjects

- Asset Management Leadership (4.1).
- Organizational Culture (4.3).
- Competence Management (4.4).
- Organizational Change Management (4.5).
- Asset Management Strategy and Objectives (3.1).
- Planning (3.4).
- Risk (2.6).
- Asset Management Data & Information Strategy (5.1).
- Configuration Management (5.5).
- Asset Management Assurance & Audit (2.3).
- Management of Change (2.5).
- Outcomes Realization (7.1).
- Asset Management System (2.2).

Relevant Standards

- ISO 5500x Series – Asset Management.
- ISO 30401.

5 Data and Information

The information-related subjects applicable to AM. This includes how information is managed as an asset and the importance to AM decision making.

5.1 Asset Management Data & Information Strategy

Definition

The strategic approach to the definition, collection, management, disposal, analysis, reporting and overall governance of Asset Management data and information necessary to support the implementation of an organisation's Asset Management strategy and objectives.

Context

An Asset Management Data & Information Strategy describes how Asset Management data and information supports the delivery of the Asset Management Strategy and objectives, and what Asset Management Data and Information Systems and governance processes are necessary to acquire, maintain, and utilize data and information. An Asset Management Data and Information Strategy can be used to support business cases for improvement in data and information capture, technology, and software investment as part of a broader digital strategy to keep pace with emerging methods for Asset Management data and information use. The Asset Management Data and Information Strategy should be developed in alignment with an organisation’s data, information and digital policies and strategies. These would typically include:

- An asset data and information model aligned to organizational standards that serves as a framework for the integration of asset data and information analysis and system interoperability across the asset portfolio and the organization.
- The identification of data and information requirements necessary to support the organisation’s processes, including opportunities to standardize systems for greater efficiencies for existing and future requirements.
- The identification of asset data and information requirements to support the organisation’s analysis, decision-making and operational processes including achieving data quality requirements.
- Consideration and monitoring of emerging technologies such as digital twins, artificial intelligence, and predictive analysis.
- An analysis of the value provided by data and information requirements, including consideration of data quality requirements, in alignment with Asset Management and organizational objectives.
- Responsibilities and accountabilities for data and information management at a strategic level, including security, ethical governance, and responsible use of data.

- Processes for continued alignment of these requirements to the Asset Management objectives as the organisation's requirements evolve.
- A gap analysis of current data and information availability, management practices, and data and information flows against requirements, including consideration of data quality requirements.
- The identification of risks related to cyber security controls for Asset Management data and information and processes to control these risks in accordance with the organisation's cyber security strategy and policies.
- A description of the organisation's Asset Management data and information improvement programs.

Artefacts

- Asset Management Data & Information Strategy.
- Asset Management Data & Information Strategy Roadmap.
- Asset Information Models.
- Cyber security strategy and policy.
- Data and information policy.
- Digital strategy.

Related Subjects

- Organizational Purpose & Context (1.1).
- Asset Management Data & Information Standards (5.2).
- Asset Management Data & Information Management (5.3).
- Configuration Management (5.5).
- Asset Management Data & Information Systems (5.4).
- Asset Management Strategy & Objectives (3.1).
- Risk (2.6).

Relevant Standards

- ISO 27000 Information technology — Security techniques — Information security management systems — Overview and vocabulary.
- ISO 19650 - Building Information Modelling (BIM).
- ISO 8000 Data quality.

5.2 Asset Management Data & Information Standards

Definition

The specification of a consistent structure and format for the acquisition, maintenance and use of data and information required to support an organisation's activities, including defining and reporting on its purpose, value to the organization, and its quality to ensure it is always fit for purpose.

Context

Asset Management Data & Information Standards include the development of standards, specifications and guidance documents which are aligned to the organisation's Asset Management Data & Information Strategy. This ensures a consistent approach to the acquisition, maintenance, use and disposal of data and information across internal and external stakeholders and interoperability between Asset Management Data & Information Systems. A standardized approach supports the use of data driven technologies and enables data driven decision-making. Information Standards include defining methods for recording, securing, and managing the quality of all types of data. They typically include:

- Asset classification, naming and delineation data.
- Metadata for configuration management.
- Asset defect and performance data.
- Geospatial and physical location data.
- Financial and accounting data.
- Legal, regulatory, and local jurisdictional data.
- Asset utilization data.
- Asset risk data.
- Operational status and performance data.
- Environmental data.

Artefacts

- Organisational Data & Information Requirements.
- Asset Data & Information Standards and Guidelines.
- Asset Data Dictionary.
- Data Quality Definitions and Guidelines.
- Project Specific Data & Information Requirements.
- Data Schemas.

Related Subjects

- Asset Management Data & Information Strategy (5.1).
- Asset Management Data & Information Management (5.3).
- Configuration Management (5.5).
- Asset Management Data & Information Systems (5.4).

Relevant Standards

- ISO 27000 Information technology — Security techniques — Information security management systems — Overview and vocabulary.
- ISO 19650 - Building Information Modelling (BIM).
- ISO 8000 Data quality.

5.3 Asset Management Data & Information Management

Definition

The processes required for the management and governance of all Asset Management data and information.

Context

Asset Management Data and Information Management includes the work processes and procedures related to treatment of data and information as an asset, including data governance and security over the life cycle of the data and information. Asset Management Data and Information Management processes apply to data-driven analytical models used within the organisation's Asset Management Data and Information Systems to support data-driven decisions. Asset Management Data and Information Management includes consideration of the following:

- The treatment of data and information as an asset with data ownership and stewardship responsibilities defined across each stage of the data and information life cycle.
- The identification of competency requirements and control of risks related to the governance and life cycle management of data-driven processes and analysis.
- User-experience and data sharing requirements throughout the data and information life cycle - from data creation and acquisition through maintenance, use, record retention, and data disposal.
- Access to information requirements, security protocols including data privacy constraints for data and information sharing with internal and external stakeholders, document and content management, regulatory requirements, and record retention processes.
- Control of data quality risks related to configuration management, management of change, and effective data transitions between stages of the asset life cycle.
- Process is inclusive of both master and reference data and transactional and historical data and could include use of metadata enrichment practices.
- Assurance processes to ensure consistency with the asset information standards, cyber security requirements, and data and information access requirements.

Artefacts

- Data management processes and procedures.
- Data governance policy and procedures.
- Data stewardship roles and responsibilities.
- Data assurance and audit reports.
- Records Retention Policy.

Related Subjects

- Asset Management Data & Information Strategy (5.1).
- Asset Management Data & Information Standards (5.2).
- Configuration Management (5.5).
- Asset Management Data & Information Systems (5.4).

Relevant Standards

- GFMAM Maintenance Framework.
- ISO 5500x Series – Asset Management.
- ISO 27000 Information technology — Security techniques — Information security management systems — Overview and vocabulary.
- ISO 8000 Data quality.
- ISO 19650 - Building Information Modelling (BIM).

5.4 Asset Management Data & Information Systems

Definition

Asset Management Data & Information Systems support Asset Management activities and decision-making processes in accordance with the Asset Information Strategy and in support of all Asset Management processes in the GFMAM Asset Management Landscape.

Context

Asset Management Data and Information Systems include the acquisition, maintenance, use and disposal of all data and information systems necessary to deliver asset information requirements defined in the Asset Management Data and Information Strategy. These support Asset Management objectives and organizational strategy. The holistic nature of Asset Management requires integration and interoperability across multiple asset information systems. They should integrate across functional areas, the asset life cycle, and internal and external stakeholder systems. Asset Management Data and Information Systems include consideration of the following:

- The asset information systems, common data environment, and interoperable architecture necessary to deliver the information system requirements defined in the Asset Management Data & Information Strategy.
- Alignment of Asset Management Data and Information System requirements to the organisation's digital strategies.
- Periodic review of system utilization to identify opportunities for emerging technologies to make processes more efficient or disrupt existing processes.
- Consideration of the usability of data and information systems, including user experience for workplace diversity, and data and analytical literacy skills.
- Analysis of the value of data and information and the costs and benefits of implementing and maintaining Asset Management Data & Information Systems to meet the organisation's requirements.
- Asset Management Data and Information Systems implementation plan including governance arrangements.
- An Asset Management Data and Information Systems migration plan to move from the current systems to the required architecture.
- A life cycle management plan for the data and information systems.
- Clearly defined system roles, responsibility, ownership, and governance processes.

- An assessment of internal, external, deliberate, and accidental data and information security risks and the development of a data and Information Security Management Plan that addresses mitigation actions, applicable standards, response protocols, remediation processes, and competence requirements.

Artefacts

- Data and Information Systems Architecture.
- Data and Information Systems Strategy and Business Cases.
- Data and Information Systems Implementation and Migration Plan.
- Data and Information Systems governance and ownership arrangements.
- Data and Information Systems Life cycle Management Plan.
- Data and Information Security Management Plan.

Related Subjects

- Asset Management Data and Information Strategy (5.1).
- Asset Management Data and Information Standards (5.2).
- Asset Management Data and Information Management (5.3).
- Configuration Management (5.5).

Relevant Standards

- ISO 27000 Information technology — Security techniques — Information security management systems — Overview and vocabulary.
- ISO 9001 Quality management.
- ISO 19650 - Building Information Modelling (BIM).

5.5 Configuration Management

Definition

A management process for establishing and maintaining consistency of an asset's physical and functional attributes with its design and operational information throughout its life cycle. Configuration management provides knowledge of the current configuration of an asset and the relationship between that asset and the information relevant to its function within a system.

Context

Configuration Management describes policies and processes for the identification, recording and monitoring, and information models for the management, of an asset's functional and physical status. Configuration Management typically includes:

- Identifying configuration management requirements for the management of master and reference data, including the recording and retention of historical data.
- Defining roles and responsibilities associated with implementing configuration change and its communication across internal and external stakeholders (both physical change and corresponding documentation and information).
- The development of configuration management policies and processes, including assurance processes.
- Consideration of the impact of physical configuration change on the operation of a system, including controls that are in place to execute configuration change.
- Maintaining up-to-date records of current and past configuration states.

Artefacts

- Configuration Item Register.
- Configuration Management Plan, Strategies and Records.
- Configuration Baselines and Baseline Agreements.
- Configuration Management Change and Variance Requests.
- Configuration Status and Evaluation Reports.
- System Release Reports and Approvals.
- Asset Data and Information Models.

Related Subjects

- Systems Engineering (6.1).
- Asset Management Data & Information Strategy (5.1).
- Asset Management Data & Information Standards (5.2).
- Asset Management Data & Information Management (5.3).
- Asset Management Data & Information Systems (5.4).
- Management of Change (2.5).

Standards

- ISO 10007 Guidelines for configuration management.
- SAE EIA-649-C Configuration Management Standard.
- ISO 19650 - Building Information Modelling (BIM).

6 Delivery

The subjects relating to Life cycle delivery of AM

6.1 Systems Engineering

Definition

Systems Engineering is an interdisciplinary, collaborative approach to derive, evolve, and verify a whole life cycle balanced system solution which satisfies stakeholder expectations and meets organizational outcomes and targets. Systems Engineering enables an assurance function and considers holistic requirements with consideration for technical system and sub-system level, and associated interoperability.

Context

Systems Engineering describes policies and processes for the requirements analysis, design, verification and validation strategies for system integration and interfaces from technical and non-technical system interactions for internal and external stakeholder. Systems Engineering processes also relate to managerial and technical activities with verification and validation being a critical element to assure that operational requirements are addressed appropriately across the whole asset life cycle. Systems Engineering considers the importance of master data and the requirements of up to date and accurate technical information.

The implementation of requirements analysis within Systems Engineering involves breaking down of the system and sub-system to a technical systems design, understanding the interactions, and any organizational requirements (concept of operations) that will be confirmed in the commissioning phase. Systems Engineering is a continuous process that relies on application of risk management and assurance practices across and between all phases of the asset life cycle.

Artifacts

- Systems Engineering Management Plan.
- System Description and documented Interface and Interoperability.
- System Requirements Documents.
- System Engineering Performance Measures.
- System Analysis Plan and Reporting.
- Documented Systems Engineering Processes and Standards.
- Design deliverables.
- Verification and Validation Strategy and Testing.
- Organizational Requirements or Concept of Operations.
- Transition/Handover documents.

- Mobilization Plans.

Related Subjects

- Asset Creation & Acquisition (6.2).
- Configuration Management (5.5).
- Management of Change (2.5).
- Integrated Reliability (6.3).
- Maintenance Delivery (6.5).
- Asset Operations (6.4).
- Asset Repurposing & Disposal (6.7).
- Risk (2.6).

Relevant Standards

- GFMAM Maintenance Framework.
- ISO 10007 - Configuration Management.
- ISO/IEC 15288 - Systems & Software Engineering.
- ISO 21500 series - Guidance on Project Management.
- ISO 31000 – Risk Management.

6.2 Asset Creation & Acquisition

Definition

Asset Creation and Acquisition encompasses activities during the planning, acquisition, design, supply, change management, manufacturing, installation, and commissioning of assets and related systems as well as the transition through the stages of the asset life cycle.

Context

Asset Creation and Acquisition is the stage in an asset life cycle where the organization decides on the specifications and required outputs of an asset to deliver against requirements, Asset Management objectives, and the capability of an asset across the life cycle. This subject describes policies and processes for the planning, acquisition, installation, commissioning, life cycle operations and maintenance, asset renewal, replacement, upgrading, repurposing, decommissioning, and retirement of assets. It also includes elements of funding, arrangements for hand-over to operations, process status reporting, the monitoring and capture of actual costs and benefits analysis. It is critical to understand all system integration and interfaces from a technical and non-technical point of view and how any requirements (concept of operations) have been confirmed.

The asset owner should understand the asset's whole of life costs, financial management of the asset, future maintenance requirements ensuring maintainability and reliability requirements and possibly future upgrades or obsolescence concerns of major systems and how this would be achieved.

Artefacts

- Acquisition Strategy.
- Acquisition Agreement.
- Asset information records.
- Asset Registers and As-Built documentation.

Related Subjects

- Planning (3.4).
- Asset Costing and Valuation (1.3).
- Maintenance Delivery (6.5).
- Asset Operations (6.4).
- Integrated Reliability (6.3).
- Configuration Management (5.5).
- Systems Engineering (6.1).
- Decision-Making (3.5).
- Demand Analysis (3.2).

Relevant Standards

- GFMAM Maintenance Framework.
- ISO 10007 - Configuration Management.
- ISO/IEC 15288 - Systems & Software Engineering.

6.3 Integrated Reliability

Definition

The reliability of an asset or system is its ability to perform and operate as intended for its projected life cycle, in a specific environment or under certain conditions.

Integrated Reliability is a holistic collection of policies, principles, processes, and systems used to deliver, monitor, and improve reliability, Asset Management and life cycle delivery activities towards a system or asset. It is an approach that applies engineering principles and techniques to identify and mitigate potential failure modes, minimize downtime, and optimize performance throughout the whole life cycle.

Context

Reliability is an approach that applies reliability principles, methods, and techniques to minimize downtime, optimize asset performance, monitor asset health, and promote value throughout the asset's life cycle. Reliability approaches consider the asset's operating context, its capacity to produce the demonstrated asset performance and stakeholder expectations.

Integrated Reliability deploys, develops, and designs policies, procedures, processes to support reliability, availability, and maintainability. The organization should identify and develop Asset Management strategy programs to manage the consequences of failure based on failure modes, operating context, criticality, risk and identified task effectiveness. It should also analyze maintenance, repair, operations (MRO) spares for criticality, redundancy, and required quantities. Integrated reliability also aims to identify, track, and monitor asset technical or process changes to improve reliability using a management of change (MOC) or the configuration management system. It should implement the specified reliability engineering processes, including the collection, analyzing and interpretation of data from these systems to support monitoring, reliability and continuous improvement of assets or systems. As well, it should measure asset performance to identify potential actions to improve asset reliability and health with relevant and appropriate techniques. Performance of root cause analysis of identified incidents related to asset failure to determine all factors, causes and potential corrective actions to mitigate future occurrences is also an important aspect of integrated reliability.

Artefacts

- Overall Production Functional Availability.
- Operational Performance Reporting.
- Asset Criticality and Risk.
- Spares Analysis.
- Standard Operating Procedures.
- System Design Specifications e.g., Operating Context.
- Asset Maintenance Strategy.
- Reliability Modelling.
- Root Cause Analysis.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Asset Management Data & Information Strategy (5.1).
- Monitoring (7.2).
- Maintenance Delivery (6.3).

Relevant Standards

- GFMAM Maintenance Framework.

6.4 Asset Operation

Definition

Asset Operations encompasses the policies, processes, procedures used by an organization to operate their assets and achieve Asset Management strategic objectives.

Context

Asset Operations provides a framework for communicating instructions on how to operate the assets within their design, maintenance, operational, reliability, safety, environmental and legal parameters.

Asset operations includes the development and management of a relevant asset operations strategy and supporting plans to define the approach, and resources required for operations to ensure that the asset and or asset system that:

- meets functional requirements.
- are operated within the required service level and operating parameters (as designed/specified).
- meet legal and technical requirements such as health, safety and environment, security, and reliability.
- achieve and sustain defined levels of physical, functional, and financial performance.
- provide rationale, data, and evidence for continuous improvement.

Artefacts

- Asset Operation Strategy.
- Asset Operations Plan.
- Standard Operating Practices and Procedures (SOPs).

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Planning (3.4).
- Resourcing Strategy and Management (3.7).
- Configuration Management (5.5).
- Management of Change (2.5).

Relevant Standards

- ISO5500X Series – Asset Management Standards.
- GFMAM Maintenance Framework.

6.5 Maintenance Delivery

Definition

Maintenance Delivery encompasses the management of maintenance work activities for tangible and intangible assets throughout their intended life cycle. This subject also considers the importance of asset data and information record keeping within the maintenance environment, and the periodic review of how asset maintenance strategies should be periodically reviewed and updated to reflect an asset's useful life and its criticality.

Context

Maintenance of assets is an integral function and value contributor to Asset Management. Maintenance delivery incorporates the maintenance work and management activities of identification, planning, scheduling, execution, and analysis. The specific asset maintenance strategies applied align to the asset life cycle stage, criticality, and risk within the operational function for an organization, the service the asset provides and the level of service to which it should be maintained, the asset's remaining useful life and its residual value. Maintenance strategies may change as the asset ages or if the operational context changes.

Shutdowns, turnarounds, and major outages are a significant maintenance delivery activity which has a strategic impact on the organizational capability to realize value. The effort to perform this aspect of maintenance delivery requires specific consideration for:

- Planning, scheduling, and an approval process for undertaking the shutdown, turnaround, or major outage.
- Communications with internal and external stakeholders.

Maintenance delivery contributes to organizational value through the balance of cost, risk, and performance. For asset intensive companies, the impact of maintenance delivery on their financial performance is significant.

Artifacts

- Asset Maintenance Plans.
- Maintenance strategies and actions.
- Maintenance Work Management policies and procedures.
- Shutdown, Turnaround, Major Outage Strategy.
- Production Forecast.

Related Subjects

- Resourcing Strategy & Management (3.7).
- Life cycle Value Realization (3.6).
- Decision-Making (3.5).
- Configuration Management (5.5).
- Management of Change (2.5).
- Competency Management (4.4).
- Asset Operations (6.5).
- Asset Management Data & Information Management (5.3).
- Shutdown and Outage Strategy& Planning (3.8).
- Integrated Reliability (6.3).
- Decision-Making (3.5).

Relevant Standards

- GFMAM Maintenance Framework.
- ISO 10007 - Configuration Management.

6.6 Incident Management and Response

Definition

Incident Management and Response is a structured approach for addressing incidents in a systematic manner, guided by the severity, risk or criticality of the incident. This a comprehensive approach that encompasses the entire incident life cycle, encompassing the stages of incident identification, escalation, reporting, response, investigation, remediation, and data gathering. This framework may draw upon pre-established contingency plans and resilience analysis documents. Its primary objectives are to safeguard the well-being of individuals, both on-site and in the broader community, ensure an effective response to protect the environment, to preserve assets, and to uphold the reputation of the organization.

Context

Incident management and response outlines the policies, plans and processes required for effective response, communication, coordination, and investigation, internally and where relevant, to the public and external regulatory bodies. They include organizational, legal, and regulatory obligations for response plans.

Artifacts

- Incident Management and Response Policy, Plans and Processes.
- Communication Plan.
- Risk Register.
- Status Reports.
- Post Incident Analysis.

Related Subjects

- Contingency Planning and Resilience (3.9).
- Integrated Reliability (6.3).
- Systems Engineering (6.1).

Relevant Standards

- GFMAM Maintenance Framework.
- Local jurisdiction legal requirements.

6.7 Asset Repurposing or Disposal

Definition

Asset Repurposing or Disposal involves the processes used by an organization to decommission, retire, repurpose, reclaim, and dispose of assets. This could be due to deterioration, technology improvements, obsolescence, or changes in performance, legal, regulatory and/or capacity requirements.

Context

Asset Repurposing or Disposal includes the integration with other organizational strategic planning activities. This includes environmental and social focus on re-use, reclamation, recycling and reduction of waste and carbon footprint. This encourages organizations to include repurposing and recycling as key considerations in asset decommissioning activities as part of life cycle management. The financial and risk management implications of asset repurposing or disposal are significant inputs to related organizational strategic and Asset Management decisions.

Artefacts

- Environmental Impact Analysis.
- Land Rehabilitation Plan.
- Strategic Asset Management Plan.
- Asset Disposal Plan.
- Maintenance Plan for decommissioned assets.

Related Subjects

- Risk (2.6).
- Asset Data & Information Management (5.3).
- Decision-Making (3.5).
- Asset Creation & Acquisition (6.2).
- Demand Analysis (3.2).
- Management of Change (2.5).
- Configuration Management (5.5).

Relevant Standards

- GFMAM Maintenance Framework.
- ISO 10007 - Configuration Management.
- Local jurisdiction legal requirements.

6.8 Supply Chain Management

Definition

Supply Chain Management is the process used by an organization to ensure the provisioning of all equipment, tools, and resources to perform Asset Management activities are aligned with the Asset Management objectives.

Context

Supply chain management includes all the activities necessary to acquire, manage, maintain, and enforce contract and supplier management over the entire life cycle of an asset, taking total cost of ownership into consideration. It includes purchasing, inventory, warehousing, and contracting (authoring, negotiations, adoption, definition of requirements, appraisal and selection of contractors, outsourcing-insourcing strategies, and claim management). Its processes align with corporate standards, procedures, operating procedures, legislation, and organizational values of fair, equitable and legal approach to purchasing and contracts.

Artifacts

- Forward Works Plan or Forecast Plan.
- Procurement Purchasing Policy.
- Contractor Policy and selection criteria.
- Service or supply contract Policy and selection criteria.

Related Subjects

- Asset Management Strategy & Objectives (3.1).
- Asset Creation & Acquisition (6.2).
- Maintenance Delivery (6.5).
- Integrated Reliability (6.3).
- Asset ManagementData & Information Management (5.3).
- Configuration Management (5.5).
- Management of Change (MoC) (2.5).
- Resource Strategy and Management (3.7).

Relevant Standards

- GFMAM Maintenance Framework.

7 Value Realization

The subjects relating to how value is created through doing AM. Subjects related to measuring outcomes and continual improvement, not just the performance of assets.

7.1 Outcomes and Impacts

Definition

Outcomes and impacts processes that assess the extent to which the implementation of Asset Management activities achieve Asset Management objectives. They also assess to what extent the Asset Management objectives contribute to the achievement of the organizational objectives to meet stakeholder needs and expectations.

Review of outcomes and their impact being delivered against the organizational and Asset Management objectives is also an aspect of outcomes and impacts. This enables adjustments to be made to objectives by an organization to ensure that the desired outcomes and impacts are achieved.

Context

The specification of the required value to be realized and the subsequent desired outcomes and impacts will depend on the needs and expectations of an organisation's stakeholders, the organizational value framework, as well as the organizational and Asset Management objectives.

In general, what generates value is the decision-making process around the identification and subsequent implementation of value drivers and value enablers that have an impact on performance, cost and/or the risk. This aids the realization of value to meet the desired outcomes and impacts.

Outcomes and impacts realization provides a basis for assessing progress towards the achievement of desired outcomes and impacts through the management of assets.

It enables the translation of quantitative and qualitative metrics established for monitoring asset health, performance of the Asset Management system, and the effectiveness of Asset Management overall.

In assessing outcomes, it is important to understand the factors that contribute to or hinder the realization of outcomes and impacts. This is necessary to inform future strategies, effective decision making and the continual improvement of value realization.

The frequency and regularity of outcome and impact reviews must be maintained at an appropriate level to help prevent any deviation from attaining Asset Management and organizational objectives.

Artifacts

- Outcomes and Impacts reporting.
- Milestone trend charts.
- Value Framework.
- The Organisational Value Generation Model.

Related Subjects

- Monitoring (7.2).
- Continuous Improvement (7.3).
- Asset Management System (2.2).
- Asset Management Strategy & Objectives (3.1).
- Planning (3.4).
- Decision-Making (3.5).
- Risk (2.6).
- Stakeholder Management (1.2).
- Asset Management Leadership (4.1).
- Management of Change (2.5).
- Asset Management Assurance and Audit (2.3).

Relevant Standards

- Asset Management Data & Information Systems (5.4).

7.2 Monitoring

Definition

Monitoring is a dynamic process that relies on the effective use of data and metrics (financial and non-financial) to continuously evaluate the value realization of assets and their management throughout their life cycle.

The core of this monitoring process is data-driven analysis that enables decision-makers to make informed choices about asset utilization, investment, and optimization. By having a clear understanding of the value realized by assets, organizations can fine-tune their strategies, leading to an improvement in asset performance and overall effectiveness.

Context

Effective Asset Management provides assurance in the achievement of organizational objectives and realization of organizational sustainability. It does this through value realizing and sustaining value from the investment, use, maintenance, and disposal of assets. In doing so, it aims to balance cost, performance, and risk requirements, as well as the diverse needs of stakeholders and accomplish well-defined Asset Management objectives. It aims to achieve these in line with broader goals of the organization.

Defining the value indicators and assessing them against value realized enables continuous monitoring at different levels within an organization. This can be used to improve decision-making processes and support continuous value realization.

Monitoring value realization can be performed on a single asset or a portfolio of assets, with the latter providing a more systemic view when considering the organizational outcomes and impacts.

The metrics used to monitor value realization must be able to show the value realized at each stage of the life cycle, and clearly demonstrate the results achieved. This is then used to assess the outcomes and impacts realized against desired objectives. Adjustments are then made as part of the ongoing value realization process.

Artifacts

- Asset health and performance objectives and data - defined or captured in reports; or embedded in and derived from 24/7 continuous performance and condition monitoring systems.
- Dashboards show indicator results, balance between cost, performance, and risk.

- Cost Data.
- Risk Management Outcomes.
- Asset Performance & Health Objectives.
- Asset Performance & Health Reports.

Related Subjects

- Life cycle Value Realization (3.6).
- Outcomes & Impacts (7.1).
- Continuous Improvement (7.3).
- Decision-Making (3.5).
- Risk (2.6).
- Asset Management Strategy & Objectives (3.1).
- Asset Management Data & Information Strategy (5.1).
- Asset Management Data & Information Systems (5.4).
- Asset Costing and Valuation (1.3).
- Asset Management Data & Information Standards (5.2).
- Maintenance Delivery (6.5).

Relevant Standards

- Asset Management Data & Information Systems (5.4).

7.3 Continuous Improvement

Definition

Continuous Improvement is an ongoing process of analyzing performance, identifying opportunities, and making incremental changes to increase the value generated by assets.

Context

Continuous Improvement allows organizations to adapt their approach to value realization and respond to the changing nature of organizational operating environments, stakeholders' needs and expectations, and organizational objectives.

Knowledge gained from outcomes and impacts realization and monitoring value will identify the need to adapt through improvement, to realize the value the organization sets out to achieve (desired outcomes and impacts). Continual improvement of decision-making criteria and processes should be considered, to ensure alignment with desired outcomes and impacts, and better balance cost, risk, and performance.

All asset life cycle stages influence the ability of an asset to realize value effectively. Therefore, continual improvement is dependent on the organisation's ability to identify and enable improvement across the whole asset life cycle.

Although individual assets can realize value to an organization, it is important to consider the system of assets in the decision-making process to optimize value generated from assets.

Increased value can also be created from technology and innovation, supporting the achievement of organizational objectives.

Sustainability is a key Asset Management principle, and organizations should consider a wider sustainability lens when identifying and implementing improvements.

Artifacts

- Decision making criteria and processes.
- Asset Management maturity assessment.
- Improvement / monitoring strategies and plans.

Related Subjects

- Outcomes & Impacts (7.1).
- Monitoring (7.2).

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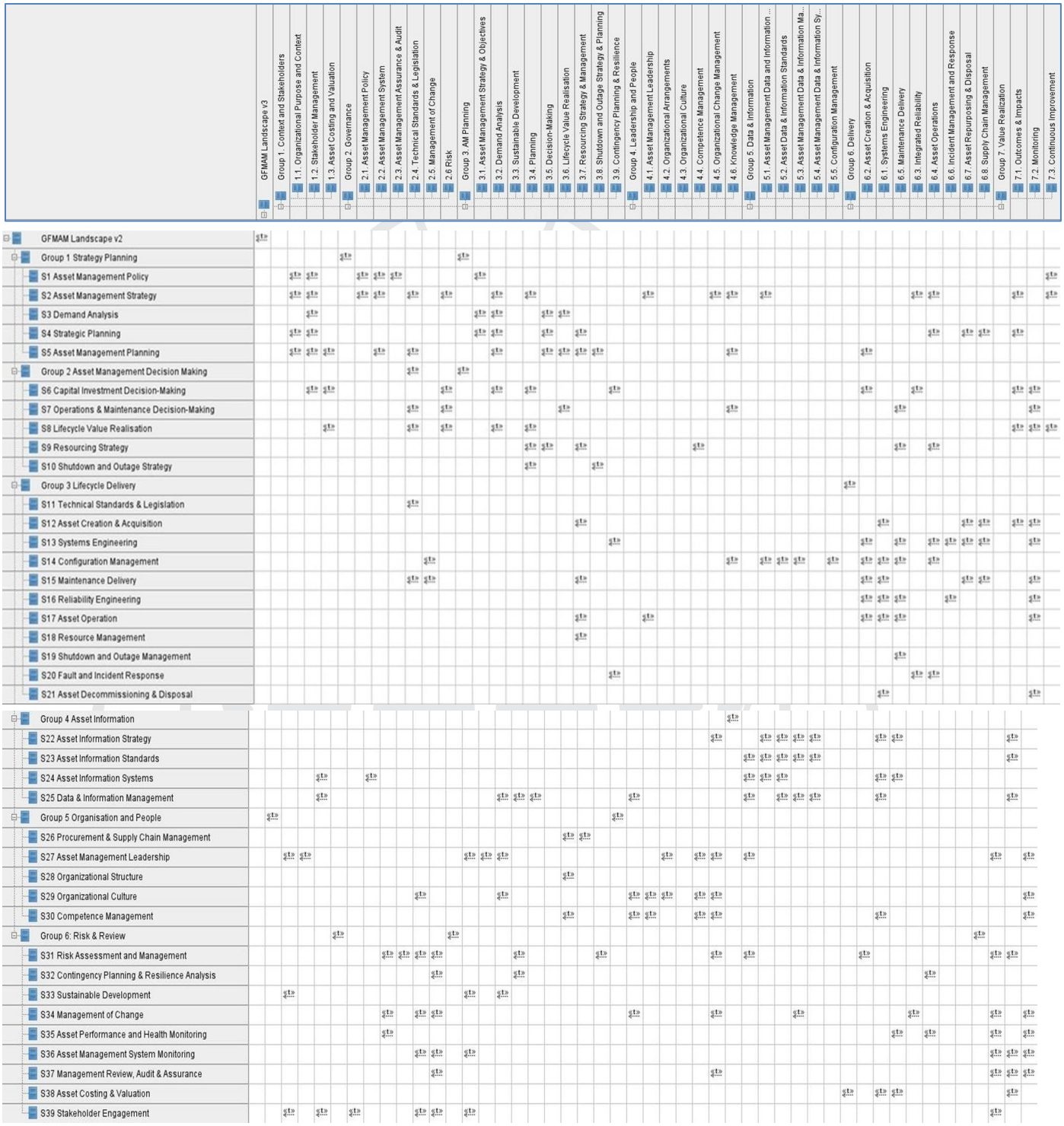
- Asset Management Strategy & Objectives (3.1).
- Planning (3.4).
- Decision-Making (3.5).
- Asset Management Leadership (4.1).
- Organizational Culture (4.3).
- Competence Management (4.4).
- Organizational Change Management (4.5).
- Asset Management Policy (2.1).
- Asset Management System (2.2).
- Asset Management Assurance & Audit (2.3).
- Management of Change (2.5).

Relevant Standards

- ISO 5500x Series – Asset Management.

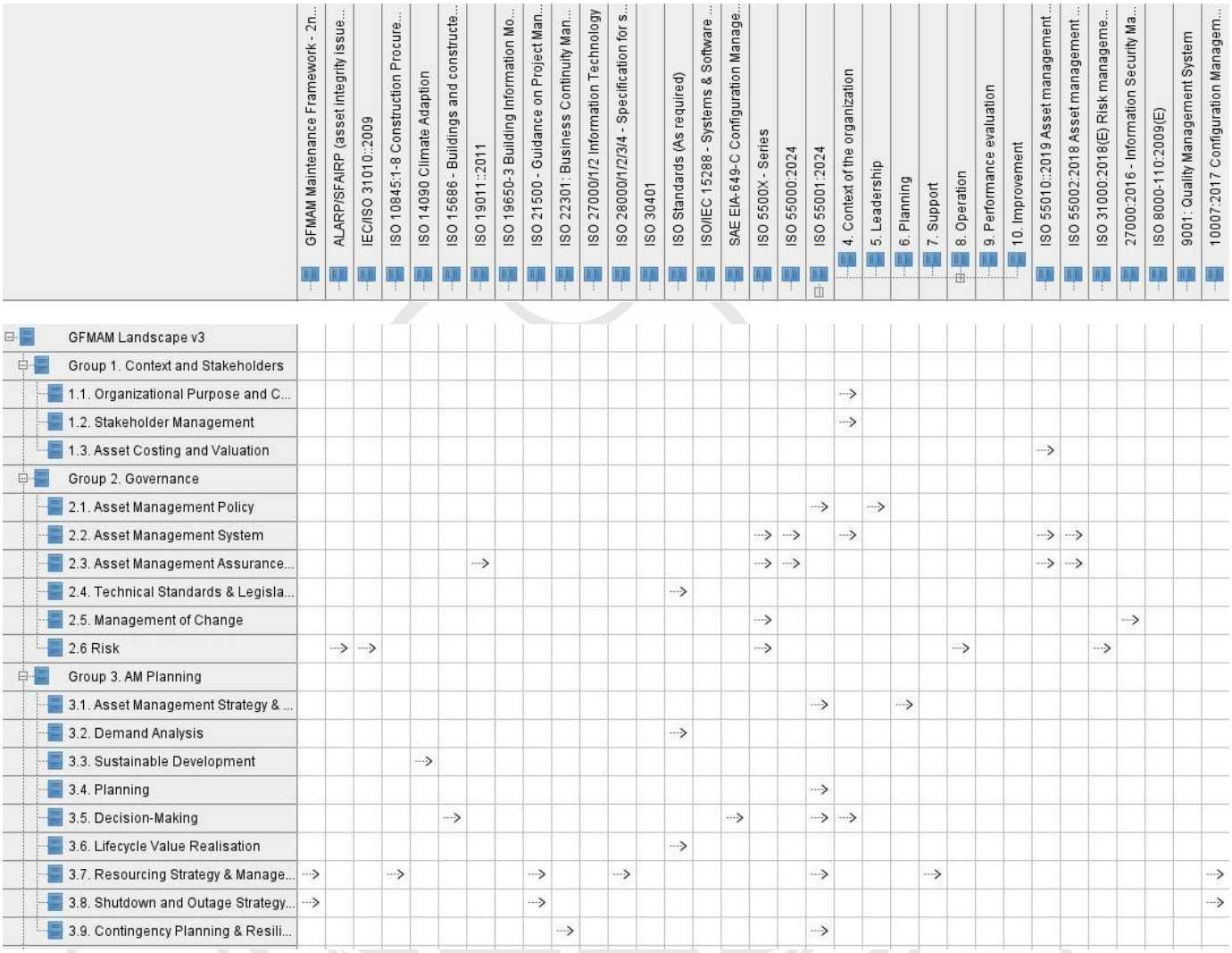
Appendix 1

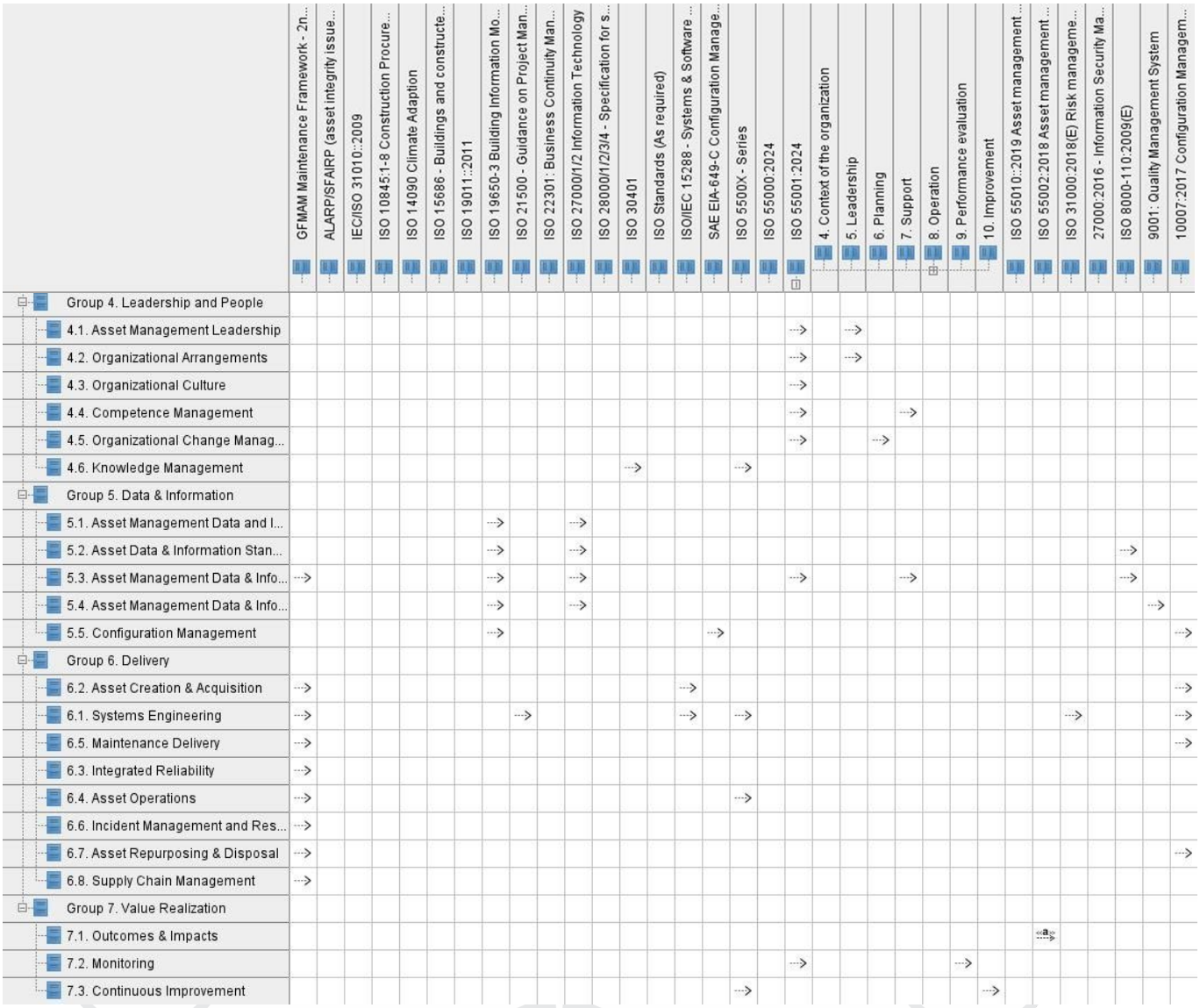
- GFMAM AM Landscape V2 – V3.



Appendix 2

- Key Standards to GFMAM AM Landscape V3.
-




GFMAM Maintenance Framework - 2n...
ALARP/SFAIRP (asset integrity issue...
IEC/ISO 31010::2009
ISO 10845:1-8 Construction Procure...
ISO 14090 Climate Adaption
ISO 15686 - Buildings and constructe...
ISO 19011::2011
ISO 19650-3 Building Information Mo...
ISO 21500 - Guidance on Project Man...
ISO 22301: Business Continuity Man...
ISO 27000/1/2 Information Technology
ISO 28000/1/2/3/4 - Specification for s...
ISO 30401
ISO Standards (As required)
ISO/IEC 15288 - Systems & Software ...
SAE EIA-649-C Configuration Manage...
ISO 5500X - Series
ISO 55000:2024
ISO 55001:2024
4. Context of the organization
5. Leadership
6. Planning
7. Support
8. Operation
9. Performance evaluation
10. Improvement
ISO 55010::2019 Asset management ...
ISO 55002:2018 Asset management ...
ISO 31000:2018(E) Risk manageme...
27000:2016 - Information Security Ma...
ISO 8000-110:2009(E)
9001: Quality Management System
10007:2017 Configuration Managem...
Group 4. Leadership and People
4.1. Asset Management Leadership
4.2. Organizational Arrangements
4.3. Organizational Culture
4.4. Competence Management
4.5. Organizational Change Manag...
4.6. Knowledge Management
Group 5. Data & Information
5.1. Asset Management Data and I...
5.2. Asset Data & Information Stan...
5.3. Asset Management Data & Info...
5.4. Asset Management Data & Info...
5.5. Configuration Management
Group 6. Delivery
6.2. Asset Creation & Acquisition
6.1. Systems Engineering
6.5. Maintenance Delivery
6.3. Integrated Reliability
6.4. Asset Operations
6.6. Incident Management and Res...
6.7. Asset Repurposing & Disposal
6.8. Supply Chain Management
Group 7. Value Realization
7.1. Outcomes & Impacts
7.2. Monitoring
7.3. Continuous Improvement

Appendix 3 ISO Map 55001:2024 – GFMAM AM Landscape V3

Landscape v 3.0	Yes No	ISO 55001 2024
Organisational Purpose & Context	Y	Section 4
Stakeholder Management	Y	Section 4
Asset Costing & Valuation	N	
Asset Management Policy	Y	Section 5
Asset Management System	Y	Section 4
Asset Management Assurance & Audit	N	
Technical Standards & Legislation	N	
Management of change	Y	Section 8
Risk	Y	Section 6
AM Strategy & Objectives	Y	Section 6
Demand Analysis	N	
Sustainable Development	N	
Asset Management Planning	Y	Section 6
Decision-Making	Y	Section 4
Life cycle Value Realization	N	
Resourcing Strategy & Management	Y	Section 7
Shutdown and Outage Strategy and Planning	N	
Contingency Planning & Resilience	N	
Asset Management Leadership	Y	Section 5
Organisational Arrangements	Y	Section 5
Organisational Culture	N	
Competence Management	Y	Section 7
Organisational Change Management	Y	Section 6
Knowledge Management	Y	Section 7
Asset Management Data & Information Strategy	N	
Asset Data & Information Standards	N	
Asset Management Data & Information Management	Y	Section 7
Asset Management Data & Information Systems	N	
Configuration Management	N	
Asset Creation & Acquisition	N	
Systems Engineering	N	
Maintenance Delivery	N	

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Integrated Reliability	N	
Asset Operations	Y	Section 8
Incident Management & Response	N	
Asset Repurposing & Disposal	N	
Supply Chain Management	N	
Outcomes & Impacts	N	
Monitoring	Y	Section 9
Continuous Improvement	Y	Section 10

For Reference -

Landscape v3.0 Subjects related to ISO 55001:2024 = 19

Landscape v3.0 Subjects NOT related to ISO 55001:2024 = 21

Appendix 4 Acronyms and Terms& Definitions

Acronyms

Acronym	Meaning
AM	Asset Management
ALARP	As low as reasonably practical
BIM	Building, Information Modelling
CAPEX	Capital Expenditure
GFMAM	Global Forum on Maintenance and Asset Management
MoC	Management of Change
MRO	Maintenance, Repair, Operations
OPEX	Operating Expenditure
PESTLE	Political, Economic, Social, Technological, Legal, Environmental
RACI	Responsible, Accountable, Consulted, Informed
SAMP	Strategic Asset Management Plan
SFAIRP	So far as reasonably practical
STO	Shutdown Turnaround & Outages
TOTEX	Total Expenditure (CAPEX + OPEX)

Terms & Definitions

For the purpose of this document the Terms & Definitions used in the ISO 5500x series - Asset Management Standards apply.

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