



Abu Dhabi Guideline

دليل أبوظبي الإرشادي



ADG 6: 2015

First Edition

**Guideline on the Application of the ISO 55001:2014 standard
(Asset management -- Management systems -- Requirements)
in the UAE (United Arab Emirates)**

Table of Contents	Pages
About the Abu Dhabi Quality and Conformity Council	3
Foreword	3
Scope	4
Acknowledgements	5
Definitions	6
Background on Asset Management Standards	8
Getting Started	10
Strategy & Planning	15
Decisions & Accountability	29
Asset Information	39
Organization & People	44
Risk & Review	50
Elements for Consideration in Abu Dhabi	66
References	68
Annex 1 – Sample Infrastructure Risk Register	--
Annex 2 - Case Studies	--

© British Standards Institution (BSI – www.bsigroup.com).

Extracts reproduced with permission. Sources:

PAS55:2008-1:2008. Specification for the optimized management of physical assets

PAS55:2008-2:2008. Guidelines for the application of PAS 55-1

Amendment Page

To ensure that each copy of this ADG contains a complete record of amendments, the Amendment Page is updated and issued with each set of revised/new pages of the document.

[illegible]



About the Abu Dhabi Quality and Conformity Council

The Abu Dhabi Quality and Conformity Council (QCC) was established by law No. 3 of 2009, issued by His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE.

The QCC is responsible for the development of Abu Dhabi Emirate's Quality Infrastructure, which enables industry leaders and regulators to ensure that products, systems and personnel may be rigorously tested and certified according to UAE and International Standards.

Products certified by the QCC receive the Abu Dhabi Trustmark. The Trustmark signifies that a product or system conforms to various safety and performance standards that are set by Abu Dhabi regulators.

1 Foreword

The QCC Working Group for Asset Management was established in July 2012 in order to review existing international standards for Asset Management and draft an Emirate-wide regulatory framework specific to conditions and requirements in Abu Dhabi.

Asset Management in this context is defined as the best practices that regulate a sustainable life cycle of all types of assets including physical infrastructure assets, such as roads, bridges, parks, utilities, buildings, etc. It also includes the management of related fields, such as the human resources, information, finances, and performance associated with physical assets.

Under the leadership of His Highness Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE and Ruler of Abu Dhabi, and His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi, Deputy Supreme Commander of the UAE Armed Forces and Chairman of the Abu Dhabi Executive Council, the Abu Dhabi Government has invested heavily in the Infrastructure of Abu Dhabi and continues to do so. Consequently, the introduction and practice of Asset Management in Abu Dhabi is paramount and continues to be refined in order to preserve past investments and ensure competitiveness and sector-specific production within the Emirate of Abu Dhabi.



2 Scope

This Abu Dhabi Guideline provides guidance on the Application of the ISO 55001:2014 standard (Asset management -- Management Systems -- Requirements) in the UAE (United Arab Emirates).

QCC policy encourages the use of UAE national standards published by ESMA (the Emirates Authority for Standardization and Metrology). ESMA is the National Standards Body of the UAE and part of the regional (GSO– the GCC Standardization Organization) & international standards system. Accordingly, in the field of Asset Management, the Abu Dhabi Guideline recommends the application of the ISO 55000 suite of standards, which are high-level international documents that have superseded forerunner documents like the PAS 55 series.

The Asset Management Working Group set out to develop a guideline that:

- Provides specific guidance for the implementation of asset management systems similar to the PAS 55 standard currently used by many Abu Dhabi entities but complying with the new ISO 55000 series.
- Updates the specific recommendations in PAS 55 to reflect the recent improvements in Asset Management practices including the release of ISO 55000 series of standards.
- Recommends specific guidance that reflects local conditions in the Emirate of Abu Dhabi

This Abu Dhabi Guideline may be raised to national level as a draft UAE national standard, hopefully to be published as a UAE national standard by ESMA and then perhaps accepted at the Gulf Cooperative Council (GCC) level by GSO – the GCC Standardization Organization - as a valuable guidance tool to assist in the implementation of Asset Management best practices throughout the region.

3 Acknowledgements

The membership of the QCC Working Group is as follows:

Name	Entity
1 Abdulhafidh Ahmed Alzbeidi	Abu Dhabi Quality & Conformity Council (QCC)
2 Abdulhameed Al Marzouqi	Emirate of Abu Dhabi Department of Municipal Affairs (DMA)
3 Abdulmouti Al-Helwani	Emirates Authority for Standardization & Metrology (ESMA)
4 Ahmed Al Zaabi	Abu Dhabi Urban Planning Council (UPC)
5 Ahmed Hassan	Abu Dhabi Regulation and Supervision Bureau (RSB)
6 Akli Ourad	DMA
7 Alan Roland	Abu Dhabi Department of Transportation (DoT)
8 Colin Arthur	Musanada
9 Enda McDonnell	QCC (Coordinator)
10 Geraldine Hurley	UPC
11 Glen Carruthers	RSB
12 Hamad Saleh Salem	Abu Dhabi Education Council (ADEC)
13 Hassan Darwish	Abu Dhabi Sewerage Services Company (ADSSC)
14 Issam Mohamad Elchayeb	ADEC
15 Mahmood Al Marzouqi (Chairman)	ADEC
16 Martin Cordwell	CH2M
17 Najib Dandachi (Dr.)	Abu Dhabi Transmission & Despatch Company (TRANSCO)
18 Robin Kalathil	Abu Dhabi Distribution Company (ADDC)
19 Saeed Al Shebli	DMA
20 Salah Mahmoud Rashed	Al Ain Distribution Company (ADDC)
21 Salem Al Mazrouee	TRANSCO
22 Salma Al Ali	ADDC
23 Shareefa Al Marzouqi	TRANSCO
24 Syed Akhlaq	ADSSC

4 Definitions

The following definitions are terms used in ISO 55000.

Asset

Item, thing or identity that has potential or actual value to an organization.

Asset Life

Period from asset creation to asset end of life.

Asset Management

Coordinated activity of an organization to realize value from assets.

Asset Management Plan

Documented information that specifies the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives.

Asset Management System

Management System for asset management whose function is to establish the asset management policy and asset management objectives.

Management System

Set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives.

Asset System

A set of assets that interact or are inter-related.

Corrective Action

Action to eliminate the cause of a non-conformity and to prevent recurrence.

Critical Assets

Asset having potential to significantly impact on the achievement of the organisation's objectives.

Documented Information.

Information required to be controlled and maintained by an organization and the medium on which it is contained.

Level Of Service

Parameters, or combination of parameters, which reflect social, political, environmental and economic outcomes that the organization delivers.

Life Cycle

Stage involved in the management of an asset.

Monitoring

Determining the status of a system, a process or an activity.

Objective

Result to be achieved.

Policy

Intentions and directions of an organization as formally expresses by its top management

Preventive Action

Actions to eliminate the cause of a potential non-conformity or other undesirable potential situation.

Predictive Action

Action to monitor the condition of the asset and predict the need for preventive action or corrective action.

Risk

Effect of uncertainty on objectives.

Stakeholder

Person or organisation that can affect, be affected by, or perceive themselves to be affected by a decision or activity.

Strategic Asset Management Plan (SAMP)

Documented Information that specifies how organizational objectives are to be converted into asset management objectives, the approach for developing asset management plans, and the role of the asset management system in supporting achievement of the asset management objectives.

5 Background on Asset Management Standards

The British PAS 55 series of standards were used as a basis for the ISO 55000 standards that were published in January 2014, along with other national and international documents and manuals (Australian and New Zealand publications were also influential in shaping the current standards of Asset Management). As such, PAS 55-1: 2008 and PAS 55-2: 2008 were among the precursors and forerunners of the ISO 55000 series.

Table 1 compares the relevant sections of ISO 55001 with the corresponding clauses of PAS 55. This outline is intended to further an organization's understanding of the current requirements in context to superseded guidance.

Table 1 - Comparison between ISO 55001 and PAS 55		
ISO 55001	PAS55: 2008	Section of This Document
4.1 Understanding the Organization	No Specific Clause	6.1 Understanding the Organization & Its Context
4.2 Understanding the Needs and, Expectation of Stakeholders	4.4.8 Legal and Other Requirements	11.9 Understanding the Needs and Expectations of Stakeholders
4.3 Determine the Scope of the Asset Management System	No Specific Clause	6.3 Determining the Scope of Asset Management
4.4 Asset Management System	4.1 General Requirements	6.3 Determining the Scope of Asset Management
5.2 Policy	4.2 Asset Management Policy	7.2 Asset Management Policy
5.3 Organizational Roles, Responsibilities and Authorities	4.4.1 Organizational Structure, Authority & Responsibilities	8.1 Organizational Roles, Responsibilities & Authorities
6.1 Actions to Address Risks and Opportunities etc.	4.4.7 Risk Management	11.1 Risk Management
6.2.1 Asset Management Objectives	4.3.2 Asset Management Objectives	7.4 Asset Management Objectives
6.2.2 Planning for Asset Management	4.3.1 Asset Management Strategy	7.3 Asset Management Strategy
7.1 Resources	No Specific Clause	10.1 Resources
7.2 Competence	4.4.3 Training, Awareness and Competence	10.2 Competence
7.3 Awareness		10.3 Awareness
7.4 Communication	4.4.4 Communication, Participation and Consultation	10.4 Communication
7.5 Information Requirements	4.4.6 Information Management	9.1 Information Requirements
7.6 Documented Management	4.4.5 Asset Management System Documentation	9.2 Documented Information

Table 1 - Comparison between ISO 55001 and PAS 55

ISO 55001	PAS55: 2008	Section of This Document
8.1 Operational Planning and Control	4.5.1 Life cycle Activities	8.2 Operational Planning and Control
8.2 Management of Change	4.4.9 Management of Change	11.2 Management of Change
8.3 Outsourcing	4.4.2 Outsourcing of Asset Management Activities	10.5 Outsourcing
9.1 Monitoring, Measurement, Analysis and Evaluation	4.6.1 Performance and Condition Monitoring	11.3 Monitoring, Measurement, Analysis and Evaluation
9.2 Internal Audit	4.6.3 Evaluation of Compliance	11.4 Internal Audit
	4.6.4 Audit	
9.3 Management Review	4.7 Management Review	11.5 Management Review
10.1 Non conformity etc.	4.6.2 Investigation of Asset Related Failures, Incidents and Nonconformances	11.6 Non-Conformity and Corrective Action
10.2 Preventative Action		11.7 Preventative Action
10.3 Continual Improvement	4.6.5 Improvement Actions	11.8 Continual Improvement
No Specific Clause	4.3.3 Asset Management Plans	7.5 Asset Management Plan(s)
No Specific Clause	4.3.4 Contingency Planning	11.1 Risk Management
No Specific Clause	4.5.2 Tools, Facilities and Equipment	8.2.4 Examples (Subsection of 8.2 Operational Planning and Control)
No Specific Clause	4.6.6 Records	9.2 Documented Information

Abu Dhabi organizations have used the PAS 55 standards as references for their Asset Management journey. Some have targeted achieving certification that conforms to these standards as part of their process. The Abu Dhabi Transmission & Dispatch Company (TRANSCO) and Abu Dhabi Gas Industries Ltd (GASCO) are examples of Abu Dhabi companies that successfully applied the PAS 55 standards.

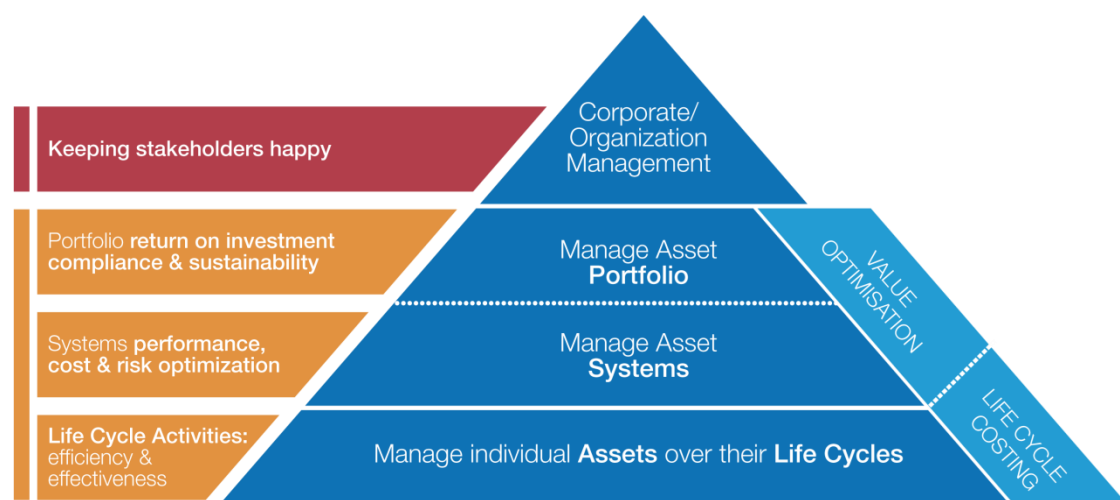
6 Getting Started

6.1 Understanding the Organization & Its Context

6.1.1 Purpose

An organization's goals and strategic priorities are directly reflected in the asset management plan(s).¹ Therefore, understanding an organization's needs – both internal and external – allow for the sustainable delivery of the organization's objectives in a holistic, optimal, and integrated manner for asset management.

Figure 6-1: Hierarchy of Assets within an Integrated Management System²



The above understanding of the value that can be derived from our assets can help us by supporting optimum decisions, but optimization will need to be based on the constraints of our environment at any point in time.³ The organizational strategic goals are the starting point for the development of the asset management policy, strategy, objectives, and plans. These, in turn, underpin the optimal combination of life cycle activities to be applied across the diverse portfolio of asset systems and assets. This top-down connective thread is a key feature of asset management and provides the

¹ PAS 55-2, x

² IAM AMA2, 9; www.theIAM.org

³ IAM AMA2, 9; www.theIAM.org

clear “line of sight” from organizational direction and goals down to individual, day-to-day activities.⁴

As such, it is important that an organization understand its overall goals, vision, strategy and needs in order to establish asset management that performs at a high level.

6.1.2 Guidance

Overall, Asset Management should be a centralized theme that is representative of an organization as a whole, and should be integrate into every business element. This need for centralization and integration can be affectively achieved by the development of a Strategic Asset Management Plan (SAMP). The SAMP is a formal document which specifies how organizational objects are to be converted to Asset Management objects and identifies the relationship between the two.

Further details should be referenced in Clause 4.1 of ISO 55001.

6.1.3 Advisory

The Strategic Asset Management Plan (SAMP) should provide criteria to ultimately develop individual asset management plans. Asset management plans should be appropriate for an organization, with respect to complexity and specificity of information. While there is no specific template for an organization to use when creating an Asset Management Plan, there are some common elements include the following:

1. Rational or business case for asset management activities;
2. Operational and Maintenance/Improvement plans;
3. Capital investment plans;
4. Performance Monitoring plans; and
5. Resource plans (financial, personnel, etc.)

It should be noted that the contents of the Asset Management Plan are not specifically dictated, but should nonetheless be informed by the company’s specific circumstances and known data records.

⁴ PAS 55-2, xi

The asset management objectives should be aligned with the organization and its respective goals. There should also be consistency with the SAMP, and other key asset management documents.

6.2 Leadership and Commitment

6.2.1 Purpose

Clear direction, commitment, and leadership within an organization are essential enablers of good asset management. Leaders of an organization must demonstrate a commitment to the ISO 55000 standard by clearly defining its guiding principles, the criteria to be used for informing the decision-making process, requirements for reporting in line with ISO 55001, and requirements for a process to facilitate continual improvement.



6.2.2 Guidance

Top-level commitment to asset management can be demonstrated in a number of ways. An example is to ensure that asset management principles are consistently communicated alongside those of the organization as a whole. The organization's leadership should prioritize asset management, and ensure that there are appropriate resource (i.e., personnel, budgets, etc.) that have been allocated to meet the asset management objectives. Progress towards these objectives should be monitored, and corrective or preventative actions should be carried out when necessary. Also, asset management should be considered with regard to the overall risk management of an organization.

6.2.3 Advisory

Asset management leadership can be demonstrated by top management through positively influencing the organization (and in its execution of all the requirements of ISO 55001, and specifically the requirements of ISO 55001:2014, 5.1). Ultimately, ownership of asset management resided with the top management, even though other people are allocated responsibility for certain elements.



The Organization shall ensure that the top management is identified in their organizational structure and their roles, responsibilities, accountability, and authority for Asset Management are clearly defined.

Also, the top management shall demonstrate leadership and commitment for the development, implementation, and continual improvement of Asset Management by:

1. Ensuring that the asset management policy, strategy, and objectives are established and are aligned with the strategic direction of the organization;
2. Ensuring the integration of Asset Management requirements into the organization's business processes, including the organization's risk management framework;
3. Ensuring that the resources for development, operation and improvement of Asset Management are available;
4. Communicating the importance of effective asset management and of conforming to Asset Management requirements to all employees and contracted service providers;
5. Ensuring that Asset Management achieves its intended outcome(s);
6. Directing and supporting persons to contribute to the effectiveness of Asset Management; and supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility;
7. Reviewing asset management performance (KPIs) and taking steps to address any deficiencies; and
8. Undertaking management reviews of Asset Management at planned intervals and promoting continual improvement.

Refer to Figure 7-1 for more information.

6.3 Determining the Scope of Asset Management

6.3.1 Purpose

Good asset management goes beyond the scope of merely maintaining or caring for physical assets, and more closely aligns itself with the central purpose of an organization. This broader





idea considers and optimizes the conflicting priorities of asset utilization and asset care, of short-term performance opportunities and long-term sustainability, and between capital investments and subsequent operating costs, risks and performance.⁵

The scope of the asset management should cover the full portfolio of assets that are required for the successful delivery of the organizational strategic plan, *commonly called the business plan*, and not exclude any assets or asset systems that are critical to the business goals.⁶

6.3.2 Guidance

Defining the scope of asset management should recognize the interdependency of managing physical assets along with various other assets, such as human, financial, informational, and intangible assets, in order to render a holistic delivery of asset management objectives.

This process should also make appropriate provision for the indirect “enablers” that are required to optimize the value of physical assets, such as structure, authority and responsibilities (leadership), training, awareness and competence, communication, participation, consultation, etc.⁷

6.3.3 Advisory

An organization shall delineate boundaries for its asset management. These should be clearly defined, and shared with all relevant individuals or entities. Further details should be referenced in Clause 4.3 of ISO 55001.

⁵ PAS 55-2, v.

⁶ PAS 55-2, 2

⁷ PAS 55-2, ix-23

7 Strategy & Planning

7.1 Integrated Asset Management

7.1.1 Purpose

Integrated asset management is vital for organizations that are heavily dependent upon physical assets in the creation or delivery of their services or products. Large numbers of assets, or diversity characteristics of assets and asset systems, particularly in an environment of conflicting stakeholder expectations, further increase the importance of having a systematic approach to managing the asset portfolio.⁸

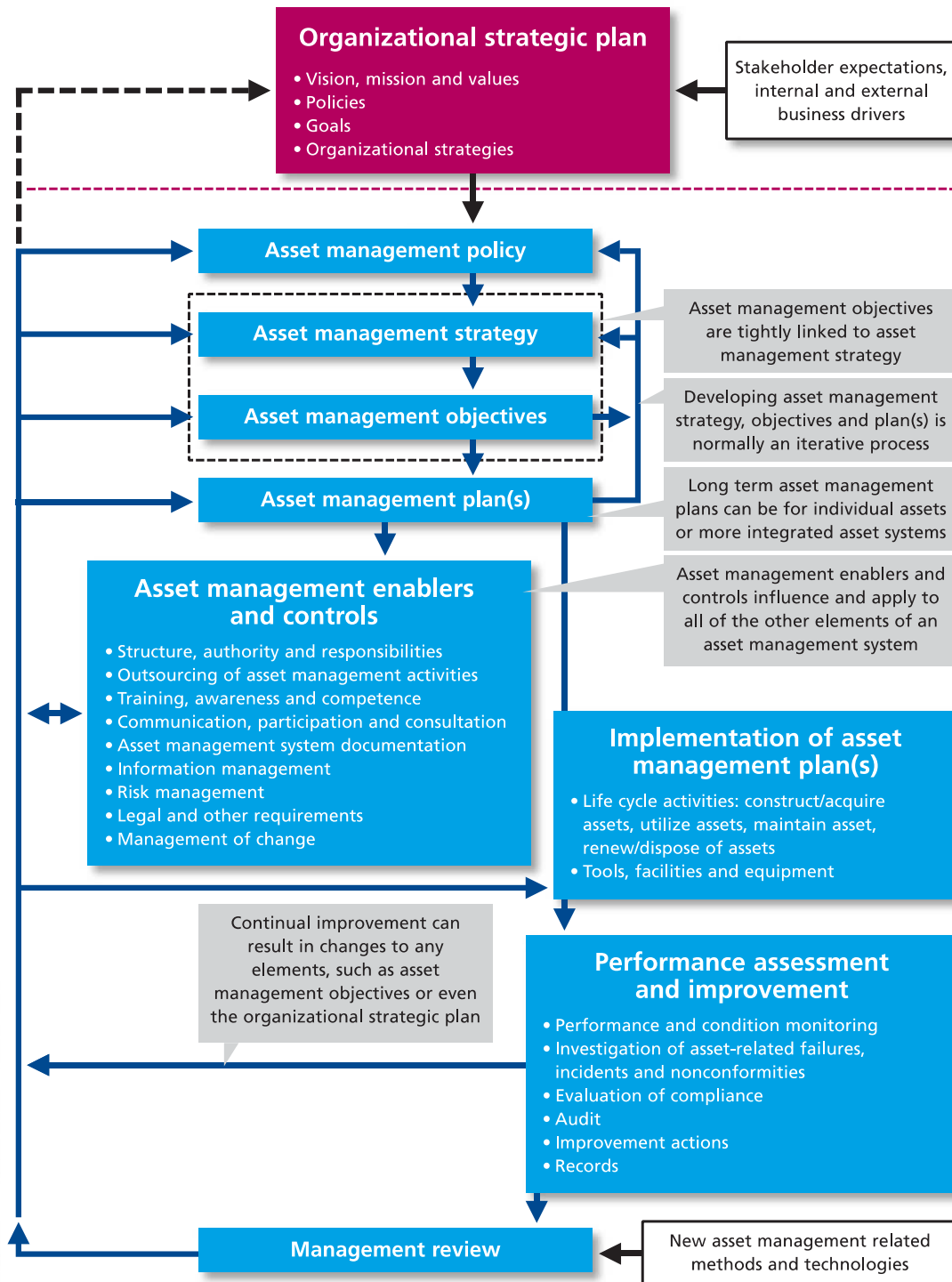
The operational elements and processes of asset management should be developed to enable connectivity, integration, total value optimization, and continual improvement. Figure 7-1 shows such typical elements.



INTEGRATION

⁸ PAS 55-2, 11.

Figure 7-1: Typical Elements of Asset Management





7.1.2 Guidance

In the initial development of asset management, the organization should outline how it will establish, implement, maintain, and improve the system. This can be supported through a gap analysis, where an organization's processes are assessed against best practices for asset management. These best practices can be drawn from a relevant asset management standard, or through industry-specific guidance.

Asset management should not stand alone. A factor of successful asset management is the ability to integrate asset management processes, activities, and data with those of other organizational functions, (e.g., quality, accounting, safety, risk, and human resources).

Consideration should be given to how to optimize and prioritize what to develop first, as there is usually a limit on resources available. The review can guide the organization in formulating plan(s) for implementing and prioritizing maintenance and improvements of its assets.

An appropriate starting point is the establishment of an asset management policy and framework, which often helps to provide focus for the organization, identify its intentions, define its regulatory requirements, and provide best practice guidance to assist them in meeting the requirements.

It is important to be aware of, and to clarify, any variations in terminology between ISO 55000 and the terminology used in the organization's common practice.

7.1.3 Advisory

The organization shall establish, maintain and document the scope of its asset management in accordance with ISO 55000 requirements. .

The above requirement is a general statement concerning the establishment and maintenance of asset management within an organization. "Establish" implies that Asset Management should not be considered established until all its elements have been demonstrably implemented. "Maintain" implies that, once established, the system continues to operate appropriately in a sustainable manner– this requires an active effort and commitment on the part of the organization.



It is required that an organization establish, implement and maintain an asset management policy, strategy, objectives and plan(s).

The level of detail and complexity of asset management, the extent of the documentation, and the resources devoted to it, are dependent on the nature (size, structure, complexity) of an organization and its activities.

Compliance with all the requirements of ISO 55001 should be considered as achieving only the minimum starting point for an effective asset management and should not be seen as the final goal.

7.2 Asset Management Policy

7.2.1 Purpose

The Asset Management Policy is a short statement that defines the overall mandated requirements and guiding principles that must be adhered to in undertaking all asset management activities involved in the life cycle management of assets. Refer to section 8.2 Operational Planning and Control for further information on asset life cycle management.

The asset management policy is also a means for top management to communicate to its managers, employees, and stakeholders the organization's position and intentions with regard to asset management. It provides a high level statement of the organization's principles, approach, and expectations relating to asset management.

7.2.2 Guidance

The organization's top management shall authorize an overall asset management policy. The policy shall:

1. Be derived from, and be consistent with the organizational strategic plan;
2. Be appropriate to the nature and scale of the organization's assets and operations;
3. Be consistent with other organizational policies;
4. Be consistent with the organization's overall risk management framework;
5. Provide the framework which enables the asset management strategy, objectives and plans to be produced and implemented;



6. Include a commitment to comply with current applicable legislation, regulatory and statutory requirements and with other requirements to which the organization subscribes;
7. Clearly state the principles to be applied, such as the organization's approach to health and safety or sustainable development;
8. Include a commitment to continual improvement in asset management and asset management performance;
9. Be documented, implemented and maintained;
10. Be communicated to all relevant stakeholders, including contracted service providers, where there is a requirement that these persons are made aware of their asset management policy-related obligations;
11. Be reviewed periodically to ensure that it remains relevant and consistent with the organizational strategic plan.
12. Include the organization's commitments to health, safety and sustainability, compliance with legal and regulatory requirements
13. Include the overall roles, responsibilities and accountabilities for applying the policy, embedding asset management principles and establishing and continually improving Asset Management

7.2.3 Advisory

ISO55000 requires that organizations establish, implement, and maintain an asset management policy, strategy, objectives, and plans.⁹ Policy documents can contain:

1. Purpose Statement
2. Applicability and scope
3. Effective date
4. Responsibilities

An organization seeking to establish Asset Management should determine its current position with regard to its asset management by means of a gap-analysis. The organization should consider the conditions and factors that affect, or could affect, its asset management; what policies it needs, and how it will manage its asset management risks. The level of detail and complexity of asset management, the

⁹ PAS 55-2, x



extent of the documentation, and the resources devoted to it, are dependent on the nature (size, structure, complexity) of an organization and its activities.¹⁰

7.2.4 Examples

The following is an example of an Asset Management Policy Statement from the Abu Dhabi Department of Municipal Affairs:

Asset Management is a broad strategic framework that encompasses many engineering, project management, and administrative disciplines and involves the entire Emirate's Municipal System. The terms Asset Management, as used in this document, are defined as "the application of sound technical, social, and economic principles that considers present and future needs of users, and the service from the asset". To guide the Municipal System, the following policy statements have been developed:

- Each Municipality within its jurisdiction will maintain and manage infrastructure assets at defined levels to support public safety, community well-being, and customer and community goals.*
- Each Municipality within its jurisdiction will monitor standards and service levels to ensure that they meet/support customer and community and Municipal System's goals and objectives*
- Each Municipality within its jurisdiction will develop and maintain asset inventories of all its infrastructures.*
- Each Municipality within its jurisdiction will establish Asset Management Plans (AMPs) including infrastructure replacement strategies through the use of full life cycle costing principles.*
- Each Municipality within its jurisdiction will plan financially for the appropriate level of maintenance of assets to deliver service levels and extend the useful life of assets.*
- Each Municipality within its jurisdiction will plan for and request stable long term funding to replace and/or renew and/or decommission infrastructure assets.*

¹⁰ PAS 55-2, 2

- *Each Municipality shall program rolling 5-Year OPEX plans consistent with the AMPs and financial requirements.*
- *Each municipality within its jurisdiction will report to DMA regularly on the status and performance of work related to the implementation of this asset management policy.*

7.3 Asset Management Strategy

7.3.1 Purpose

An asset management strategy directs the organization's asset management activities in achieving the asset management policy. It provides information on how the asset management policy will be converted into specific asset management objectives and activity plans, taking into account short and long term optimum asset outputs (realized value) throughout the assets whole life cost.

7.3.2 Guidance

The asset management strategy should describe, at a high level, the mechanisms for achieving the relevant asset management requirements throughout the activities of the business (including the methods of prioritization, optimization, sustainability, and risk management). Where appropriate, this should also include reference to required performance and condition requirements for assets, or provide guidance to ensure that these are set out in derived asset management objectives and associated procedures or functional specifications.

The organization shall establish, document, implement, and maintain a long-term asset management strategy that shall be authorized by top management. The strategy shall:¹¹

1. Be derived from, and be consistent with, the asset management policy and the organizational strategic plan;
2. Be consistent with other organizational policies and strategies;
3. Identify and consider the requirements of relevant stakeholders;
4. Consider the life cycle management requirements of the assets;

¹¹ PAS 55-2, 6



5. Take account of asset-related risks and asset system criticalities;
6. Identify the function(s), performance, and condition of existing asset systems and critical assets;
7. State the desired future function(s), performance and condition of existing and new asset systems and critical assets, on timescales aligned to those of the organizational strategic plan;
8. Clearly state the approach and principal methods by which assets and asset systems will be managed (which may include, for example, the criteria to be adopted for determining asset criticality and value, the life cycle and sustainability basis for asset management planning, the approach to asset risk and reliability management and the methods of optimization and decision-making);
9. Provide sufficient information, direction, and guidance to enable specific asset management objectives and asset management plan(s) to be produced;
10. Include criteria for optimizing and prioritizing asset management objectives and plans;
11. Be communicated to all relevant stakeholders, including contracted service providers, where there is a requirement that these persons are made aware of their asset management strategy-related obligations; and
12. Be reviewed periodically to ensure that it remains effective and consistent with the asset management policy and organizational strategic plan and with other organizational policies and strategies.

When establishing and reviewing its asset management strategy, the organization should ensure that it is derived from, and consistent with its asset management policy, organizational strategic plan and other organizational strategies.

7.3.3 Advisory

ISO 55000 stipulates that asset management strategies take a long-term viewpoint of the needs of assets. Also, organizational leadership must consider the relationship between asset management strategies with other business strategies. Thus, the asset management strategy should demonstrate how the asset management policy is to be implemented and how it will support the organizational strategic plan.

7.3.4 Examples

The following is an example of an asset management strategy, provided for reference by the Abu Dhabi Department of Municipal Affairs:

DMA and the Municipality together shall adopt an overarching asset management strategy for delivering the asset management objectives to provide:

- *Decision criteria for prioritization of funding and resources between asset classes and asset life cycle stages*
- *Approach for balancing short term interests versus longer term asset needs*
- *Preferred methods for planning and delivering asset life cycle activities such as demand forecasting, asset creation, utilization, maintenance planning, asset disposal planning, etc.*
- *A long term strategic plan (with a horizon reflecting asset life cycles) to define how the Municipality acquires, utilizes, maintains, monitors and disposes of the various kinds of assets it is responsible for in delivering its asset management objectives.*
- *Approach for establishing, operating, sustaining and improving the Municipality's Asset Management System*
- *Approach for developing the required asset management capability, including organizational arrangements, resource levels, relevant competencies and outsourcing arrangements.*

7.4 Asset Management Objectives

7.4.1 Purpose

The asset management objectives provide context to link the organization's overall objectives with the asset management plans. This is done by specifying the activities that are appropriate for an organization to carry out.



OBJECTIVES

7.4.2 Guidance

The organization shall establish and maintain asset management objectives that shall:¹²

1. Be measurable (i.e., quantified and/or capable of being demonstrated as achieved through objective assessment);
2. Be derived from, and consistent with the asset management strategy;
3. Be consistent with the organization's commitment to continual improvement;
4. Be communicated to all relevant stakeholders, including contracted service providers, where there is a requirement that these persons are made aware of their obligations;
5. Be reviewed and updated periodically by the organization to ensure that they remain relevant and consistent with the asset management strategy;
6. Consider legal, regulatory, statutory and other asset management requirements;
7. Take account of the expectations of relevant stakeholders and financial, operational and business requirements;
8. Take account of asset management related risks; and
9. Consider improvement opportunities including new technologies and asset management tools, techniques and practices.

7.4.3 Advisory

Organizations seeking to implement Asset Management, which is compliant with ISO55000 series of standards, should consider the recommendations and guidance provided below:

1. It is necessary to ensure that measurable asset management objectives are established not only at the corporate level, but throughout relevant parts of the organization to enable the asset management policy to be implemented and the asset management strategy to be achieved.
2. Asset management objectives should be derived from, and be consistent with, organizational objectives.

¹² PAS 55-2, 8



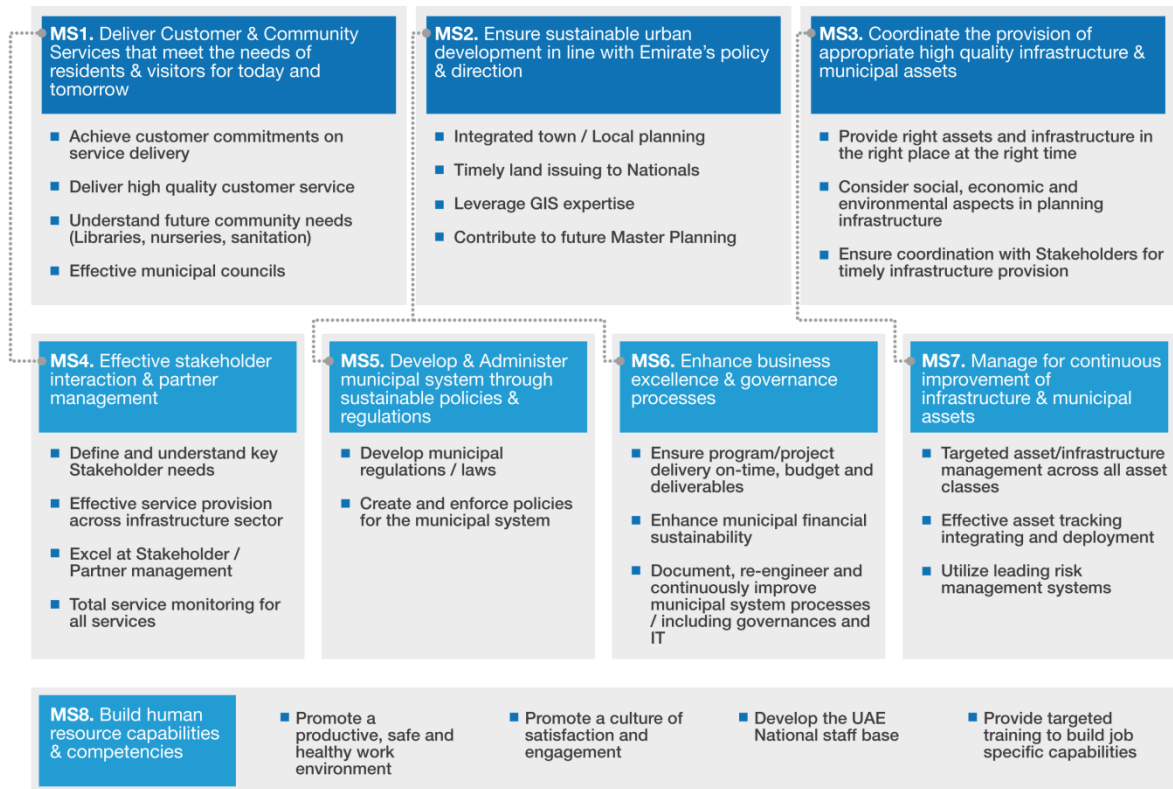
3. Using pertinent information or data, appropriate levels of management should identify, establish, and prioritize asset management objectives. During the establishment of asset management objectives, consultation with those most likely to be affected should assist in ensuring that the objectives are reasonable and more widely accepted. To help ensure achievable asset management objectives are set, it is also useful to consider information or data from sources external to the organization, for example, contractors, key suppliers or other stakeholders.
4. Asset management objectives should be kept to a limited number of clear goals and should be as “SMART” as possible (i.e., Specific, Measurable, Achievable, Realistic, and Time-based).
5. When establishing its asset management objectives, the Organization shall consider the expectations of relevant stakeholders, the Levels of Service agreed with customers, as well as other legal, regulatory, technical, or organizational requirements.
6. Care should be taken not to set asset management objectives without due consideration of the cost (including lost income) of achieving those objectives. Potential conflict between objectives should also be identified and resolved. This will involve consideration of the business impact for each objective, and optimization to determine the best value combination of partial achievements.

Overall, the Organization shall document the asset management objectives, communicate them to relevant stakeholders, and updated them as appropriate.

7.4.4 Examples

The following is an example of Asset Management Objectives, provided for reference by the Abu Dhabi Department of Municipal Affairs.

Figure 7-2 - Example of Asset Management Objectives



Other relevant examples¹³ of objectives are to:

1. Improve availability to benchmark standards
2. Reduce hazardous chemical by products by 30% over 3 years
3. Extend asset useful life through reuse of equipment
4. New capital investment will focus on total cost of ownership across asset life cycle
5. Improve organizational problem solving capabilities as a key success factor for continuous improvement.

¹³ Life Cycle Engineering ISO 55000 Review
(<http://www.slideshare.net/LifeCycleEngineering/iso-55000-overview>)

7.5 Asset Management Plan(s)

7.5.1 Purpose

Asset management plans are the detailed (how to) instructions the organization plans to implement in order to achieve the asset management strategies and deliver the asset management objectives. These plans shall encompass the delivery of these activities through the whole life cycle of the assets (for example, creation, acquisition or enhancement; utilization, maintenance, and decommissioning and/or disposal, etc.)

7.5.2 Guidance

When developing asset management plans, it is necessary to take into consideration all impacts, both positive and negative, resultant from planning activities executed per life cycle period, such as acquisition or construction, and apply this impacts to the planning activities in subsequent phase in order to achieve optimum prioritization, performance, sustainability, risk management, etc.

Multiple plans (for example, covering a portfolio of asset systems or assets) shall be jointly optimized and prioritized, taking into account overall value, resource requirements, interdependencies, risks and performance impact.¹⁴

The asset management plan(s) shall include documentation of:¹⁵

1. The specific tasks and activities (actions) required to optimize costs, risks and performance of the assets and/or asset system(s);
2. The designated responsibilities and authorities for the implementation of such actions and for the achievement of asset management objectives; and
3. The means and time scales by which these actions are to be achieved.

7.5.3 Advisory

Organizations seeking to implement Asset Management, which is compliant with the ISO55000 series of standards shall integrate asset management planning with the

¹⁴ PAS 55-2, 11

¹⁵ PAS 55-2, 11



organizational strategic plan and ensure that that asset management plans include the following whole life cycle criteria, but not limited to:

1. Detailed activities necessary for the delivery of the various asset management objectives, risk and opportunity valuations, and the impacts over time;
2. Resources, (e.g. financial, human, equipment, and logistics) in support of each activity including the source of such resources;
3. Timescales necessary for delivery of individual asset management objectives; and
4. Planning for periodic review facilitating optimization and if necessary, realignment with the asset management strategies and objectives.

7.5.4 Examples

The following is an example of an asset management plan, provided for reference by the Abu Dhabi Department of Municipal Affairs:

The Municipality shall establish mapped processes and procedures to develop optimized asset management plans using the solutions determined to address the identified asset needs and actions required to control the risks.

Asset management plans can be developed for individual major assets, groups of assets, asset classes, or asset systems as appropriate. However, the plans shall be jointly optimized to ensure that they can delivered with the specified funding and considering available resources and access to the assets. The plans shall be optimized considering the decision criteria specified in the asset management strategy with an analysis period of a minimum of 30 years for most assets.

The time horizon for the asset management plans shall be 5 years and shall align with the DMA's and Municipality's business planning cycle.

The asset management plans shall specify:

- *Activities to be undertaken and their timescale;*
- *Responsibility for undertaking the activities;*
- *Resources required for delivering the activities (including people, plant, equipment, spares, materials, etc.);*

- *Activities that will be outsourced and how these will be procured and controlled;*
- *Funding required and source of funding (e.g. budget heads);*
- *Benefits to be delivered in terms of increased capacity, performance, risk reduction, etc. and their timescales; and*
- *Risks and opportunities involved in delivering the plans and how these will be managed.*

Along with the asset management plans, the Municipality shall produce an 'Asset Management System Development Plan' setting out the improvements to processes, resources, competencies, information, and technology needed to successfully deliver the asset management plans.

8 Decisions & Accountability

8.1 Organizational Roles, Responsibilities & Authorities

8.1.1 Purpose

An organization should establish and maintain an organizational structure of roles, responsibilities, and authorities, consistent with the achievement of its asset management policy, strategy, objectives, and plans. These roles, responsibilities, and authorities shall be defined, documented, and communicated to the relevant individuals.¹⁶



The organizational structure of roles, responsibilities, and authorities plays a significant part in the successful implementation of asset management, and is considered a critical control for achieving an organization's desired outcomes.¹⁷

¹⁶ PAS 55-2, 18

¹⁷ PAS 55-2, 19

8.1.2 Guidance

Assigning and Defining Internal and External Roles

The organization shall establish and maintain an organizational structure of roles, responsibilities, and authorities, consistent with the achievement of its asset management policy, strategy, objectives, and plans. These roles, responsibilities, and authorities shall be defined, documented, and communicated to the relevant individuals.¹⁸

Responsibilities and authorities of all relevant individuals that contribute to the development, implementation, operation, maintenance, and continual improvement of Asset Management shall be defined.

The entity should ensure that asset management responsibilities are incorporated into the overall job descriptions. Top management should assign clear responsibilities and accountabilities for the management of assets/asset systems and ensure that the individuals who are assigned the responsibility are competent and have adequate resources to discharge their duties.

Development, Implementation and Continuous Improvement

Top management shall provide evidence of its commitment to the development and implementation of the asset management and the continuous improvement of its effectiveness by:¹⁸

1. Appointing a member of top management who shall be responsible for the overall design, maintenance, documentation, review, and improvement of asset management for an organization;
2. Appointing member(s) of management whose responsibility is to ensure that the assets and assets systems deliver the requirements of the asset management policy, strategy, objectives and plans and who have the authority to achieve this;
3. Identifying and monitoring the requirements and expectations of the organization's stakeholders and taking corresponding and timely action;
4. Ensuring that the asset management policy and strategy are consistent with the organizational strategic plan;

¹⁸ PAS 55-2, 18



5. Considering the relationship between the asset management policy, strategy, objectives, and plan(s) with other aspects of the organization and vice versa;
6. Ensuring the viability of the asset management policy, strategy, objectives, and plan(s);
7. Ensuring asset-related risks are identified, assessed and controlled, and are included in the organization's overall risk management framework;
8. Ensuring the availability of sufficient resources; and
9. Communicating to all relevant stakeholders the importance of complying with the requirements of the asset management system in order to achieve its organizational strategic plan.

8.1.3 Advisory

The organization shall ensure that any person(s) under its direct control undertaking asset management related activities has an appropriate level of competence in terms of education, training, or experience. Levels of appropriate asset management competence can be ascertained through the use of a competency requirements framework.¹⁹

In addition, the organization shall develop plans for the human resources required to develop and implement asset management. The organization shall identify the competency requirements for these human resources and plan the training necessary for them to achieve these competencies. It shall arrange for provision of this training and retain associated records.

¹⁹ PAS 55-2, 21



The organization shall establish, implement, and maintain process(es) and/or procedure(s) to make persons working under its control aware of:

1. The asset management related risks associated with their work activities and the asset management benefits of personal performance;
2. Their roles and responsibilities and the importance in complying with the asset management policy, process(es) and/or procedure(s) and plan(s); and
3. The potential consequences of departure from specified asset management process(es) and/or procedure(s).²⁰

8.1.4 Example

The following is an example provided for reference by the Abu Dhabi Department of Municipal Affairs.

Each organization wishing to implement Asset Management must:

- 1. Establish, document, and maintain an organization structure with Asset Management roles, responsibilities, and authorities for establishing, implementing, operating, maintaining, and continually improving their Asset Management in compliance with all the requirements of their Asset Management Policy and Framework.*
- 2. Communicate the Asset Management roles, responsibilities, and authorities to all employees and relevant stakeholders.*

8.2 Operational Planning and Control

8.2.1 Purpose

Operational planning and control is a key aspect of “life cycle” asset management that ensures holistic stewardship over the creation/acquisition, utilization, maintenance, and renewal/disposal of a physical asset.



PLANNING

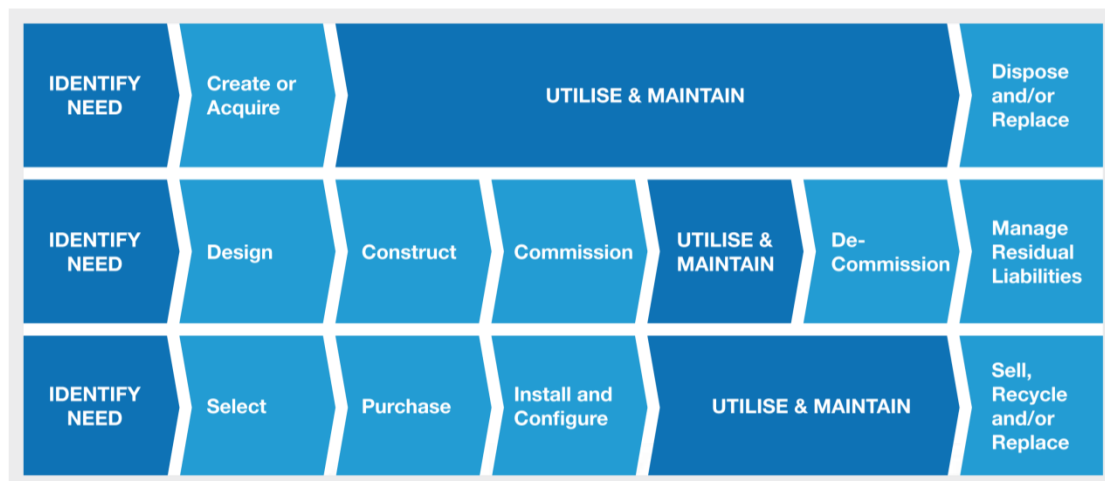
²⁰ PAS 55-1, 21.

8.2.2 Guidance

The organization shall establish, implement, and maintain process(es) and/or procedure(s) for the implementation of its asset management plan(s) and control of activities across the whole life cycle, including:

1. The creation, acquisition or enhancement of assets
2. The utilization of assets
3. The maintenance of assets
4. Decommissioning and/or disposal of assets

Figure 4-1 – Core asset Life Cycle stages and examples of variations²¹



²¹ IAM AMA2 www.theIAM.org



The process(es) and/or procedure(s) for the implementation of the asset management plan(s) and for the control of life cycle activities shall:

1. Be sufficient to ensure that operations and activities are carried out under specified conditions;
2. Be consistent with the asset management policy, asset management strategy and asset management objectives; and
3. Ensure that costs, risks and asset system performance are controlled across the asset life cycle phases.

The organization shall ensure that the planned arrangements, functional policies, standards, processes and procedures, asset management enablers, and resources are utilized for the efficient and cost-effective implementation of the asset management plan(s).

The organization should also establish and maintain arrangements to ensure the effective control of all activities required to fulfil the asset management policy, strategy, objectives and plans, the control of its asset-related risks, and the conformity to legal, statutory and other asset management requirements.

The controlled delivery of the asset management plan(s) through the day-to-day activities of the organization is fundamental to the principles of asset management. In practice, this means that procedures and processes need to be in place that set out roles and accountabilities for every asset management activity, and introduce the necessary governance and controls for managing unplanned events or variations to the plan.

Implementing the Asset Management Plan(s)

Asset management plan(s) should address all of the life cycle phases and all asset types, although the structure and composition of those plans may be varied accordingly. The structure and composition of the plans, and the implementation of those plans will also vary with organizational and industry requirements.

The following guidance should be considered in light of each of the life cycle phases:

1. The asset management plan(s) should state who is responsible for the effective, efficient, and compliant delivery of the plan(s).



2. Deliverables and procedures for managing variations in the delivery of the plan should be agreed and understood by all parties, with appropriate governance in place.
3. Supplier(s), internal and external to the organization, should be consistently informed with the delivery of the plan, and the organization's key performance measures.
4. Information systems should provide adequate information to enable the efficient and economic delivery of asset management plans.
5. Quality assurance processes should be aligned to the delivery of the plan.
6. The delivery of the plan should include scheduling and management of resources and ensuring that sufficient materials, suitably qualified staff, tools, access equipment, etc. are available.
7. Plan delivery should align with constraints and wider business objectives.
8. Progress monitoring of the plan should be ongoing, with regular exchange of information, including forward predictions of completion dates and performance outcomes, between parties responsible for each asset management activity.
9. There should be clear escalation procedures to enable the management of variations in plan delivery to be agreed.
10. Plan delivery should incorporate the updating of asset information and records, and the recording of condition and actual expenditure against assets to enable continuous improvement

Operational Control of Asset Management Processes

In addition to the delivery of the asset management plan(s), organizations should maintain and improve the processes that manage all phases of life of asset systems (create/acquire, utilize, maintain, decommissioning/disposal, etc.) These activities should be controlled in line with the requirements of the asset management strategy, and should have clear boundaries, effective interfaces, and coordination with associated activities. Governance and accountabilities should be unambiguous, effective and should not present any barriers to delivery.

It is essential to develop functional policies in order to provide a framework for the control of specific asset management related activities (such as capital investment, operation, maintenance, materials management, or transport logistics). These policies



should be consistent and guided by the asset management strategy where they relate to the management of activities within the asset management system

Functional policies provide the workforce with clarity for what is expected of them and the boundaries for any permissible variability. They assist managers to implement stated asset management objectives and plans, and they should also constrain them within carefully defined boundaries.

Creation, Acquisition or Enhancement of Assets

Adding to, or enhancing assets, asset systems or the asset portfolio are critical, often high cost activities, with long-term consequences and uncertainties about their future utilization, performance, costs and risks. Procedures and operational controls for asset acquisition, creation, or modification therefore need to match the planning and scheduling processes closely to ensure that required design criteria are met at optimal life cycle cost. Opportunities and options encountered during the acquisition, creation or enhancement of assets should be evaluated for whole life cost, performance, and risk impact to determine if the asset management plan(s) should be changed to exploit the opportunities and/or mitigate the risks.

In the early life cycle stage (create/acquire assets) it is of particular importance to ensure that new assets meet quality assurance requirements and are handed over in good operational order to those responsible for future operation (utilization and maintenance) of the assets. This will include consideration of training and knowledge transfer and the provision of necessary design, operations, performance, reliability, maintainability and life cycle assumptions, guidance and data. Effective commissioning procedures, warranty conditions, and provision of all records and asset data should normally be tied in to contractual requirements.

Utilization of Assets

During the utilization of assets, consideration should be given to how operating criteria are defined, documented, and communicated, as well as how they are controlled and monitored. It is important that the operational parameters and controls are considered and managed in conjunction with maintenance arrangements (because of the potential impact of utilization upon asset degradation characteristics, failure risks, and asset life cycles).



Maintenance of Assets

Controls for maintenance of assets should be consistent with ensuring compliance with the asset management policy, asset management strategy and asset management objectives, and take account of asset operating parameters. Consideration should be given to control mechanisms for ensuring that:

1. Staff are competent at the point of work;
2. Operating parameters are understood; and
3. Appropriate records are kept.

Maintenance management systems are often used to coordinate maintenance activities. The organization should ensure that such systems are selected, implemented, and utilized appropriately and effectively for the coordination and management of different types of maintenance activity. Work procedures or instructions, standards and systems for supervision, checking, or approvals should be designed to ensure adequate control of quality, consistency and control of risk in the delivery of maintenance activities.

The control of maintenance activities should also reflect the criticality and urgency of the tasks, the dynamic nature of condition-based work, work bundling opportunities and resource constraints.

Decommissioning and/or Disposal of Assets

At decommissioning, the safe management and disposal of any redundant equipment should follow appropriate policies, including environmental management. From an asset management perspective, decommissioning should also include consideration of the long-term management of similar assets, and controlled retention if appropriate (for example, spare parts). It is also essential that records and asset information are correctly updated – it is good practice to write this into decommissioning procedures and include such obligations in contractual requirements. Decommissioning should ensure that equipment is removed as planned, and that remaining equipment is left in the required safe condition and that any relevant signs and notices are updated.

8.2.3 Advisory

Controls must be strategically devised and implemented to provide a sufficient level of oversight by a company's management. Implementation should involve an iterative process to achieve a balance between cost, risk and performance, to resolve conflicts

between what is planned and what can be achieved, while taking into account the constraints faced by the organization. In addition, organizations should document operational processes and monitor/manage risks.

8.2.4 Examples

The following list provides examples of the range of operational controls that might be employed by the organization in managing its assets.

Control of Imported Risks

1. Assessment and approval of the design for new plant or equipment
2. Procedures ensuring the availability of documentation for the safe handling, operation and maintenance of new machinery, equipment, materials or substances
3. Evaluation, and periodic re-evaluation, of the competence of contractors
4. Procedures for the review, approval and control of contracts

Controls on Specific Tasks

1. Pre-determination and approval of working methods
2. Pre-qualification of personnel for hazardous/critical tasks
3. Permit-to-work systems, and procedures controlling the entry and exit of personnel to hazardous areas or those containing critical equipment
4. Procedures for tactical planning, development, project management, scheduling and resource management

Controls on Through-Life Management of Plant and Equipment

1. Evaluation and approval procedures at the various asset life cycle stages, e.g. Creation/acquisition, utilization, maintenance and decommissioning/disposal
2. Procedures for the operation of plant and equipment
3. Procedures for repair, maintenance and inspection activities
4. Procedures for calibration and maintenance of tools and test equipment
5. Procedures for the management of spares
6. Isolation of equipment and segregation and control of access
7. Maintenance, inspection and testing of protection systems and emergency equipment such as:

- a. Guarding and physical protection
- b. Shutdown systems
- c. Fire detection and suppression equipment
- d. Essential monitoring devices

9 Asset Information

9.1 Information Requirements

9.1.1 Purpose

Good asset management requires meaningful, quality, and timely information. Asset management information is essential for achieving an effective and efficient asset management system and for the continual improvement of that system. This information includes asset registers, drawings, contracts, licenses, legal, regulatory, and statutory documents, policies, standards, guidance notes, technical instructions, procedures, operating criteria, asset performance and condition data, tacit knowledge and all types of asset management records.²²

9.1.2 Guidance

The organization should determine processes for managing asset information over its life cycle from identifying information needs, planning, acquiring information, maintenance, deployment and finally archival and disposal of information.

Employees and other stakeholders shall have access to the information relevant to their asset management activities or responsibilities. Where separate asset management information systems exist, the organization shall ensure that the information provided by these systems is consistent. These procedures shall ensure:



INFORMATION

²² Further information on documentation is identified in 4.4.5 and records in 4.6.6 From PAS 55-2 Section 4.4.6 Information Management



1. The adequacy of the information is approved by authorized personnel prior to use;
2. Information is maintained and adequacy assured through periodic review and revision, including version control where appropriate;
3. Allocation of appropriate roles, responsibilities and authorities regarding the origination, generation, capture, maintenance, assurance, transmission, rights of access, retention, archiving and disposal of items of information;
4. Obsolete information is promptly removed from all points of issue and points of use, or otherwise assured against unintended use;
5. Archival information retained for legal or knowledge preservation purposes is identified; and
6. Information is secure and, if in electronic form, is backed up and can be recovered.

Asset management information should be capable of enabling an organization to:

1. Optimize its asset management strategy and optimize/prioritize its asset management plan(s);
2. Assess the financial benefits of planned improvement activities;
3. Determine the operational and financial impact of asset unavailability or failure;
4. Make life cycle cost comparisons of alternative capital investments;
5. Identify expiry of warranty period and warranty;
6. Determine the end of economic life of assets/asset systems, e.g. The point in time when the asset related expenditure exceeds the associated income;
7. Determine the cost of specific activities (activity based costing), e.g. The total cost of maintaining a specific asset(s)/asset system;
8. Obtain/calculate asset replacement values;
9. Undertake financial analysis of planned income and expenditure;
10. Obtain/calculate the financial and resource impact of deviating from plans that might result in a change in asset availability or performance (e.g. What is the financial impact of deferring the maintenance of a specific generator by six months);
11. Assess its overall financial performance;
12. Undertake the ongoing identification, assessment and control of asset related risks; and

13. Comply with statutory and regulatory obligations.

The systems for managing asset management information should be designed so that data and information is readily accessible and available to all relevant personnel under routine and non-routine conditions, including emergencies.

All information, including documentation, required for the operation of the asset management system and the performance of the organization's asset management activities should be controlled as part of the organizations greater document management system.

9.1.3 Advisory

An organization should use best practices for its industry, or look to industry peers to determine the appropriate asset information that is required. Overall, organizations seeking asset management elements on information management, should consider identifying the information essential to meeting the requirements of ISO 55000.

9.1.4 Examples

The following is an example of Asset Information Requirements provided by the Abu Dhabi Department of Municipal Affairs:

The Municipality shall:

- 1. Establish, implement, and maintain policy, process(es)/procedure(s) for managing asset data and information over the entire life cycle of an asset, including process for recording, deploying, archival, retention, and disposal of information in compliance with the ADSIC data protocol*
- 2. Define and allocate roles and responsibilities for the management of information over its life cycle*
- 3. Ensure that arrangements are in place for monitoring compliance with the defined policies and process(es)/procedure(s)*

Some examples of information to be considered include the following:

1. Descriptions of assets, their functions, and the asset system they serve;
2. Unique asset identification numbers;



3. Locations of the assets, possibly using spatial referencing or geographical information systems;
4. Details of ownership and maintenance demarcation where assets interface across a system or network of assets;
5. Engineering data, design parameters, and engineering drawings;
6. Details of asset dependencies and interdependencies;
7. Vendor data (details of the organization that supplied the asset);
8. Commissioning dates and data;
9. Key performance indicators;
10. Access planning and work schedules;
11. Details of the tasks to be carried out;
12. Criteria of non-conformance and the actions to be taken;
13. Historical record of planned and unplanned maintenance tasks performed;
14. Identities and levels of spares held, interchangeability, specifications and storage locations;
15. Financial data including the cost of historical and planned maintenance tasks, operating costs, downtime impact, current asset replacement value, original purchase cost; and
16. Asset-related contractual information.

9.2 Documented Information

9.2.1 Purpose

Documentation describing how physical assets will be managed to achieve the organizational strategic plan needs to be adequately informative and unambiguous. The asset management policy, in particular, mandates the direction, principles, and absolute requirements, and is a key driver for the asset management system.²³ Up-to-date documentation can ensure that an organization's asset management system can be adequately understood, communicated, and operated.

9.2.2 Guidance

The organization shall establish, implement, and maintain up-to-date documentation to ensure that its asset management system can be adequately understood,

²³ PAS 55-2, xiii



communicated, and operated. The asset management system documentation shall include:

1. A description of the main elements of the asset management system and their interaction, and direction to related documents;
2. The asset management policy, strategy, and objectives; and
3. Documents, including records, specified by ISO regulations.

9.2.3 Advisory

Asset management policy, strategy and other elements of the asset management system do not have to be produced as separate documents. It is also important that documentation is proportional to the level of complexity and risks being managed. It should also be appropriate to the level at which the documentation will be used and kept to the minimum required for effectiveness and efficiency.

In establishing its documented information needs, the organization should consider the identification and definition of documented information that will be managed and maintained over the life cycle, taking into account its period of responsibility for the assets. The organization should also consider the requirement to maintain this documented information for any defined period beyond the disposal of the assets, in accordance with its business, legal and regulatory requirements.

9.2.4 Examples

The following is an example of requirements for information documentation provided by the Abu Dhabi Department of Municipal Affairs:

The Organization shall:

- 1. Establish, implement, and maintain up-to-date documentation to ensure that its Asset Management System can be adequately understood, communicated, and operated consistently across the organization.*
- 2. The Asset Management System documentation shall include, as a minimum:*
 - a. A high level description of the main elements of the system and their interaction, and direction to related documents;*
 - b. The asset management policy, strategy, objectives, and plan(s)*

c. Roles, responsibilities and authorities for key asset management roles

d. Processes critical to the delivery of asset management plans and achievement of asset management objectives.

3. The documentation shall be properly controlled, distributed to the concerned people, regularly reviewed for appropriateness and updated as necessary. Documentation of external origin necessary for the operation of the Asset Management System (for example technical standards, O&M manuals, etc.) shall also be controlled.

Other examples of documented procedures which an organization decides it needs to establish to control its asset management activities may include procedures for:

1. The design, procurement, construction, installation and commissioning of new equipment;
2. The review, approval and control of contracts;
3. The operation of plant and equipment;
4. Repair, maintenance and inspection activities;
5. Calibration and maintenance of tools and test equipment;
6. Renewal, refurbishment, modification and disposal of equipment; and
7. Management of spares.

10 Organization & People

10.1 Resources

10.1.1 Purpose

In many organizations, there are often more potential tasks to carry out than resources, time or budgets will permit. Optimizing and prioritizing tasks and plans are a way of life for organizations that wish to enable proper asset management given a limited amount of available resources, be they financial, environmental, or human.²⁴



²⁴ PAS 55-2, vii

10.1.2 Guidance

For organizations with established asset management, the adequacy of resources can be at least partially evaluated by comparing the planned achievement of asset management objectives with actual results. Consideration should also be given to whether the resources provided were excessive.²⁵

10.1.3 Advisory

ISO 55001 requires that the organization determine the resources required for asset management, and identify any gaps that may be present. Asset management activities should be prioritized to aid in assigning resources to those activities. Further details should be referenced in Clause 7.1 of ISO 55001.

10.2 Competence

10.2.1 Purpose

Activities and processes within the asset management system require the integration and alignment of many aspects of a business, and depend upon a wide variety of individual and corporate competences. In particular, the behavior, knowledge, and competence of the workforce have a fundamental influence on the performance of the physical assets and are critical enablers of asset management.²⁶

The organization should ensure that all employees who have been assigned asset management roles and responsibilities are aware of the importance, are adequately trained, and are competent to discharge their responsibilities. This is critical for the successful delivery of the asset management strategy and achievement of asset management objectives.

²⁵ PAS 55-2, 19-20.

²⁶ PAS 55-2, ix. References to competence requirements and frameworks may be viewed in the selected works from PAS 55-2: Asset Management Competence Requirements Framework (Version 2.0) and User Guidance Notes, Institute of Asset Management, London 2008; UK Standard for Professional Engineering Competence, Engineering Council, 2005.

10.2.2 Guidance

The organization shall ensure that any person(s) under its direct control undertaking asset management related activities has an appropriate level of competence in terms of education, training, or experience.²⁷

Competency in asset management should be addressed at all levels of the organization in a way that ensures alignment between roles and levels and not just for those considered to be asset managers. Where asset management activities are outsourced, the organization shall ensure that contracted service providers have arrangements in place to ascertain and demonstrate that their staffs are competent.²⁸

10.2.3 Advisory

The Organization shall ensure that all its employees and contracted service providers with asset management responsibilities are:

1. Fully aware of the asset management policy; their contribution to the effectiveness of the Asset Management System, including its benefits; and the implications of not conforming to Asset Management;
2. Competent in terms of education, training, or experience to discharge the asset management responsibilities assigned to them;
3. Provided the necessary training to achieve the competency required; and

10.3 Awareness

10.3.1 Purpose

Closely tied to competence, awareness is a key element of asset management on multiple levels, from building awareness of asset management requirements and expectations, to awareness of legal requirements, to the on-going training of personnel.

²⁷ PAS 55-2, 21

²⁸ PAS 55-2, 21



10.3.2 Guidance

Activities and processes within the asset management system require the integration and alignment of many aspects of a business, and depend upon a wide variety of individual and corporate competencies. An organization that is heavily dependent upon the performance of physical assets should actively monitor, develop, and maintain an appropriate balance of these competencies. In particular, asset management should provide for adequate skills and competencies in the performance of the following key activities and processes.²⁹

In addition, staff, contractors, etc. should know and understand the elements of the asset management systems and activities that are relevant to their respective role.

10.3.3 Advisory

Actions that can be taken to improve the asset management awareness of an organization are based around communication. The asset management system, processes, and relevant personnel are all communicated, as needed, on a consistent basis across multiple communication mediums (e.g., emails, meetings, notice boards, newsletters, etc.).

10.4 Communication

10.4.1 Purpose

Communication, participation, and consultation are critical enablers of a well-executed asset management plan because they are not just about the distribution of information. Effective communication is a two-way process, both top-down and bottom-up. Interfacing with internal and external stakeholders can ensure that asset management information is provided, received, and understood across the organization, while consultation allows for management and others to consider and discuss issues of mutual concern. It involves seeking acceptable solutions to problems through the general exchange of views and information.³⁰

²⁹ PAS 55-2, 23

³⁰ PAS 55-2, 23



10.4.2 Guidance

The organization should put in place adequate arrangements for effective communication and consultations with employees, service providers and other relevant stakeholders on pertinent asset management matters. This promotes ownership, commitment, and motivation to embrace change and efficient delivery of asset management activities.

The organization, through the processes of communication and consultation, should encourage participation in good asset management and support for its asset management policy, strategy and objectives from those affected by its activities or interested in its asset management system.

10.4.3 Advisory

Asset management activities carried out by the organization should be communicated to relevant stakeholders periodically, in a coordinated way, as an integral part of the organization's asset management activity and asset management system.

In addition, the appropriate use of consultation and participation can be a powerful aid to the development of the workforce, promoting teamwork, individual and collective responsibility and accountability, and helping to create an organizational culture of continuous improvement.

The Organization shall ensure that:

1. Pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers through an information sharing system;
1. Appropriate consultation on pertinent asset management issues is undertaken with employees and other stakeholders, including contracted service providers; and
2. Arrangements are in place for engaging with customers on a regular basis to agree the Levels of Service, performance standards and measure the satisfaction with the services provided, and informing them of any significant events that may impact on the services.

10.5 Outsourcing

10.5.1 Purpose

Outsourcing is when an organization designates another party to carry out asset management activities. In fact, many asset management organizations have developed contracting strategies and supply chain alliances to provide them with asset management services.³¹ Such agreements can result in an organization effectively outsourcing most of its asset management activities from asset management strategies, objectives and plans down to the activities in the asset management plan(s).³²



10.5.2 Guidance

Where an organization chooses to outsource any aspect of asset management, the organization shall ensure control over such aspects. The organization shall determine and document how these parts will be controlled and integrated into the organizations' asset management system. The organization shall also identify and document:

1. The processes and activities that are to be outsourced (including the scope and boundaries of the outsourced processes and activities and their interfaces with the organization's own processes and activities);
2. The processes and scope for the sharing of knowledge and information between the organization and the contracted service provider(s); and
3. Authorities and responsibilities within the organization for managing the outsourced processes and activities.

Many asset management organizations have developed contracting strategies and supply chain alliances to provide them with asset management services. Business

³¹ PAS-55-2, 20

³² PAS 55-2, 20-21



relationship models, such as engineering, procurement, and construction (EPC), public-private partnerships (PPP), private finance initiatives (PFI) and build-operate-transfer contracts (BOT) have emerged to enable organizations to deliver complex asset investments and asset management programs.

10.5.3 Advisory

If an organization relies heavily on outsourcing to carry out asset management activities, then it must also ensure that a controls system is in place to help give assurance that the SAMP is carried out and KPIs are achieved.

In addition, an organization should consider what potential risks cannot be transferred, even if the related asset management activities are transferred (e.g., damage to its reputation). A corresponding control over those risks should be maintained within the organization.

11 Risk & Review

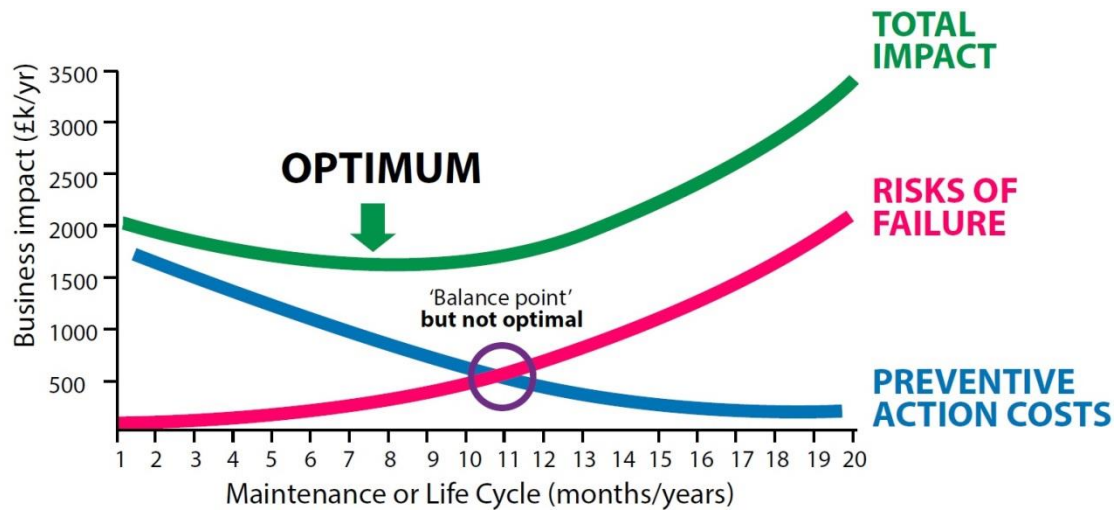
11.1 Risk Management

11.1.1 Purpose

Risk management is an important foundation for proactive asset management. Its overall purpose is to understand the cause, effect, and likelihood of adverse events occurring, to optimally manage such risks to an acceptable level, and to provide an audit trail for the management of risks.³³

³³ PAS 55-2, 30

Figure 11-1 Optimum value achieved by optimizing total cost/risk/performance impact³⁴



The organization should determine the actions that are necessary for addressing risks when planning for asset management (see also ISO 55001:2014, 6.1).³⁵ Asset management involves balancing costs, risks, and performance over the life cycle of assets. Thus it is crucial to identify, prioritize, and treat risks relating to assets and asset management activities.

Information about risks should be used in all aspects of management of assets and communicated to employees and other stakeholders as appropriate.

Furthermore, it is essential to ensure continuity of critical asset management activities and services to customers and have contingency plans in place to identify and rapidly respond to major incidents and emergency situations.

11.1.2 Guidance

Risk Management Process(es)³⁶

The organization shall establish, implement, and maintain documented process(es) and/or procedure(s) for the ongoing identification and assessment of asset-related

³⁴ IAM AMA2, Figure 3. www.theIAM.org

³⁵ NOTE: In this International Standard, it is assumed that the term “risk” also includes opportunities (see ISO 55000:2014, 3.1.21).

³⁶ PAS 55-2, 30



and asset management-related risks, and the identification and implementation of necessary control measures throughout the life cycles of the assets.

This is achieved by:

1. Identifying potential risks associated with the assets, and making an estimate of the associated risk levels, on the basis of existing or proposed risk controls;
2. Determining whether these risks are tolerable;
3. Determining whether further analysis is required to establish whether the risks are, or are not, tolerable; and
4. Devising risk controls where these are found to be necessary or desirable.

Risk Management Methodology

Risk Management principles should be in place and integrated into all activities and procedures of asset management, together with the necessary governance and assurance to ensure that risk controls are effectively implemented and monitored throughout the whole asset life cycle.

The organization's methodology for risk management shall:

1. Be proportionate to the level of risk under consideration;
2. Be defined with respect to its scope, nature and timing to ensure it is proactive rather than reactive;
3. Include, where appropriate, the assessment of how risks change or can change over time and usage;
4. Provide for the classification of risks and identification of those risks that are to be avoided, eliminated or controlled by asset management objectives and plans;
5. Be consistent with the organization's operating experience and the capabilities of risk control measures employed; and
6. Provide for the monitoring of required actions to ensure both the effectiveness and the timeliness of their implementation.

Risk Registers

Risk registers are a common and effective mechanism for recording and managing risks within the organization. At a corporate level, this may comprise a list of significant risks defined in terms of likelihood and consequence, together with existing mitigation, planned actions and responsibilities.



The type of risk should also be recorded to enable clear classification and auditability of safety and other types of risk. The monitoring and management of this risk register includes senior management review, together with clear processes and accountabilities for supporting processing and delivery of planned mitigation. The process of maintaining, updating, and auditing the risk register is one of the key asset management processes, and should be referenced in the asset management strategy.

A sample risk register is available for reference as Annex 1 – Sample Infrastructure Risk Register.

Management of Asset-Related Risks

The management of asset risks should be carried out using processes that are consistent with any corporate risk register, enabling risks to be escalated to the corporate risk register where they are of sufficient magnitude. Asset-related risks need to be identified and recorded in a way that is appropriate to the type of asset or asset system, taking into account their utilization and variety of failure consequences.

The nature of asset-related risks is that they are also likely to vary over time, as a result of many factors, including the degradation and fatigue of assets. Good risk management systems for asset management include recognition of how risks change with time (for example, with age or use), and the control of such changing risks is critical to asset maintenance and renewal decisions.

Asset Criticality

The concept of asset criticality is a particular manifestation of risk management. This is the recognition that assets and asset systems have differing importance (i.e., value), or represent different vulnerabilities, to the organization.

Criticality will usually include, but is not limited to:

1. The risks of asset failure or non-performance;
2. Capital value, performance or efficiency; and
3. Flexibility and other characteristics that reflect organizational goals and values.



The corresponding asset characteristics should be assessed and weighted or scaled in a consistent manner to determine asset criticality for the purposes of prioritized asset management attention.

Risk Identification & Assessment

The identification and assessment of risks shall consider the probability of credible events and their consequences, and shall as a minimum cover:

1. Physical failure risks, such as functional failure, incidental damage, malicious damage or terrorist action;
2. Operational risks, including the control of the asset, human factors and all other activities which affect its performance, condition or safety;
3. Natural environmental events (storm, floods, etc., including the likely effects of climate change);
4. Factors outside of the organization's control, such as failures in externally supplied materials and services;
5. Stakeholder risks, such as failure to meet regulatory performance requirements or risks to the reputation of the organization; and
6. Risks associated with the different life cycle phases of assets.

Risk identification and assessment needs to recognize and include consideration of both probability and consequence. The complexity of modeling and risk controls should be commensurate with the nature and magnitude of the risks being managed. It is important that risk assessment is applied coherently and consistently throughout the organization. Ideally, risk assessment should be based on a common approach and methodology with a common calibrated scale for quantification, but if this is not practical, then care should be taken in the way risk is treated for different types or scales of risk.

Organizations should consider their individual requirements, including the nature and scale of their business, the availability of information and implementation practicalities, when adopting appropriate methods and techniques.

Use and Maintenance of Asset Risk Information

The organization shall ensure that the results of risk assessments and the effects of risk control measures are considered and, as appropriate, provide input into:

1. The asset management strategy, objectives and plan(s);



2. The identification of adequate resources including staffing levels;
3. The identification of training and competency needs;
4. The determination of controls for assets' life cycle activities, and the implementation of asset management plan(s); and
5. The organization's overall risk management framework.

The organization shall keep the results of identification of risks, risk assessments and determined controls up-to-date, and document these where not doing so could affect the delivery of the asset management objectives and the asset management strategy.

11.1.3 Advisory

Risks for asset management should fit into the risk profile for the organization as a whole, and be conducted within the bounds of the organization's approach to risk management.

Further details should be referenced in ISO 55001.

11.2 Management of Change

11.2.1 Purpose

Internal or external changes – personnel, processes, or policies – that affect assets or asset management systems can impact on the organization's ability to achieve its objectives and long-term goals. These changes can be evaluated ahead of time and their risks mitigated prior to implementation.

11.2.2 Guidance

Where existing arrangements are revised, or new arrangements are introduced that could have an impact on asset management activities, the organization shall assess the associated risks before the arrangements are implemented. The new or revised arrangements to be considered shall include:

1. Revised organizational structure, roles or responsibilities;
2. Revised asset management policy, strategy, objectives or plans;
3. Revised process(es) or procedure(s) for asset management activities;
4. The introduction of new assets, asset systems or technology; and
5. The introduction of new contractors or suppliers.

The organization should ensure that risk assessments are performed for any significant changes to elements of the asset management system. This does not necessitate additional risk management processes but ensures that there are existing arrangements in place which provide assurance that risk assessment is carried out when changes occur.

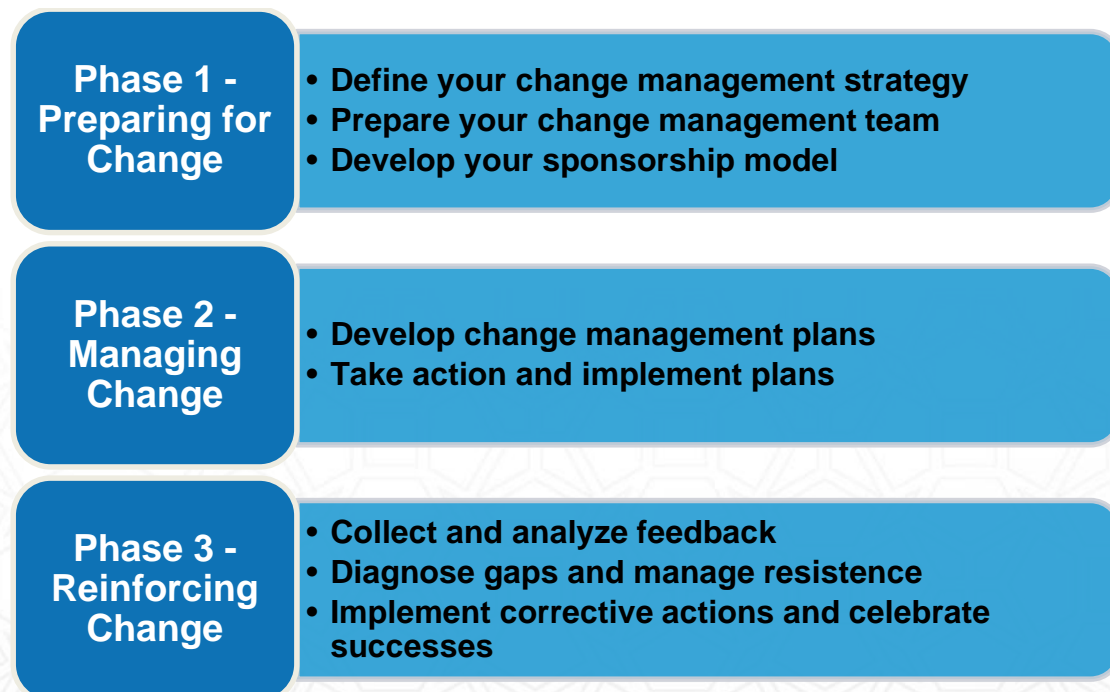
11.2.3 Advisory

Changes are bound to occur and thus an organization should find the appropriate actions to mitigate and/or minimize any downside effects. It should also have the capability to make evidence-based decisions on proposed changes and the ability to consider scenarios systematically across the entire organization.

11.2.4 Example

Figure 11-2 is an illustrative example of the change management process.

Figure 11-2: Change Management Process³⁷



³⁷ Prosci Inc. <http://www.change-management.com/change-management-process.htm>

11.3 Monitoring, Measurement, Analysis and Evaluation

11.3.1 Purpose

Monitoring and continual improvements within the asset management system are integral to adopting a holistic and complete approach to asset management. The Plan-Do-Check-Act (PDCA) framework notes that it is necessary to monitor and measure results against asset management policy, strategy, objectives, legal and other requirements, and record and report the results in order to continually improve and fine-tune the performance of an organization's physical assets.³⁸ This bottom-upwards monitoring of asset characteristics, problems, risks, and opportunities can provide the factual basis for adjusting and refining realistic asset management strategies and plans.³⁹



PERFORMANCE EVALUATION

11.3.2 Guidance

The organization shall establish, implement, and maintain process(es) and/or procedure(s) to monitor and measure the performance of asset management and the performance and/or condition of assets and/or asset systems. The process(es) and/or procedure(s) shall provide for the consideration of:

1. Reactive monitoring to identify past or existing nonconformities in the asset management system, and any asset-related deterioration, failures or incidents;
2. Proactive monitoring to seek assurance that the asset management system and assets and/or asset systems are operating as intended;
3. Leading performance indicators to provide warning of potential non-compliance with the performance requirements of the asset management system and/or the assets and/or asset systems;

³⁸ PAS 55-1, xiii

³⁹ PAS 55-2, xi



4. Lagging performance indicators to enable detection of, and to provide data about, incidents and failures of the asset management system, and for incidents, failures, or deficient performance of assets and/or asset systems;
5. Both objective and subjective qualitative and quantitative measures, appropriate to the needs of the organization;
6. Monitoring the overall effectiveness and efficiency of the asset management system; and
7. Recording of monitoring and measurement data and results to facilitate subsequent analysis of problem causes to assist in determining corrective or preventive actions and/or to facilitate continual improvement.

It is important to consider the source of data for monitoring. The data for leading indicators results mainly from proactive monitoring, while the data for lagging indicators results mainly from reactive monitoring.

11.3.3 Advisory

Performance and condition measurement and monitoring focuses on the performance of the asset management system (i.e., processes) and the performance and/or condition of the assets or asset systems on a day-to-day basis, whereas auditing is a process for reviewing and evaluating the effectiveness of the asset management system retrospectively (normally based on an annual plan). The two should not be confused.

Steps to assist an organization include:

1. Conduct performance assessment and improvement
2. Monitor the effectiveness of asset management
3. Assess outcomes

11.4 Internal Audit

11.4.1 Purpose

Internal audits allow an organization to ensure that the asset management system conforms to its requirements. This is a very important element of asset management, and should be carried out to track progress and/or problems related to meeting the objectives and plans of an organization

11.4.2 Guidance

The organization shall establish, implement, and maintain process(es) and/or procedure(s) for evaluation of its compliance with applicable legal and other regulatory or absolute requirements, shall determine the frequency of such evaluations, and keep records of the results of these evaluations.

An organization should establish, implement, and maintain a procedure for periodically evaluating its compliance with the legal or other requirements that are applicable to its asset management, as part of its commitment to compliance.

Evaluation of the organization's compliance should be performed by competent persons either from within the organization and/or using external resources. A variety of inputs can be used to assess compliance, including:

1. Audits;
2. The results of regulatory inspections;
3. Analysis of legal and other requirements;
4. Reviews of documents and /or records of incidents and risk assessments;
5. Interviews;
6. Facility, equipment and area inspections;
7. Project or work reviews;
8. Analysis of test results from monitoring and testing; and
9. Facility tours and/or direct observations.

11.4.3 Advisory

Audits should be carried out in a thorough and productive manner and always focus on the asset management system. The audit process should be as neutral as possible, and avoid singling out the performance or actions of individuals.

11.5 Management Review

11.5.1 Purpose

Management reviews provide top management with an opportunity to evaluate the continuing suitability, adequacy, and effectiveness of the assets, and asset management. Top management should be involved in the review of the various elements of asset management activities and outcomes. Consideration should also be made for ensuring the policy, objectives, and plans are still appropriate.

11.5.2 Guidance

Top management shall review at intervals that it determines appropriate the organization's asset management system to ensure its continuing suitability, adequacy, and effectiveness. Reviews shall include assessing the need for changes to the asset management system, including asset management policy, asset management strategy and asset management objectives.

Input to management reviews shall include:

1. The results of internal audits and evaluations of compliance with applicable legal requirements and with other requirements to which the organization subscribes;
2. The results of communication, participation, and consultation with employees and other stakeholders;
3. Relevant communication(s) from external stakeholders, including complaints;
4. Records or reports on the asset management performance of the organization;
5. The extent to which objectives have been met;
6. Performance in addressing incident investigations, corrective actions and preventive action;
7. Follow-up actions from previous management reviews; and
8. Changing circumstances, including developments in legal and other requirements related to asset management and changes in technology.

Outputs from management reviews, which are relevant to the organizational strategic plan, shall be made available to top management for consideration in reviews of the organizational strategic plan and other plans related to asset management.

11.5.3 Advisory

The management review should cover the scope of the asset management system and the asset management activity; although, it is not necessary to review all elements at once and the review process may take place over a period of time.

Reviews of the implementation and outcomes by top management should be regularly scheduled and evaluated. While ongoing system reviews are advisable, formal reviews should be structured and appropriately documented.

11.5.4 Example

The following is an example of requirements for management review provided by the Abu Dhabi Department of Municipal Affairs:

The organization shall ensure that:

- 1. The top management regularly reviews the Asset Management System (including asset management policy, strategy, objectives, and plan(s)) to ensure its continuing suitability, adequacy and effectiveness;*
- 2. Comprehensive inputs for management reviews have been determined and are available;*
- 3. Mechanism for making changes to Asset Management resulting from management reviews are in place;*
- 4. Relevant output from management reviews shall be made available to top management for consideration during reviews of the organizations' strategic plan, goals and objectives; and*
- 5. Records of management reviews are kept and communicated to employees, stakeholders and service providers as appropriate.*

11.6 Non-Conformity and Corrective Action

11.6.1 Purpose

Nonconformities (including failures) can occur in its assets, and asset management activities. Processes and procedures must be implemented by an organization to identify and correct any non-conformities. Corrective actions are actions taken to address the root cause(s) of identified non-conformances, or incidents, in order to manage their consequences, and to prevent or reduce the likelihood of recurrence.



11.6.2 Guidance

The organization shall establish, implement, and maintain process(es) and/or procedure(s) for the handling and investigation of failures, incidents, and nonconformities associated with assets, asset systems and the asset management



system. These process(es) and/or procedure(s) shall define responsibility and authority for:

1. Taking action to mitigate consequences arising from a failure, incident, or nonconformity;
2. Investigating failures, incidents, and nonconformities to determine their root cause(s);
3. Evaluating the need for preventive action(s) to avoid failures, incidents, and nonconformities occurring; and
4. Communicating, as appropriate to relevant stakeholders, the results of investigations and identified corrective action(s) and/or preventive action(s).

Investigations shall be performed within a timescale commensurate with the actual and/or potential consequences of the failure, incident, or nonconformity.

11.6.3 Advisory

The organization should establish, implement, and maintain process(es) for instigating corrective action(s) for eliminating the causes of nonconformities or incidents identified from investigations, evaluations of compliance and audits, to avoid their recurrence.

Any corrective actions taken and their timings should be commensurate with the risk(s) encountered. Where a corrective action identifies new or changed risks, or the need for new or changed process(es), procedure(s) or other arrangements to control life cycle activities, the proposed actions should be risk assessed prior to implementation.

11.7 Preventative Action

11.7.1 Purpose

Preventative actions are taken before an incident occurs, and are directed at root causes of problems associated with assets.

11.7.2 Guidance

Preventive actions are those taken to address the root cause(s) of potential non-conformances or incidents, as a proactive measure, before such incidents occur.

Examples of elements to be considered in establishing and maintaining preventive action procedures include:

1. The use of appropriate sources of information, e.g. trends in asset performance indicating imminent risk of failure, failure rates across a population of assets, revised risk assessments, data on environmental changes;
2. Identification of any potential problems requiring preventive action;
3. Use of an appropriate methodology to select a suitable and sufficient preventive action;
4. Initiation and implementation of preventive action; and
5. Recording of any changes in procedures resulting from the preventive action.

11.7.3 Advisory

The organization should establish methods for proactively carrying out preventative actions to help eliminate the potential of non-conformities or poor performance.

11.8 Continual Improvement

11.8.1 Purpose

Organizations that continually improve focus on progressively making things better in order to fulfill policies and objectives.



IMPROVEMENT

11.8.2 Guidance

The organization shall establish, implement, and maintain process(es) and/or procedure(s) for identifying opportunities and assessing, prioritizing, and implementing actions to achieve continual improvement in:

1. The optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle; and
2. The performance of the asset management system.

The organization shall actively seek and acquire knowledge about new asset management-related technology and practices, including new tools and techniques, and these shall be evaluated to establish their potential benefit to the organization.

11.8.3 Advisory

Organization should seek to continually improve asset management and the asset management system. Including the following:

1. Establish, implement and maintain top-down and bottom-up process(es) for assessing, prioritizing and implementing improvement actions and evaluating effectiveness;
2. Actively seek and acquire knowledge about new asset management- related technology and practices, including conferences, seminars, online publications and competitor check-ups; and
3. Determine a process of improvement that includes identification of needs, evaluation of options, risk assessment, links to decision-making criteria, execution, and tracking of outcomes

11.9 Understanding the Needs and Expectations of Stakeholders

11.9.1 Purpose

An organization's stakeholders can be very diverse. Different stakeholders include the public, regulator and law-makers, staff, and shareholders. Each of these groups is likely to have a multitude of preferences and requirements that must be considered by an organization.

In addition, stakeholders are increasingly seeking assurance that the asset management of an organization will deliver safety, continuity of service and financial performance. Because organizations are ever more sensitive to the impact that adverse public opinion and negative publicity can have on their business when assets or asset systems fail, it is critical to consider stakeholder perspectives, values, and desired outcomes.⁴⁰

11.9.2 Guidance

The organization shall establish, implement, and maintain process(es) and/or procedure(s) for identifying and accessing the legal, regulatory, statutory, and other applicable asset management requirements.

⁴⁰ PAS 55-2, xi



The organization shall also ensure that the applicable legal and other external obligations or requirements are identified and incorporated into the corresponding elements of asset management.

The organization shall keep this information up-to-date. The organization shall communicate information on legal and other requirements to all relevant stakeholders.

An Organization seeking to implement Asset Management should communicate its intentions to do so, which may include publishing a copy of the Asset Management Policy in the public domain for all to access freely. Such openness will allow for continual engagement to keep stakeholders involved.

11.9.3 Advisory

The organization should identify and review the stakeholders that are relevant to asset management and the needs and expectations of these stakeholders.

1. Internal stakeholders include:
 - a. Employees within the organization;
 - b. Employee representatives;
 - c. Groups within the organization, i.e. functional groups (e.g. engineering, accounting, maintenance, operations, purchasing, receiving, logistics, safety delegates); and
 - d. Shareholders, management consortiums, owners.
2. External stakeholders include:
 - a. Customers, users, suppliers, service providers and contractors;
 - b. Non-governmental organizations, including civil society organizations, consumer organizations and the media with an interest in issues related to Asset Management;
 - c. Government organizations, government agencies, regulatory authorities, and politicians at all levels of government;
 - d. Investors, taxpayers and local communities;
 - e. Those in society interested in social, financial, environmental or other forms of sustainability; and
 - f. Financial institutions, rating agencies, and insurers.



Stakeholders' needs and expectations should be documented and communicated. This may be captured in a statement of stakeholders needs within the SAMP and should reference any mandatory requirements, as well as the expectations of different stakeholder groups. The organization should consider a means of tracking how current the information is, and the methods involved for its collection.

An overall asset management policy should be communicated to all relevant stakeholders, including contracted service providers, where there is a requirement that these persons are made aware of their asset management policy-related obligations.

Each organization must establish an Asset Management Framework to define the regulatory requirements and provide best practice guidance to assist them in meeting the requirements.

12 Elements for Consideration in Abu Dhabi

12.1 Asset Transfer

The Government of Abu Dhabi Emirate is currently preparing various mandatory procedures, regulations, policies, and methodologies addressing asset handover from developers to government entities and enforcing best-practice methodologies for asset evaluation, useful life assessment, etc. Once published, these requirements shall be implemented in conjunction with the guidance provided here, and in accordance with relevant government instructions/decrees/decisions.

12.2 Asset Valuation & Useful Life

Asset valuation must account for buildings, land, etc. in a consistent manner. Additionally, valuation must provide clarification that contract value or reimbursement value of various assets can, and often does, differ from the book value on accounts when an asset is taken over by entity after transfer.

As of April 2015, the Abu Dhabi Department of Finance (DoF) is in the process of preparing an Emirate-wide Asset Valuation Policy that will be aligned with Generally Accepted Accounting Principles. These will set the methods and procedures to be used by all entities in charge of government assets for their valuation.



The Asset Useful Life is an important step in the asset valuation work. The DoF has established asset useful life criteria for all types of infrastructure, and has carried out an integration of these criteria into their Accrual Accounting System.

Once these policies are fully implemented, they shall be considered in conjunction with the guidance provided here, and in accordance with relevant government instructions/decrees/decisions.

12.3 Institutional Reforms & Capacity Building

It has been identified that organizations in the Emirate of Abu Dhabi are not well suited to easily adopt Asset Management, at present. This is because many organization structures currently deviate from those required for compliance with asset management standards. Changes in organization structures would allow for gradual adoption of asset management principles, but such changes can often take long periods of time to fully implement.

Similarly, while the structure of the organization itself must evolve to align with asset management principles, so too must the knowledge and understanding of the principles held by the people that make up the organization. Education and awareness programs would certainly help to expose more individuals to asset management principles; thereby, helping to build capacity overall.

12.4 Adoption of Emirate-Wide & Entity-Specific Policies

A top-down approach for widespread adoption of asset management principles is to adopt an Emirate-wide Asset Management Policy. Such a policy could establish overarching criteria for relevant organizations to follow and align to when deriving their own asset management policies.

12.5 Regulatory Requirements

At present, organizations in Abu Dhabi are not bound by any regulatory requirements related to asset management. However, regulatory requirements are under development by government entities and will be promulgated in the future.

13 References

- 1) ISO 55000: Asset management -- Management Systems - Overview, principles and terminology
- 2) ISO 55001: Asset management – Management Systems - Requirements
- 3) ISO 55002: Asset management -- Management Systems - Guidelines on the application of ISO 55001
- 4) PAS 55-1:2008 Asset management Specification for the optimized management of physical infrastructure assets
- 5) PAS 55-2:2008 Asset management Guidelines for the application of PAS 55-1
- 6) Abu Dhabi Specification ADS 1 / 2013 (First Edition) Asset management Standards – Review & Recommendations
- 7) Kyogle Council - “Infrastructure Risk Management Plan (Version 1.2 from May 2012)
- 8) Prosci Inc. – Change Management Process

Note 1) Another key reference for Asset Management in Abu Dhabi is the “Municipal Asset Management Framework” published by the Abu Dhabi Department of Municipal Affairs. This document has complementary resources to guide asset management for municipal assets across the Emirate of Abu Dhabi.

Note 2) The UAE ISO member body is ESMA (<http://www.esma.ae>). The PAS documents have been published by BSI (<http://www.bsigroup.com>).



Annex 1 – Sample Infrastructure Risk Register

The following is an excerpt from the Kyogle Council's "Infrastructure Risk Management Plan (Version 1.2 from May 2012)". The excerpt presents *Appendix A Risk Register* of this document, which is available in full at http://www.kyogle.nsw.gov.au/cp_content/resources/Core%20Infrastructure%20Risk%20Management%20Plan.pdf



Annex 2 - Case Studies



About the organization:

The Abu Dhabi Transmission & Dispatch Company (TRANSCO) is an accomplished subsidiary of the Abu Dhabi Water & Electricity Authority (ADWEA). The organizations' success is attributed to its effective capability in the safe, secure and reliable transmission of water and electricity to national utility distributors, namely the Abu Dhabi Distribution Company (ADDC) and Al Ain Distribution Company (AADC). To execute its role with optimum efficiency and effectiveness, the company maintains and operates a comprehensive network of transmission assets across the Emirate which includes:

1. Pipelines, pumping stations and storage stations for water transmission; and
2. Substations and transmission cables for power transmission.

In a regional context, TRANSCO plays an integral role in the development of wider GCC transmission infrastructure to facilitate trading and transmission of power across Kuwait, Oman, Qatar and Saudi Arabia.

Achieving excellence in asset management:

On November 24, 2014, TRANSCO showcased its excellence in Asset Management by receiving the International Accreditation of Asset Management (ISO 55000); an award commemorating TRANSCO as a leader in asset management amongst other government organizations in Abu Dhabi.

As the Emirate's water and power demand surged in both consumption and regional expansion, TRANSCO acknowledged the need for an integrated asset management approach that would protect the various government investments in critical infrastructure systems. In 2006, the leadership of the company set about its journey of implementing an integrated asset management policy by re-organizing functional departments and refining the roles and responsibilities of its executive staff. To initiate this transition, a third party consultant was appointed to assess current organization practices, policies and procedures and further implement a comprehensive asset



management model based on industry standards such as PASS 55. To empower and maintain the asset management model, TRANSCO enforced a set of asset management policies, strategies, objectives and plans on which were to be addressed by all pertinent components of the organization.

By adopting a sound asset management model TRANSCO was able to take positive steps towards ensuring that assets life cycles are optimized and their full potential is realized in alignment with the organizations business model.

Methodology:

The section below provides an overview of the methodology adopted by TRANSCO to develop, implement and maintain a robust asset management approach:

Kicking Off the Process

Initially, the Managing Director acknowledged the value of implementing asset management at TRANSCO. Thus, a third-party consultant/specialist was appointed to implement the transition towards integrated asset management and develop the plans and policies needed to execute the asset management strategy.

Leadership Commitment: Asset Management Workshop

An Asset Management Workshop was held to present an asset management strategy to the organization department heads. To demonstrate the commitment of TRANSCO's leadership, all senior level directors and executives were invited to attend the workshop to undertake their commitment by signing off the Asset Management Policy.

Organizational Change and Restructuring

TRANSCO's early goal was to initiate a radical change in the organizational structure to create suitable grounds for adopting a company-wide asset management approach. In fact, the actual scope for asset management control was still being determined at the time the organizational change was pursued. This is a testament of TRANSCO's serious commitment to begin rolling out the asset management strategy even though certain variables were undefined. By doing so, TRANSCO was then positioned to further evolve its asset management strategy and begin the development of an asset management policy for the company.



TRANSCO initiated the change to its organization structure by developing new roles and refining existing roles in the company. In some cases, existing roles were selected based on professional competencies and shifted to other departments. In other cases, new positions were identified and responsibilities delegated for the core purpose of executing asset management. For example, an Asset Management Director was appointed as part of the new organizational structure.

Auditing Process

TRANSCO began its journey towards adopting an integrated asset management model in 2006. In 2010, TRANSCO took the decision to enlist the services of a third party auditor to review the progress of the asset management strategy execution. The auditor issued an informal report assessing the likelihood of achieving PASS 55 certification.

The key points and gaps identified for further improvement included:

1. Additional evidence was required to demonstrate alignment between TRANSCO's business plans and asset management strategies, objectives, plans and day-to-day activities. Although it was evident that a line of sight existed between the company's divisional structures; additional documentation was required to verify the connection.
2. Additional evidence was required of the implemented asset management strategies, objectives, plans and day-to-day activities. While the organization had already begun executing its asset management model, it was required to document its achievements more meticulously. The provision of maintaining sufficient documentation is crucial and streamlines the process of performance monitoring, auditing (internal and external), and achieving certification.

Upon conclusion of the external audit, TRANSCO's executive management enforced an aggressive schedule to amend any gaps hindering the progression of the asset management system within the organization. To enable this, the executive management team was involved in monthly meetings throughout the certification process. The culmination of hard team work, dedication and great leadership was acknowledged by all parties involved when PAS 55 certification was awarded.

To ensure that asset management auditing is continuous throughout the life-cycle of the organization, TRANSCO appointed several internal auditors to regularly assess the



organizations procedures and policies. Internal auditors were engaged on a regular basis with asset management strategy developers to ensure documentation is up to speed with the company's asset management policy and business model.

In addition to TRANSCO's continuous internal auditing procedures, external auditors were also utilized to ensure the continuous improvement of the organizations business model against the industry's best asset management framework such as ISO 55000.

Performance Monitoring, Appraisal and Continuous Improvement

To ensure the efforts exerted by TRANSCO are maintained, a comprehensive mechanism for performance monitoring, appraisal and continuous improvement was established for the entire organization.

An Asset Management Business Unit was developed to monitor performance of: (i) the asset management system and (ii) the performance of TRANSCO's assets. Performance monitoring is achieved by utilizing review cycles to monitor, measure, analyze and evaluate the effectiveness of asset management processes.

Interviews are regularly conducted with management staff to identify the challenges faced when delivering asset management objectives. Tools such as performance monitoring strategies, scorecards, and questionnaires are employed to capture, collate and analyze the performance of the organizations asset management system. Using the findings yielded from performance data collection, the Asset Management Business Unit is accountable for updating the company's asset management policy by employing working groups and ensure an archive of most recent supporting documentation is maintained.

An appraisal system was implemented to assess individual asset management competence within the organization. Individuals, depending which division they belong to (e.g., HR, Planning, Procurement or Operations and Management), must demonstrate a minimum level of understanding of asset management as it pertains to their functional role in the organization. Personnel working in the Asset Management Business Unit are expected to demonstrate advanced knowledge of asset management across a wider spectrum of disciplines. Individual assessments are employed to determine the type and level of training required for each individual in



order to meet the needs of the each functional role and meet the objectives of the organization as a whole.

In an effort to continuously develop the company's asset management strategy and ensure stakeholder objectives are constantly addressed, TRANSCO conducts regular stakeholder discussion forums. The intent of these discussions is to continuously present the progress of the asset management system and exchange feedback for improvement of the asset management policy. These meetings are also held to obtain executive management approval on yearly targets and implementation strategies. TRANSCO's stakeholders include but are not limited to: government bodies, regulators, regional ministries, power and water generation companies, utility distributors and direct customers such as oil, gas and steel industries.

Conclusion

The scope of TRANSCO's asset management is limited to the physical transmission assets for both water and power. TRANSCO's core strategy is to ensure the full life cycle potential of these assets is realized from planning, procurement, operations and maintenance until reaching the final decommissioning stage or refurbishment of the asset.

TRANSCO considers itself a leading asset management organization within the region. In fact, the company's achievements in the field of asset management were realized well before the official publication of the ISO 55000 standard. Through years of continuous improvement and refinement of their PAS 55 oriented asset management strategies, objectives, plans and day-to-day activities, TRANSCO was confident that it possessed the base structure which would allow it to apply for ISO 55000 certification. In 2014, shortly after the publication of the standard, TRANSCO was well positioned to apply and then achieve ISO 55000 certification in November 2014.

Today, TRANSCO's staff, contractors, internal or external service providers and suppliers are reminded of the company's commitment to asset management by viewing TRANSCO's Asset Management Policy posting at the company's main lobby, corridors and even through awareness media.



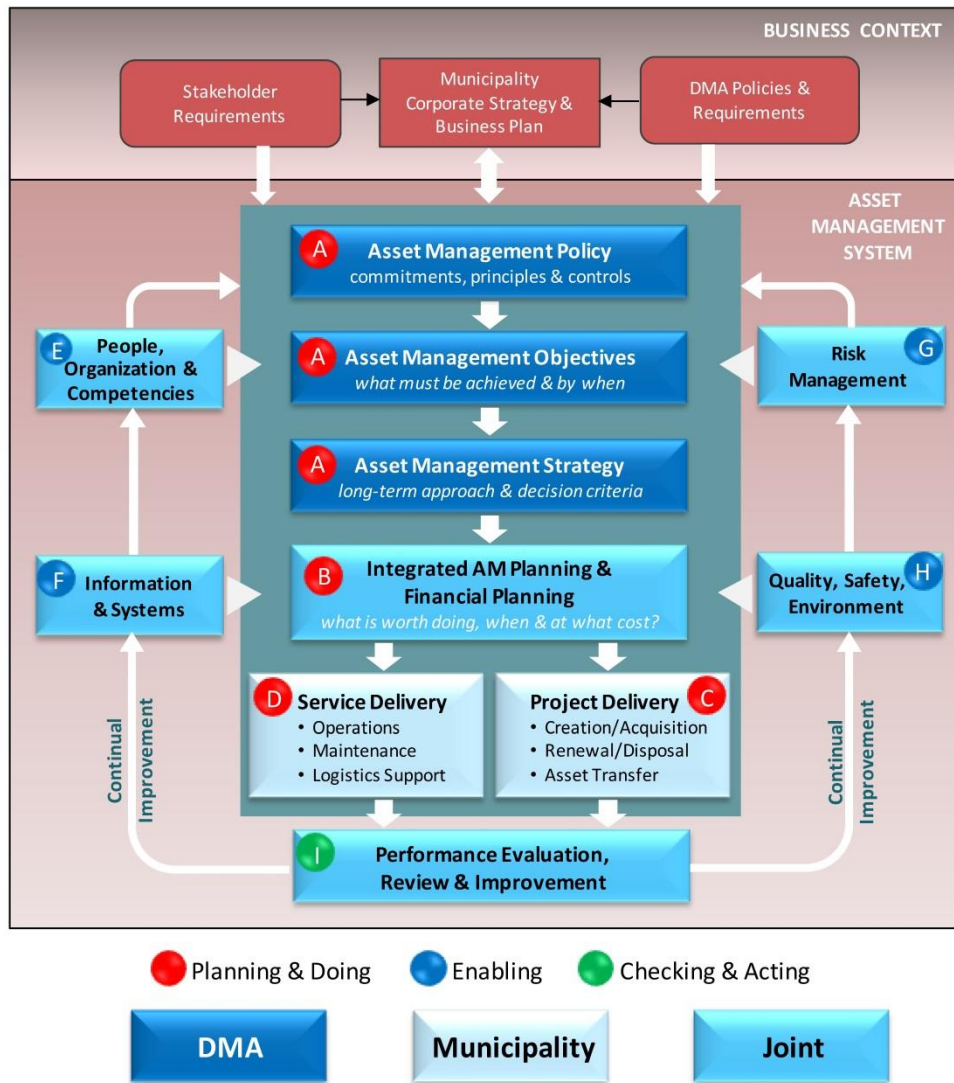
About the organization

Established in May 2007, the Department of Municipal Affairs (DMA) is a leading arm in the government of Abu Dhabi responsible for regulating the municipalities of the three main regions of the Emirate: the Abu Dhabi Municipality, Al Ain Municipality and the Western Region Municipality. The DMA functions as the main focal point of all municipal activities by planning and overseeing public works projects in the Emirate of Abu Dhabi.

In addition to its critical role in the governance of regional municipal services and development of regional codes, the DMA plays a key role in the planning, management and protection of infrastructure assets in the Emirate. Although it is yet to implement a comprehensive system to meet its asset management objectives, the DMA realizes the importance of strategic planning. As such, DMA has prepared a program plan for transitioning to integrated asset management.

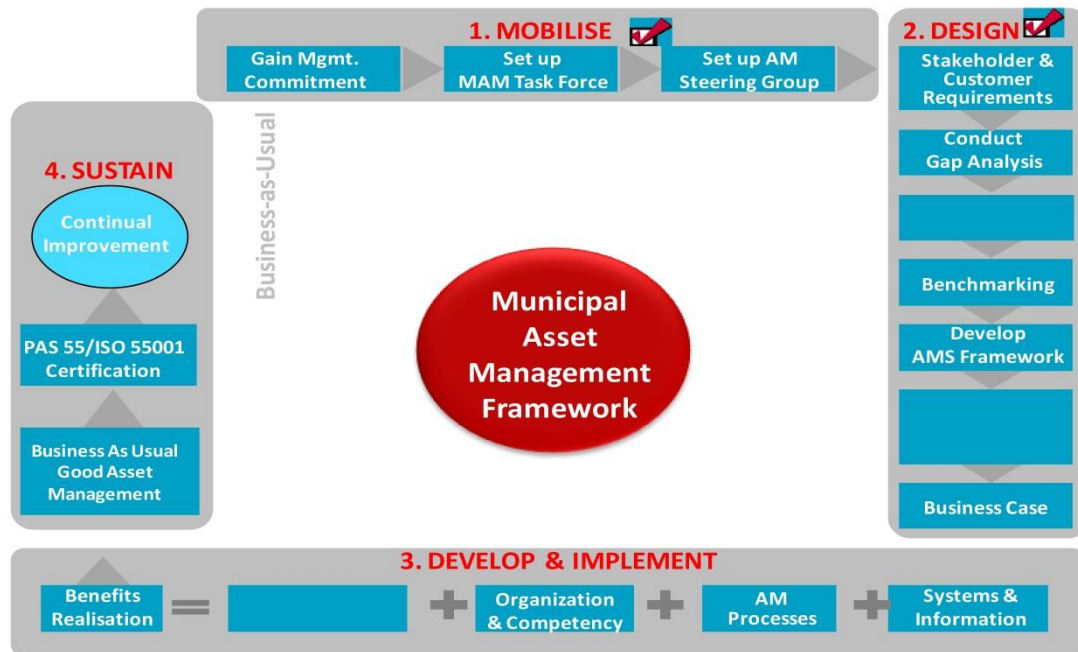
Building the Municipality Asset Management (MAM) Roadmap

Today, the DMA has established a clear 'Municipality Asset Management (MAM) Roadmap' to achieve its vision for asset management. Similar to other leading government models in Abu Dhabi, the DMA's aspiration is to adopt an integrated asset management system that is compatible with its organizational structure and has the ability to sustain itself throughout the lifecycle of its assets. In the near future, the DMA aims to implement an asset management system in accordance with international standards with the goal of achieving ISO 55000 certification. An overview of the Municipal Asset Management System is provided in the figure on the next page.





The sections below describe the DMA's '4-stage roadmap', which is currently laid out for the implementation of an integrated asset management system. Each section will detail the current steps undertaken to develop and implement the roadmap. As presented in the figure below.



Stage 1: Mobilization

In 2011 the DMA realized the need for an asset management approach and petitioned senior management for their approval to develop a roadmap for an integrated asset management system. The first step was then to assemble an internal task force that would be responsible for the coordination between the relevant stakeholders associated with asset management. The objective of assembling a task force was to understand the needs and objectives of the DMA's stakeholders to ensure these are aligned with the overall asset management vision. Representatives from municipalities were then elected to join the existing task force to form a Municipality Asset Management (MAM) Steering Committee to monitor and oversee the development of the MAM Roadmap ensuring all strategic aims and goals are addressed throughout all phases of the MAM system and embedded within the DMA's Strategic Plan.



Stage 2: Design

The design stage of the MAM Roadmap included the 'legwork' and exploratory research that was required to develop and implement an asset management system for the DMA. In brief, the objectives of this stage were to:

1. Understand the needs and objectives of key stakeholders (regional municipalities) in terms of asset management;
2. Collectively assess the status quo of the DMA and its associated stakeholders in terms of asset management process implementation;
3. Propose an Asset Management Framework for further development and implementation; and
4. Prepare and present a business case demonstrating the financial and economic feasibility of implementing an asset management system.

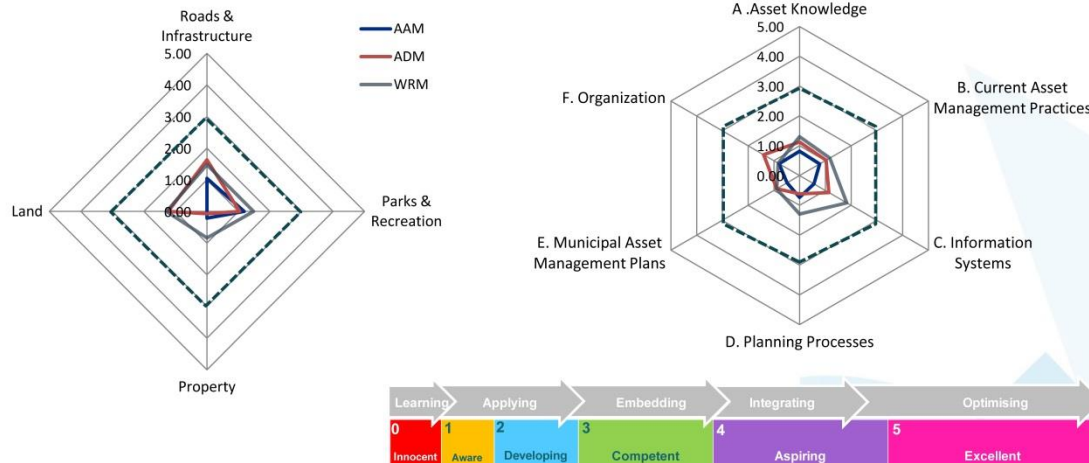
To understand the needs and objectives of regional municipalities, the assigned task force started a comprehensive data collection exercise with each specific division involved with asset management. To achieve this, alternative data collection methods were employed such as questionnaires, meetings and work groups. Moreover, a comprehensive education and awareness campaign was carried out using presentations, workshops, and information-exchange meetings with the aim of promoting the value and benefits of asset management.

The next important step was to assess the DMA's current 'business-as-usual' processes against the relevant asset management framework. In order to achieve this, a third party specialist was employed to identify: (i) current compliant processes for enhancement and (ii) gaps to address for alignment of current processes with international benchmarks. At the end of this stage, the appointed specialist successfully delivered a gap analysis and scorecard benchmarking the current business process of the DMA against PASS 55 certification requirements. The results of which is provided below.



ASSET TYPE	AAM	ADM	WRM
Roads & Infrastructure	1.05	1.63	1.48
Parks & Recreation	1.18	1.04	1.48
Property	0.21	0.07	0.84
Land	0.00	1.23	1.28

AM CATEGORY	AAM	ADM	WRM
A .Asset Knowledge	0.82	1.12	1.30
B. Current Asset Management Practices	0.78	1.03	1.18
C. Information Systems	0.56	1.14	1.83
D. Planning Processes	0.73	0.61	1.29
E. Municipal Asset Management Plans	0.49	0.89	0.89
F. Organization	0.80	1.40	0.83



From this, the DMA understood the specific areas of concern it needs to address as part of its asset management system in order to meet its goals.

The asset management task force in collaboration with the specialist were now positioned to propose an asset management framework based on the specific needs and objectives of the DMA and its stakeholders. The DMA's main vision is to create an organizational culture which would promote the benefits of responsible asset management rather than prioritizing the use of software tools that would result in non-sustainable growth. In order to achieve this vision, the DMA would have to introduce organizational reforms, and introduce new positions dedicated to monitoring and controlling the asset management system once implemented. To demonstrate the feasibility of funding of such organizational changes, the DMA's task force was required to present a business case to the executive management demonstrating the financial benefits of rolling out an integrated asset management system. The findings of the asset management business case demonstrated reductions in operational costs, as well as improved performance of assets throughout their life-cycles.



Stage 3: Development and Implementation

The third stage of the MAM Roadmap is associated with the actual implementation of the DMA's asset management system, which is currently under development. Based on the findings of the previous stage which focuses on the design of the asset management framework, this stage entails the following processes:

- (a) Reformation of organizational structure and the establishment of an asset management entity/division;
- (b) Delegation and assignment of responsibilities for the execution of asset management processes within the organization; and
- (c) Development and operation of information systems to support the implementation of asset management within the organization.

Based on the findings of the asset management framework developed at the previous stage, the DMA's task force issued the necessary Terms of Reference (TOR) to source a competent asset management consultancy for leading the transition by: (i) initiating the required organizational changes, (ii) building in-house capacity for asset management and (iii) setting up asset management information systems. This stage is targeted for completion by the end of 2015.

Stage 4: Sustain

When the necessary organizational changes are made and the asset management information systems are functional, the DMA will then be positioned to pursue ISO 55000 certification to showcase its model in asset management excellence. As part of its MAM Roadmap, the DMA has considered multiple strategies to ensure asset management is sustained and continues to meet the organization's goals. The strategies for sustained asset management include but are not limited to:

- (a) Employing UAE citizens for asset management positions to meet the nations' goal of harnessing Emirati human capital and ensuring continuous capacity building;
- (b) Maintaining the involvement of executive leadership by continuously reporting on progress and identifying challenges to ensure continuous improvement is kept on top of the agenda; and
- (c) Maintaining certification under ISO 55000 to ensure that asset management efforts are kept in alignment with international benchmarks.



Conclusion:

The vision for the DMA's asset management system was first established in 2011. Since then, the DMA has taken care and demonstrated diligence in visualizing and planning a robust mechanism for implementing the necessary processes to achieve its sought objectives. In fact, the MAM Roadmap can be adapted to most government organizations within disparate sectors. As such, the development of the MAM Roadmap itself is considered a major milestone when compared to the great successes in asset management achieved by other government sectors in the Emirate.

According to the DMA, key to the successful planning and implementation of an asset management system is leadership commitment. It therefore imperative to engage senior management in the earliest stages of strategy development and ensure they are constantly updated with progress at each step of the process.

Another crucial observation conveyed by the DMA is for organizations to realize that the process of 'asset management' is only part of the implementation of an asset management system. The DMA urges organizations to acknowledge the importance of education and awareness when it comes to developing an organizational asset management strategy emphasizing on the need for organizations to understand their own assets prior to managing them.