

# ISO 55000:2014 - Asset Management Family of Standards - An Overview

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## EXECUTIVE SUMMARY

The ISO 55000 family of standards describes requirements for a comprehensive asset management system, which aligns business objectives to asset performance. The core of the program is the asset management plan, which details the activities, resources and timing required for an individual asset to achieve specified objectives, such as maximizing return on investment (ROI). Supporting the development and implementation of these asset management plans are: organizational objectives and policies, addressing of risks, ensuring personnel competency, performance evaluation, and continuous improvement. The successful implementation of an asset management system results in a consistent, risk-based approach to identifying and correcting individual equipment failures and overall facility performance improvement.

## THE CHALLENGE

Facilities depend on their assets day in and day out to reliably perform various processes. In fact, the success of a company is directly affected by the performance of its assets and the way they are managed. If a critical asset fails, potential results include safety or environmental events, and associated fines can be financially draining. Additionally, if the failure requires repair or replacement, the facility may suffer from unbudgeted expenses and unplanned downtime, which can lead to a loss of profits. Thus, as facilities age and budget restraints increase, proper asset management becomes increasingly important.

For facilities, the goal should be to operate responsibly in regards to safety and environment, while maximizing ROI and optimizing costs. All of these goals can be achieved by efficient and effective management of risk. Although companies do strive to reach these goals, oftentimes the efforts are managed across separate groups within the organization, with no coordination (e.g. different definitions of risk and different criteria for success). This lack of coordination is inefficient, and will only waste precious time, funds, and resources.

Most facilities in the oil and gas and petrochemical industries utilize a Computerized Maintenance Management System (CMMS) to manage their assets, but the sole act of using the CMMS will not result in an effective asset management program. For an asset management system to be considered effective, the organization must have the following: a plan, leadership support, clearly defined roles and business goals, evaluation of performance, and implementation of continuous improvement actions.

Therefore, a strong need arose for a set of standards to be developed to help guide facilities as they develop asset management programs. Specifically, the standard should provide guidance for developing a comprehensive asset management program and should enable companies to establish their asset management processes in a way that provides repeatable results.

This white paper describes what is required by the ISO 55000 family of standards to implement an asset management program. A fully-implemented asset management system will help minimize equipment life cycle costs, reduce production losses, and improve safety and environmental performance.

### **THE SOLUTION – ISO 55000 FAMILY OF STANDARDS**

Asset management is a coordinated process of managing the risk associated with assets and asset systems in a way that optimizes costs and asset performance. In short, effective asset management will ensure organizations receive value from their assets.

Comprehensive asset management is designed to align organizational goals across all departments, so that each group within a facility is able to work in harmony to achieve business objectives. To help ensure that organizations efficiently manage risk and receive planned ROI from its assets, these organizations need a framework to guide them as they develop their asset management systems. To provide said framework, the International Organization for Standardization (ISO) produced the ISO 55000 family of standards for asset management.

### **EVOLUTION OF ISO 55000**

#### ***PAS 55***

The work leading up to the ISO family of standards first began in 2004, when the British Standards Institution (BSI) and the Institute of Asset Management (IAM) created Publicly Available Specification 55 (PAS 55) for the management of physical assets. This specification, said to be the first international specification for asset management, was quickly adopted across numerous asset intensive industries.

#### ***PAS 55:2008***

In 2008, the initial PAS 55 standard was updated to include two main parts. Part 1 provides specification for the optimization of physical assets and Part 2 provides guidelines and requirements for application. The updated specification, PAS 55:2008, provides asset management definitions, requirements and implementation guidance. It features 28 aspects of asset management, covering all phases encompassed in the asset life cycle. The standard also encourages cross-functional interactions and provides a framework describing how different roles within an organization should coordinate with one another. The updates to this specification included input from 50 organizations across 10 countries and 15 different industry sectors.

#### ***ISO 55000 Family of Standards***

In 2009 BSI, in conjunction with IAM, proposed to form a “Project Committee” to develop an International Standard (i.e. ISO Standard) for asset management, based upon the PAS 55 specifications, but with increased involvement from various industries and organizations worldwide. Thus, in January 2014 the ISO 55000 family of standards was published.

### **ISO 55000 FAMILY OF STANDARDS - OVERVIEW**

The ISO 55000 family of standards provides a structured approach to comprehensively managing assets (both tangible and intangible assets). These standards do not explain specifically how to manage assets; instead, they provide requirements for how to handle the system in which activities are defined, organized,

and managed.

The requirements set forth by the standards seek to align business objectives across an entire organization, so that the management of risk can be achieved through an integrated asset management system, which effectively and efficiently optimizes costs and asset performance. Additionally, these standards assure that the organization's asset management practices are carried out consistently and in way in which non-conformance and/or proactive opportunities can be identified in order to achieve continuous improvement.

**THE ISO 55000 FAMILY OF STANDARDS CONTAINS THREE KEY STANDARDS:**

1. ISO 55000 – Asset Management – Overview, principles and terminology
2. ISO 55001 – Asset Management – Management Systems – Requirements
3. ISO 55002 – Asset Management – Management Systems – Guidelines for application

The first standard, ISO 55000, provides a foundational overview to the family of standards by explaining its purpose, and by establishing key principles and terminology. ISO 55001 then supplies the actual requirements for developing a comprehensive asset management system. Lastly, ISO 55002 offers guidance for application of the requirements provided in ISO 55001.

Because the ISO 55001 standard contains the primary framework for an effective asset management system, the next sections of this paper will highlight the major requirements provided in ISO 55001 – Asset Management – Management Systems – Requirements.

**ELEMENTS OF ISO 55001 - REQUIREMENTS**

The ISO 55001 standard contains seven fundamental asset management elements:

1. Context of organization
2. Leadership
3. Planning
4. Support
5. Operation
6. Performance evaluation
7. Improvement

These seven elements can be further broken down into two general categories:

1. Overarching elements
  - a. Leadership
  - b. Support
2. Discreet system steps
  - a. Context of organization
  - b. Planning

- c. Operation
- d. Performance evaluation
- e. Improvement

See Figure 1 below for a graphic depiction of how the overarching elements and discreet system steps integrate.

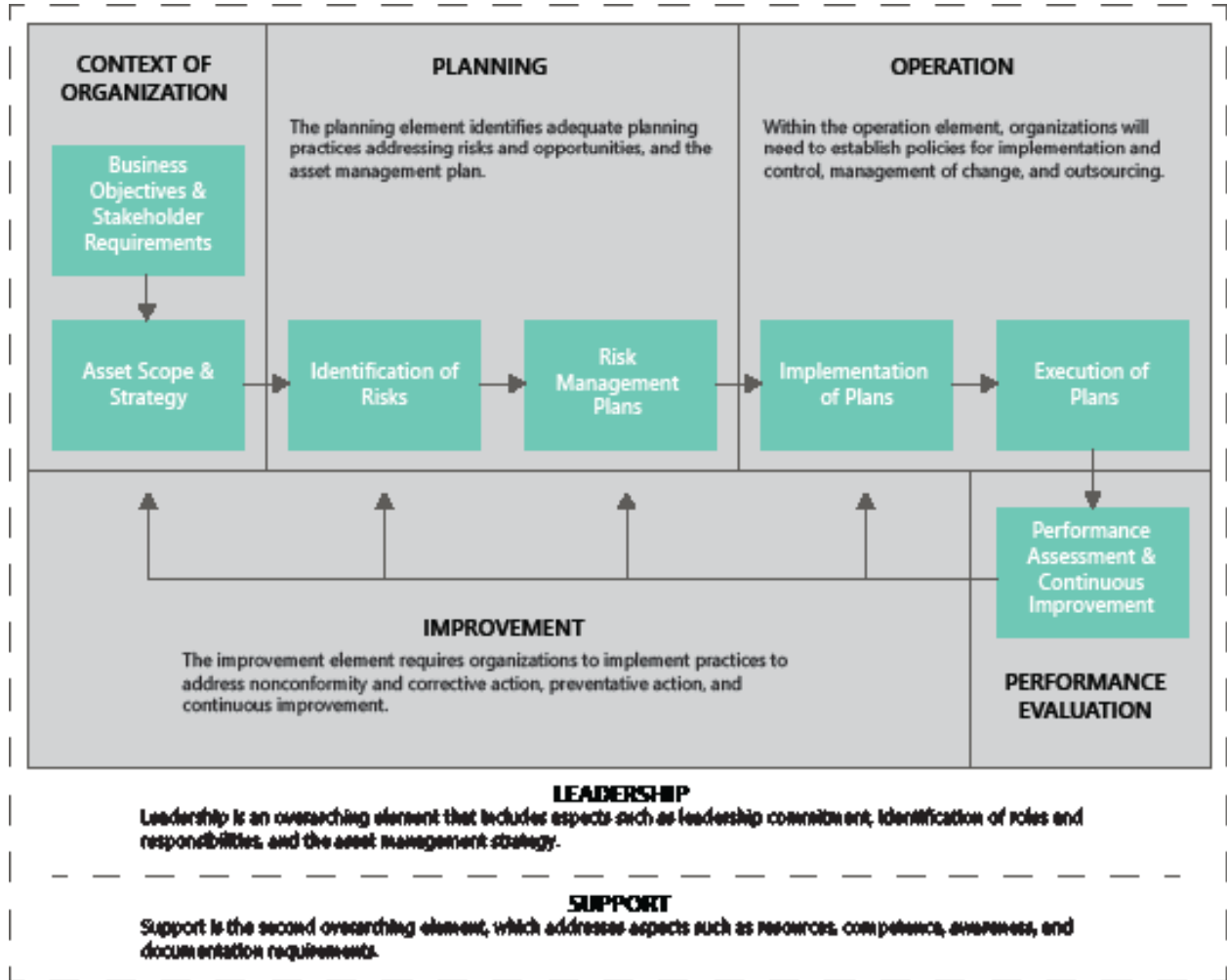


Figure 1 - ISO 55001 Elements

The next sections of this paper describe the elements in the order they appear in ISO 55001, but will clarify how the individual concepts fit into either the overarching elements or the discreet steps.

### Context of Organization

The first step of ISO 55001 involves determining the context of the organization. This includes aspects such as internal / external environment; business goals, objectives, and needs; stakeholder requirements; and the scope of the asset management system. From the start, organizations need to clearly define

organizational objectives and stakeholder requirements so that all activities are aligned to meet the business goals and/or objectives. Once organizations know what they are working to achieve, they can then strategize how to achieve these goals (i.e. determine which activities will be beneficial).

Next, organizations will need to determine the scope of the asset management strategy. The scope will define which assets will be included in the system. This directly applies to equipment and inventory, but also can apply to intangible assets, such as, intellectual property, brands, agreements, digital assets, and reputation. The scope should also address any interactions between the asset management system and other management systems, such as the quality management system and project management system.

### ***Leadership***

Leadership is the first overarching element in the ISO 55001 standard. This element describes how an organization's top management will support the asset management system. To start, the top management should make a commitment to leading and supporting the system by establishing an asset management policy. According to the ISO 55000 standard, the asset management policy is "a statement that indicates a commitment from the company to place importance on the asset management system and its continuous improvement."

Leadership will also need to define asset management objectives, as discussed in context of the organization, and then clearly define and specify proper roles, responsibilities and authorities (both internal and external) for the ongoing support of the asset management system. As part of compliance with ISO 55001, leadership will need to clearly document how all of this will be achieved.

### ***Planning***

The planning element identifies adequate planning practices that should be in place when developing an asset management program. Top leadership should first establish a set of asset management objectives that define how to accomplish the business objectives and stakeholder requirements identified in the "context of organization" element. These objectives should be measurable, in order to be continuously monitored and updated as necessary during the business life cycle.

Next, organizations will need to develop a Strategic Asset Management Plan (SAMP) that will result in alignment between business objectives and asset management objectives. The ISO 55000 standard states that the SAMP includes "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."

After the SAMP, organizations can then document the asset management plan, which "specifies the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives," according to the ISO 55000 standard. The asset management plan is a structured approach to achieving the goals and objectives of the asset management system, minimizing undesirable results, and achieving continual improvement. The plan will also include how assets will be managed, personnel responsibilities, how results will be measured, and mitigation of risks affecting the implementation of the asset management program. Primary aspects of the asset

management plan include the following:

- Comprehensive location hierarchy with asset attributes arranged for effective, logical management of work orders and financial performance of the assets
- Risk-based proactive maintenance program that defines tasks performed by operations and maintenance technicians to minimize the effects of equipment failure
- Risk-Based Inspection (RBI) program that defines Integrity Operating Windows (IOWs) and inspection tasks performed by trained inspectors for covered equipment and piping systems
- Compliance management program that defines proactive tasks performed by facility personnel that are required by external agencies
- Training and competency assurance for operations, maintenance, and other support personnel
- Detailed planning of proactive and corrective work orders, including labor and material details needed to perform only the required work
- Detailed operating procedures, including start-up, shutdown, and emergency conditions; troubleshooting guides; and operating envelopes
- Inventory management system with all parts linked to the location hierarchy, as well as optimal stocking quantities that have been justified by a risk analysis
- Root Cause Analysis (RCA) process to eliminate undesirable situations, and an action item tracking system to ensure recommendations are approved and implemented effectively
- Continuous improvement process to ensure that the effectiveness of the asset management program and facility performance are, in fact, improving

### ***Support***

Support is the second and final overarching element featured in the ISO 55001 standard. This element outlines support requirements for the asset management system. To begin, all resources needed to carry out the asset management plans need to be identified. Leadership also needs to ensure that those assigned to certain roles and responsibilities within the “leadership” element have adequate qualifications and experience (i.e. competency).

The support element also defines requirements for awareness of the asset management system. Specifically, the entire organization needs to be aware of all aspects of the asset management system (i.e. goals, objectives, roles, responsibilities, and strategies for achieving goals). Organizations should also have a consistent communication plan in place to ensure successful transmission of information.

Also defined within support is the information necessary to implement and manage the system, as well as all documentation requirements for verification of compliance and demonstrated effectiveness of the system. For example, a document control procedure will need to be created to define how the documents in the asset management program will be maintained, updated, reviewed, and approved. Additionally, organizations will need a control of records procedure, documenting how records of asset management system performance will be maintained (e.g. electronic backups, retention periods).

### ***Operation***

The operation element contains the actual execution and implementation of the actions set forth in the asset management plans. Within this element, organizations implement the processes established in earlier phases and document that they are being carried out effectively.

Also required with the operation phase is a detailed Management of Change (MOC) procedure. Organizations will need to develop an MOC procedure in order to assess the risk (i.e. evaluate the risk across the entire organization and consider potential consequences) associated with changes. The MOC procedure also helps ensure that all affected systems and personnel are updated and notified of the change.

Another topic addressed within the operation phase is outsourcing. When outsourcing work or resources, organizations are still responsible for the work being completed by external organizations. Specifically, organizations need to ensure all outsourced work is successful and that it remains consistent with all internal requirements.

### ***Performance Evaluation***

To determine whether the asset management system is successful and desired outcomes are being achieved, organizations need a standard to evaluate performance. Within this phase, requirements are defined for the monitoring, measuring, analyzing, and evaluation of the asset and the asset management system performance. For instance, organizations must identify what data is measured, how it will be measured and monitored (i.e. which methods will be used for monitoring and analysis), and when to perform the measurements and communicate the findings to the necessary individuals.

Additionally, this phase requires organizations to perform periodic internal audits and management reviews to ensure system compliance and effectiveness. Organizations will need to develop an internal audits procedure to document periodic reviews of the asset management system.

The data derived from this phase can then be used to make improvements towards achieving organizational goals and stakeholder requirements.

### ***Improvement***

Improvement is the final of the seven ISO 55001 elements, and it addresses non-conformity and corrective action; preventive action; and continuous improvement. To begin, organizations should have methods in place to identify nonconformities and/or take action to prevent future nonconformities. Specifically, organizations should implement a corrective and preventive action procedure to document how to: identify actual and potential poor performance, determine root causes, mitigate the consequences for any affected equipment, and review the effectiveness of the corrective action taken.

ISO also requires an organization to implement a procedure to continuously assess and evaluate its asset management system, in order to find opportunities for improvements (i.e. simplify a process, reduce costs, etc.) capable of making the process more efficient and effective.

## **THE BENEFITS**

By adopting the requirements set forth in the ISO 55000 family of standards, you will achieve alignment

across your entire organization through the connection of the organizational goals and the asset management goals, resulting in a completely integrated system of managing assets and associated risks. The standards contained in the ISO 55000 family of standards will help organizations realize the value of all of their assets (both tangible and intangible) and will help organizations leverage their assets to achieve an effective asset management system, leading to lower life cycle costs (i.e. maintenance costs and production impacts) over time. Costs will also be optimized through enabled well-informed decision making (i.e. optimal decisions regarding asset investments).

Overall, the asset management system defined in the ISO 55000 family of standards provides requirements for a consistent, risk-based approach to identify and correct equipment failures and improve overall facility performance. Adherence to the standard and implementation of a comprehensive asset management system has the potential to produce significant performance improvement and long-term ROI.

## **CONCLUSION**

Similar to ISO 9001 for quality management systems, ISO 55001 is currently optional, but will likely become mandatory, as customers require this certification and as competitors begin implementing certified asset management systems. Many times, investors and clients like to see demonstrated compliance with standards such as these, by organizations they partner with.

In order to receive ISO 55001 certification, organizations will first need to purchase the standard and complete all required processes and documentation necessary to become fully compliant. Organizations then submit an application to a certifying agency, which will conduct an audit to verify compliance with the standard. Once an organization passes the audit, they will receive the ISO 55001 certification, which will be valid for three years.

It is recommended that organizations desiring to adopt and/or become compliant with the ISO 55000 standards identify and engage external organizations with expertise in implementing comprehensive and ISO compliant asset management programs. Managing these initiatives alone is a large undertaking, and oftentimes outside resources can better facilitate the process, ensuring a smooth implementation.

## **WORKS CITED & WORKS CONSULTED**

- ISO 55000: 2014(en), Asset Management--Overview, principles and terminology. N.p.: International Organization of Standardization, 15 Jan. 2014. <https://www.iso.org/ui/#iso:std:iso:55000:ed-1:v2:en> obp/
- ISO 55001: 2014(en), Asset Management--Management Systems--Requirements. N.p.: International Organization of Standardization, 15 Jan. 2014. <https://www.iso.org/ui/#iso:std:iso:55001:ed-1:v1:en> obp/
- ISO 55002: 2014(en), Asset Management--Management Systems—Guidelines for the application of ISO 55001. N.p.: International Organization of Standardization, 15 Jan. 2014. <https://www.iso.org/obp/ui/#iso:std:iso:55002:ed-1:v2:en>





With more than 25 years in the oil and gas industry, Brad Moore serves as Senior Project Manager for Pinnacle's Reliability Department. In this role, Brad is responsible for the development and execution of reliability projects, managing resources for the reliability team and forecasting revenue for current and pipeline projects.

Brad holds 17 years of experience working in the reliability realm. His expertise includes an invaluable acumen for Reliability-Centered Maintenance (RCM) analysis and facilitation as well as the development of proposals and estimates for reliability and CMMS content implementation work. He credits his past position as a Reliability Engineer as helping him to be successful in his current role. As a reliability engineer, Brad was responsible for the implementation of mobile data collection systems, performing root cause analyses on equipment failures and the tracking of maintenance key performance indicators.

Brad received a Bachelor of Science degree in Mechanical Engineering from Georgia Institute of Technology. He is a member of the Society of Maintenance and Reliability Professionals (SMRP) and the Project Management Institute (PMI).

#### **ABOUT PINNACLE**

Pinnacle is the global leader in designing, implementing, and maintaining comprehensive asset reliability and integrity programs for process facilities in the oil and gas, chemical, mining, pharmaceutical, wastewater, and electric power industries—including national oil companies, super majors, and majors, as well as independents. Our team of talented experts, engineers, and inspectors help clients mitigate risk of downtime and loss of containment; ensure safety of personnel; optimize costs associated with inspection, maintenance and total asset spend; and ensure compliance with regulatory standards.