
**Asset management — Guidance
on the alignment of financial and
non-financial functions in asset
management**

*Gestion d'actifs — Orientation sur l'alignement des fonctions
financières et non financières dans la gestion d'actifs*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 251 *Asset management*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 55000, ISO 55001 and ISO 55002 asset management standards have raised awareness of the importance of improving alignment between an organization's financial and non-financial functions, and this document provides guidance on how to achieve this. ISO 55001:2014, 7.5 d), states that "the organization shall determine the requirements for alignment of financial and non-financial terminology relevant to asset management throughout the organization".

As used in this document, financial functions refer to processes and activities such as managerial costing and accounting, budgeting, financing and valuation related to the assets. Non-financial functions are the complementary processes and activities, for providing a product or service from the assets.

The definition of "asset" in ISO 55000 differs from that of the generally accepted accounting principles (GAAP) or the International Financial Reporting Standards (IFRS). The term "asset" as primarily used in this document is defined in ISO 55000 and organizations need to be aware of this to avoid any misunderstanding. For the authoritative GAAP or IFRS definitions of asset, refer to the appropriate accounting standards, internal policies and experts.

In many organizations, the financial and non-financial functions of asset management are inadequately aligned. Often the financial accounting functions are predominantly focused on retrospective reporting of accounting/regulatory financial activities. However, there is a growing awareness in organizations of the need to focus on providing a managerial costing approach in order to support decision-making for the future. At the same time, the non-financial functions are recognizing the need to improve their understanding of the financial implications of their activities. These are examples of initial moves towards better alignment of the financial and non-financial functions with the aim of better decision-making and value realization.

Lack of alignment between financial and non-financial functions can be attributed to silos in an organization, including reporting structures, functional/operational business processes, and related technical data. The United States Government's "Government Accountability Office interviews with asset management experts"^[23] advises that "... silos are necessary to allow for the required level of specialization, but if these silos do not communicate, inefficiencies and errors in asset management result" and that "when asset management implementation fails, it is often because asset management staff and senior management are not in alignment".

Alignment needs to work both "vertically" and "horizontally". Vertical alignment means that financial and non-financial asset-related directives by top management are informed by accurate upward information flows, effectively implemented across the appropriate levels of the organization. Horizontal alignment means that financial and non-financial information that flows between departments (conducting functions such as operations, engineering, plant maintenance, financial accounting, financial management and risk management) uses the same terminology and refers to the assets identified in the same way.

The aim of this document is to encourage organizations to support alignment between these asset management functions and to provide guidance on how such alignment can be achieved. It also promotes the benefits that can be achieved for an organization and its stakeholders by having alignment of these asset management functions better understood, implemented and improved. This enables an organization's functional areas to share information and collaborate to achieve its objectives.

This document can assist users in applying the concepts of ISO 55000 and the requirements of ISO 55001. It provides additional advice and guidance over and above the explanations outlined in ISO 55002 on the benefits to be realized for an organization through alignment.

This document can be applied to all types of assets and by all types and sizes of organizations.

It is intended for use by personnel, at all levels in an organization, who are involved in asset management, including:

- top management and decision-makers, to derive the benefits that are achievable by better alignment between financial and non-financial functions;

- those in asset-related multidisciplinary functions who provide information to support decision-making or rely on the outcomes of those decisions;
- a wide range of personnel, including those who have responsibility for the technical planning, design, construction, operation, maintenance and performance of the assets and those with financial responsibilities such as accounting, financial planning, budgeting and financial reporting.

Knowledge and understanding of terminology and common language used by financial and non-financial functions can facilitate discussion, communication and exchange of information between these functions. [Clause 3](#) defines relevant terms. [Clauses 4](#) to [9](#) and related annexes provide a range of information on financial and non-financial functions in asset management, including information on asset management accounting principles.

Details concerning other International Standards and materials on asset management can be found on the ISO website, as well as on the ISO/TC 251 website at: <https://committee.iso.org/home/tc251>.

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Asset management — Guidance on the alignment of financial and non-financial functions in asset management

1 Scope

This document gives guidelines for the alignment between financial and non-financial asset management functions, in order to improve internal control as part of an organization's management system. Alignment of these functions will enable the realization of value derived from the implementation of asset management detailed within ISO 55000, ISO 55001 and ISO 55002, particularly ISO 55002:2018, Annex F.

The guidance in this document is consistent with the requirements of ISO 55001 for an asset management system but does not add new requirements to ISO 55001 or provide interpretations of the requirements of ISO 55001.

For an example of an organization aligning its asset management functions, see [Annex F](#).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 55000, *Asset management — Overview, principles and terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 55000 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

financial accounting

process of recording, summarizing and reporting the transactions resulting from an organization's operations over a period of time

Note 1 to entry: These transactions are summarized in the preparation of financial statements (including the balance sheet, income statement and cash-flow statement) that communicate the organization's operating performance over a specified period.

3.2

management accounting

accounting to assist management in the formulation and implementation of an organization's strategy

Note 1 to entry: Management accounting usually requires partnering across different functions in an organization for management decision-making, devising planning and performance management systems, and providing expertise in financial reporting and control.

3.3

managerial costing

costing used internally by an organization to ensure that information for decisions reflects the characteristics of the organization's resources and operations

Note 1 to entry: For further information on managerial costing, see Reference [19].

3.4

financial function

work, or portions of work, that pertain to financial management

Note 1 to entry: Examples include financial reporting, budgeting, financing, *valuation* (3.12), financial planning and analysis, *management accounting* (3.2) and tax accounting.

3.5

non-financial function

work, or portions of work, that combine with the organization's *financial functions* (3.4) in delivering its services or products

Note 1 to entry: Examples include asset planning, acquisition, marketing, operations and maintenance.

3.6

internal control

process(es) used by an organization's managers to help it achieve its objectives

Note 1 to entry: Internal control helps an organization run its operations efficiently and effectively, report reliable information about its operations and comply with applicable laws and regulations.

Note 2 to entry: Internal control applies to all activities, irrespective of whether they are financial or non-financial.

Note 3 to entry: Internal control supports sound decision-making, taking into account risks to the achievement of objectives and reducing them to acceptable levels through cost-effective controls.

Note 4 to entry: This definition of internal control is derived from the definition provided by the Committee of Sponsoring Organizations of the Treadway Commission (COSO)^[9], which also provides further useful information on this topic.

3.7

asset register

record of asset data and information considered worthy of separate identification and accountability

Note 1 to entry: Financial, or accounting asset registers are those databases or systems, which are used to describe and manage the organization's financial accounts and *management accounting* (3.2).

Note 2 to entry: Non-financial asset registers (technical or operational) are databases or systems, in which relevant technical or operational data and information of an asset are kept.

3.8

capital expenditure

CapEx

expenditure on acquisitions of, or improvements to, assets

Note 1 to entry: Based upon accounting standards and organization policy, CapEx usually relates to relatively large (material) expenditure, which has benefits that are expected to last for more than 12 months.

3.9

operational expenditure

OpEx

recurrent expenditures required to provide a service or product

3.10
total expenditure
TotEx

sum of *capital expenditure* (3.8) and *operational expenditure* (3.9) over a period

3.11
alignment

deliberate arrangement, relationship and mutual understanding of common concerns within a particular activity or among activities

3.12
valuation

process of determining the current value of an asset

Note 1 to entry: Valuation methods and bases are numerous and varied and may be expressed quantitatively and in monetary terms.

Note 2 to entry: Application may be made to a single asset, a group of assets, or an entire enterprise, as determined by various bases and methods.

3.13
book value
carrying value

monetary expression at which an asset or group of assets are carried on a balance sheet

3.14
residual value

estimated financial amount that an organization would expect to obtain from disposal of an asset, after deducting the estimated costs of disposal, if the asset were already of the age and in the condition expected at the end of its *useful life* (3.15)

3.15
useful life

period over which an asset or class of assets are expected to be available for use by an organization

Note 1 to entry: Useful life will be determined by factors such as the economic, technological, physical and functional performance of the assets or asset system, which demands an understanding between *financial functions* (3.4) and *non-financial functions* (3.5) depending on the context (e.g. tax, cost recovery, maintenance planning, long-term planning).

Note 2 to entry: The applicable period is dependent on the nature of the asset or asset system and can be elapsed time, operating hours, number of cycles, number of units of production, etc.

3.16
depreciation

systematic allocation of the depreciable amount of an asset over its *useful life* (3.15)

Note 1 to entry: While “depreciation” can be used for both tangible and intangible assets, “amortization” is normally used for intangible assets only.

3.17
fair value

price that would be received to sell an asset, or paid to transfer a *liability* (3.18), in an orderly transaction between market participants at the measurement date

3.18
liability

present obligation of the organization arising from past events, the settlement of which is expected to result in an out-flow of resources from the organization

4 Why alignment between financial and non-financial functions is important

4.1 General

Top management often struggles with many asset-management-related questions because of a lack of alignment due to barriers within the organization, e.g. language/terminology differences, information/data standard quality differences, and poor coordination between the organization's financial and non-financial functions in asset management. Some examples of questions include the following.

- How can I be sure I am getting best value for my stakeholders from my assets?
- How do my assets contribute to the delivery of the organization's strategy and objectives? Which assets are critical for it?
- What are the risks (and opportunities) to the organizational objectives arising from its assets?
- What level of investment do I need to make in assets over both the short and longer term (TotEx) to deliver my organizational objectives and how do I prioritize this investment?
- What is the cost of delivering products or services to meet customer satisfaction and how can I use this to inform my pricing?
- How do I determine the cost impacts of environmental and social changes, and the resilience of my assets to these changes?
- How can I know the total cost of ownership (TCO) of my assets?
- Are we making decisions that provide short-term cost savings but, due to lack of adequate asset management involvement, are leading to higher long-term costs?
- How can I get the necessary funding commitment to ensure the long-term financial sustainability of my assets to be able to continue meeting the objectives of the organization?
- How can I obtain enough information on the asset base for reporting purposes, enable correct and timely decisions, and understand the nature and use of seemingly conflicting information from different sources?
- Are my stakeholders confident about the asset verification/valuation/existence/necessity/impairment tests?
- Do I have the financial information to make evidence-based asset management decisions?
- What assets are not delivering the value expected and what assets are costing more than anticipated?
- What liabilities, and hence cost, are the assets exposing us too?
- Do my financial statements really reflect the state of my asset portfolio including leased assets?
- For my outsourced services, how are the associated costs tracked and managed through an appropriate internal control?
- How can I obtain/maintain competitive advantage through my assets used?

As illustrated in the above questions, all parts of the organization need to work together, to share and utilize information, to provide the transparency, insight and necessary answers, and to support asset management reporting and decision-making. This document provides a general solution to these questions in the form of better alignment across the organization, enabling a realization of the benefits detailed in 4.2. It does not seek to explicitly answer these questions individually but instead guides users to adopt the concepts contained within this document to find their own answers to these and other pertinent questions.

Asset management deals with the challenge of maximizing value derived from the assets. A significant explanation of the value proposition can be found in ISO 55002:2018, Annex A.

The concept of value in asset management is broader than the more constrained specific definition of value in accounting terms, where the various accounting standards deal with value as part of the valuation of assets process. The value in asset management can be expressed in both monetary and non-monetary terms and an aligned understanding of financial and non-financial value is needed to determine decision-making criteria.

Financial planning, decision-making and reporting are crucial to asset management and, conversely, asset management has major impacts on financial aspects. Accordingly, close coordination of financial and accounting functions with the non-financial asset management functions is essential to meeting organizational objectives.

4.2 Benefits of alignment

Alignment and coordination between financial and non-financial functions related to assets and asset management can lead to resolution of many of the issues listed in 4.1, as follows.

- a) Improved expression of asset criticality and risk in financial terms, which would help to implement more robust risk controls.
- b) Integrated and efficient asset investment planning and prioritization for the short- and longer-term timescales.
- c) Improved understanding of longer-term funding needs relating to assets that supports informed decision-making for financing and budgeting, leading to long-term predictable and sustainable funding mechanisms.
- d) Improved options analysis and decision-making on investment projects based on more complete information from both financial and non-financial functions.
- e) Improved decision-making and communication on pricing for the organization's products and services based on sound practices such as managerial costing, and a better understanding of value to customers and stakeholders.
- f) More accurate, complete, transparent and timely registration and reporting of all changes to asset management information affecting the financial functions, including functions of accounting and finance, auditing, regulating, tax and insurance. This includes for accounting purposes when a self-constructed asset is determined to be substantially complete and ready for use, at which time the cost of the capital project is taken from a construction in the progress account and capitalized for depreciation or amortization purposes.
- g) Improved methodology and procedures to enable financial and non-financial staff to efficiently share knowledge and information whereby both financial and non-financial staff use commonly agreed terminology, which can lead to collective understanding.
- h) Maintained or improved competitive advantage.
- i) Improved internal controls as part of the wider management system of the organization.
- j) More efficient measurement of operational performance and the organization's overall performance.
- k) More efficient procedures for capital and operational budgeting processes.
- l) Better alignment of long-term financial planning and asset life cycle planning.
- m) Collaboration across departments to optimize resources and reduce duplication.
- n) Improved depreciation methodology.

- o) Improved teamwork, collaboration, clarity, transparency and availability of information and upskilling for financial and non-financial staff.
- p) Better understanding of what services can be provided, based on available funding, enabling meaningful trade-off analyses when reviewing service and funding gaps.
- q) More reliable knowledge of cost inputs for pricing, considering all life cycle costs originating from financial and non-financial functions (see [Annex G](#)).

Improved alignment between financial and non-financial functions helps to improve the quality of information used to support an organization's decision-making and value maximization. Such improved alignment also encourages both financial and non-financial practitioners to speak the same language.

5 Enablers for alignment

5.1 General

This clause focuses on how business processes, leadership and governance are key enablers for the alignment of financial and non-financial asset management activities. It provides examples of the data, information, knowledge and capabilities required to support alignment among different levels of the organization.

5.2 Processes, leadership and governance

5.2.1 Processes

Defined processes can be significant enablers for the alignment of financial and non-financial asset management functions. Processes should be properly supported by documented information and opportunities identified to link tasks across different levels, functions and processes. For example, the process used by an asset manager to bring a new asset online (non-financial) should contain a task to capture total installed cost and send/link this to the accounting function where it can be used as the cost basis of the asset (financial). This example of a co-developed process would enable timely and accurate data and information for asset cost, installation date and expected useful life to be captured in both the financial and non-financial asset registers. The processes developed within an organization should use common terminology across the financial and non-financial functions and focus on the end-to-end need rather than being governed solely by function.

5.2.2 Leadership

To achieve alignment between the financial and non-financial asset management functions within the organization, top management should demonstrate leadership and commitment by:

- a) promoting and encouraging collaboration and clarity, transparency and availability of information for financial and non-financial staff;
- b) ensuring alignment between the objectives of the various financial and non-financial functions in conformity with the defined overall organizational objectives;
- c) facilitating training for people involved at intersecting processes, between financial and non-financial asset management disciplines, to promote communication and common understanding of the terminology being applied;
- d) ensuring the availability of adequate resources capable of promoting and implementing cross-functional collaborative teams with a focus on continual improvement;
- e) ensuring both financial and non-financial functions have adequate influence in decision-making processes;
- f) ensuring consistency of the various policies in their intent, language and communication;

- g) ensuring implementation and maintenance of inter-departmental shared granularity to identify how an asset is recorded;
- h) ensuring alignment in risk management of the various financial and non-financial functions in conformity with the overall risk management framework.

5.2.3 Governance

Governance should provide a framework to align financial and non-financial asset management functions. This is demonstrated by a governance process and policies designed to establish alignment relationships between stakeholders that can address any conflicting interests regarding how assets are managed.

Figure 1 suggests key elements of a framework that can be adopted to achieve alignment.

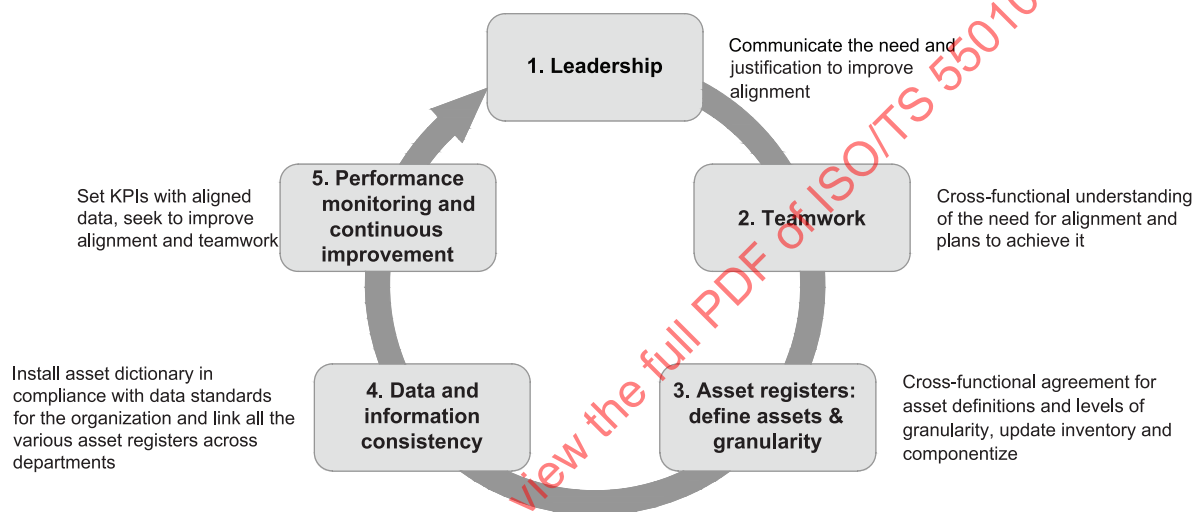


Figure 1 — Key elements of a framework to achieve alignment

It is important that the governance framework addresses the alignment of financial and non-financial functions in relation to risk management (particularly financial risk) within the context of the common overall risk management framework. ISO 55002:2018, Annex E, provides further detail on risk management. Another useful reference on risk management is the COSO framework^[9].

5.3 Policy, strategy, data and information

5.3.1 Asset management policy support

Top management, through the asset management policy, should acknowledge and endorse the role of alignment between the financial and non-financial functions. Top management should provide commitment to the provision of the information, knowledge and capabilities required to achieve, maintain and continually improve alignment. Such information should be available for use within the organization's non-financial decision-making functions, e.g. replacement, renewal, maintenance, training, inspection. This will ensure decisions are informed and balance the financial needs as well as the organization's wider performance requirements.

5.3.2 Strategic asset management plan support

Department/division managers, through the strategic asset management plan (SAMP), should specifically address the high-level requirements needed to capture, store and share the information, knowledge and capabilities required to support alignment between financial and non-financial asset management activities. ISO 55002:2018, Annex C, provides significant guidance on the format and content of a SAMP.

5.3.3 Data and information

Accurate, reliable and current data and the resulting information are key elements of asset management. When data are processed, interpreted, organized, structured or presented so as to make them meaningful or useful, they are called information. Data and information management is of utmost importance to facilitate and ensure the collection, accuracy, availability, integrity and completeness of data and information. Data management should cover data generated within the organization as well as data coming from outsourced or contracted functions.

After determining its reporting, planning and analysis requirements, an organization should determine the data needed to facilitate the reporting and planning functions and the best source of such data. Both financial and non-financial areas are likely sources of the required data. Emerging and evolving business and technology innovations for data and information will continue to provide emerging means to support alignment.

The organization should ensure that both financial and non-financial functional areas strive to collaborate on data collection and ensure the access of data for the right people.

5.4 Non-financial functions in asset management

There are a range of non-financial functions involved across the whole life cycle of assets, from creation through to disposal, that have financial implications. For example, the operational phase of the asset life cycle represents a significant proportion of the whole of life costs, particularly for long-life infrastructure assets. The financial and non-financial functional areas should collaborate to find ways to perform the necessary operational and maintenance activities at an optimized cost and acceptable risk. It is important that those staff with knowledge of these activities are involved at the decision-making stage of acquiring the assets, so that accurate life cycle costing can be assessed and considered.

Teams responsible for non-financial asset life cycle activities should collaborate with financial teams on issues such as:

- planned shutdowns;
- the balance between preventive and corrective maintenance;
- when to intervene with an asset replacement, upgrade, or disposal;
- the possible outsourcing of activities.

More information on how to achieve alignment between the financial and non-financial functions required across the various life cycle activities is provided in [Annex E](#).

5.5 Terminology for financial and non-financial alignment

Physical-asset-holding organizations should embrace the development of common terminology within their organization. This is to ensure that all stakeholders have a clear understanding and agreement in relation to the meaning of various terms commonly employed in differing professional sectors such as finance, operations, information and communications technology (ICT), etc. This process also provides a means of addressing ISO 55001:2014, 7.5 d). Various terms designate accounting treatment, e.g. a “repair” means the cost may be expensed in the period the repair was made while a “betterment” or “improvement” should be treated as a CapEx.

6 How to achieve system alignment

6.1 General

Organizations often have to deal with several different asset information management systems, designed for specific purposes by different functions, very often as a result of piecemeal and ad hoc development and investment. Organizations benefit from asset information management systems that

are designed and developed with a common purpose; however, this is often not the case. To address this common alignment issue, data within the different systems should comply with the data standards of the organization, to avoid duplication, misuse and misunderstanding.

Staff in the different functions should have basic knowledge as to where data in the systems is used and why it can contain critical information for other functions. This means that staff should be trained regularly in common terminology and understanding.

6.2 Information systems

Organizations use their information systems to register, manage, analyse and report on asset data and activities. These systems may comprise computer hardware, computer software, databases and data warehouses, telecommunications to connect hardware to form a network, and people to operate the systems (human resources and procedures). Financial and non-financial data from within these various information systems is often needed to facilitate alignment of the financial and non-financial asset management processes, particularly when seeking to determine value derived from assets and to facilitate long-term financial planning for asset management.

With relation to tangible assets, different departments typically desire different levels of asset information, according to their specific needs. In the general case, the financial accounting department can satisfy their direct needs by grouping assets and identifying the components of assets with different useful lives for accounting depreciation. Other financial functional areas involved in management accounting can require different levels of detail for forward financial planning on asset replacements, etc. On the other hand, plant maintenance and operations need to register assets in close relation with their functions. For example, plant maintenance will need to further break down assets that are independent functional units (e.g. each machine) into components with different maintenance schedules. Therefore, while departments normally have different granularity needs, to achieve aligned financial/non-financial information, it is desirable that all departments generating or utilizing asset-related information:

- a) reach agreement on the common levels of asset detail, with which different departments can drill down to or roll up to their required asset componentization, to distinguish the specific needs for each department or user;
- b) implement the common levels of asset detail into the organization's asset management system, with conformity to them being mandatory regardless of any changes of staff in charge of asset-related functions in each department;
- c) implement procedures for maintaining the linkage between financial and non-financial information systems to the desired levels of asset detail.

Technologically advanced organizations can integrate their asset datasets from within each of these different information systems through the deployment of analytics and decision support software solutions. The benefits of alignment in this manner are that it does not require duplication of data across information systems and it enables a wide variety of analytical capabilities through the incorporation of different asset information at various stages of the asset life cycle.

6.3 Data management

Data management is a subset of information management. It comprises all disciplines related to managing data that are used by the organization in both financial and non-financial functions. In order to deliver the information requirements of ISO 55001, financial and non-financial functions should collaborate in evaluating the information needed to deliver asset management objectives and ensure that appropriate asset management information is available.

Each data user (or user group) within an organization needs to understand the data and be confident that these data are fit for purpose to meet the organizational objectives. Properly maintained metadata

and fundamental classifications of assets are useful in supporting these alignment requirements. It is of vital importance that organizations:

- a) clearly define, develop and communicate their processes for the capture and creation of data, for managing and dissemination of data, and for data maintenance and updates;
- b) ensure these processes are understood and deployed by the end users;
- c) establish and enforce performance measures that monitor how current, complete and accurate the data are;
- d) make arrangements to maintain current, complete and accurate data when implementing changes to existing systems and tools, or when introducing new ones.

The registration of data should ensure that each data element has the same meaning for all data users. Here, there is a need for training staff on the meaning of common terminology that should be used across different functional areas. The data registration, based on asset transactions, should trigger the necessary transactions in the relevant database(s). For example, registration of an investment in a physical asset should appear in both the non-financial asset register and have a counterpart in the financial accounting database.

7 How to achieve asset-register-related alignment

7.1 General

Traditionally, an organization's different departments carry data and information on assets to suit their own purpose. That data and information is generally recorded in departmental asset registers, with each department doing so independently. Therefore, an asset's financial and non-financial data and information may be recorded in different registers that need to be linked, so the organization can have a comprehensive view of all the relevant information necessary for decision-making. For that reason, a key to the alignment of an organization's financial and non-financial functions lies in managing and aligning the different asset registers.

Asset registers are the tools that organizations use to assemble and manage pertinent information (e.g. physical, operational, financial) about their assets/asset systems (tangible and intangible). Organizations can utilize a number of different asset registers to support the breadth of their operations. Asset registers are essential for good asset management and can range from simple (e.g. spreadsheet ledgers) to more complex software applications/databases [e.g. an enterprise resource planning (ERP) system, computerized maintenance management system (CMMS), geographic information system (GIS), financial/accounting information system (FIS), associated visualization tools].

7.2 Financial asset registers

Financial asset registers are used for managing the organization's financial functions. They are used for financial reporting purposes, as well as for other activities, including accounting, taxation, insurance, valuation and legal requirements. Other financial registers are typically developed for managerial costing and are purely for the organization to use internally to ensure that information used for decision-making reflects the characteristics of the organization's resources and operations. Financial asset registers should be continuously maintained throughout all phases of the asset life cycle (i.e. new assets added, assets divested) to reflect the accurate book value of assets. For example, asset disposals noted in the non-financial asset register should be properly reflected in the corresponding financial asset register records.

7.3 Non-financial asset registers

The non-financial asset registers are the organization's definitive key source of information for all the assets it manages and operates (tangible and intangible). Operational level asset information systems including maintenance management, telemetry/supervisory control and data acquisition, and modelling

systems link to the non-financial asset registers. More complex non-financial asset registers use asset hierarchical modelling to define asset components, their physical locations and their role in specific processes. Non-financial asset registers should be continuously maintained throughout all phases of the asset life cycle (i.e. new assets added, assets improved, assets moved, assets divested) to reflect a complete and current asset inventory.

7.4 Asset register alignment

Facilitating alignment between financial and non-financial asset management processes requires a common aspect/tag to be contained within each register. Without such commonality, full alignment will be difficult to achieve. It requires an understanding of, and alignment between, the financial and non-financial asset registers. Alignment enables the sharing of asset life cycle operational and financial data by and between the different information systems used to manage and analyse asset performance and delivery of value. Asset register alignment is critical to the successful development of asset management plans for the various asset classes (and as required by ISO 55001:2014, 6.2.2).

In any organization, a hierarchical structure can have been implemented in one or more asset registers (or not have been implemented at all). If hierarchies have been implemented in more than one type of asset register, they do not need to be the same. Each department can establish any hierarchy that best suits its own functions.

Organizations with no hierarchy implemented need to determine the level of detail, i.e. granularity, with which they will share inter-departmental information on assets. This will result from a trade-off between finer granularity, providing more precise information on the assets but also a higher number of individual assets to keep track of, or thicker granularity, with lower precision and lower asset management overhead costs.

Organizations that use a hierarchical structure in one or more of their asset registers, typically in a non-financial asset register as mentioned in 7.3, need to determine which level of that hierarchy will be the “asset” level, i.e. the shared granularity with which all asset registers are to comply. Items higher in that hierarchy will be “asset systems”, and items below it will be “components”, “sub-components”, etc.

In order to collaborate, there needs to be an organization-wide consensus on shared granularity, i.e. the asset breakdown detail at which financial and non-financial data will be shared. That consensus needs to be formalized in a dictionary of standard descriptions of the assets in the shared granularity and complied with across all departmental asset register platforms. Assets at that level of granularity need to share the same identification code to ensure integrity, so that data in the different departmental asset registers can be reported together for completeness. Organizations that have implemented asset registers with one or more hierarchies need to agree on which level of those hierarchies will be the one with shared granularity and apply the agreed unique code and description.

When seeking to align the various asset registers (and the associated processes they support), the organization should coordinate the activities of appropriate staff and stakeholders from across the various functional areas responsible for the operational and financial asset management activities. Asset register alignment is achieved when the following criteria are met (this also applies to different non-financial functions within asset management):

- a) a common understanding of the specific asset data capture, reporting and analysis requirements across each functional area is achieved;
- b) data and information that needs to be shared across the different functional areas is identified and defined;
- c) a single key source for each of the specific data elements is identified and agreed upon;
- d) data quality standards, business processes, responsibilities and timelines for maintaining the asset register data have been defined and agreed upon by the different stakeholders.

8 Financial planning for asset management

8.1 General

Financial planning for asset management is an integral part of the overarching asset management process. Asset management planning aims to achieve both financial and non-financial objectives while balancing performance, cost and risk over the total life cycle of the asset systems. It starts with the objectives (including financial objectives) the organization wants to achieve for its stakeholders and incorporates the desired performance, risks and costs over the total life of the asset systems. It concerns not only the operational phase of the asset systems, but also the design, acquisition or construction, operation, maintenance, renewal and decommissioning phases.

From a financial perspective, it concerns both capital investments (CapEx) and annual recurrent costs (OpEx). The sum of the two over various periods is referred to as TotEx. In some jurisdictions, the concept of TotEx (now or in future) is of increasing significance in investment planning (it is not used in accounting reports). It balances short-term spend against longer-term spend. This has led to innovative solutions that reduce lifetime costs and encourages sustainability.

Long-term planning includes capacity planning, asset life cycle planning, capital investment planning and long-term financial planning.

Short-term planning includes budgets and operational planning.

8.2 Capital investment planning

Capital investment planning identifies the capital investment requirements of the organization over a specified period of time, (e.g. typically a 5 to 10 year forward planning horizon or longer, depending on the organization's circumstances).

Capital investments typically cover three distinct types of CapEx, or combination of these:

- a) the creation and purchase of new assets, upgrade or expansion of existing assets (typically to address a growth in demand), technological advances, or changes to the required level of service;
- b) the renewal or rehabilitation of existing assets, usually to prevent failure of these existing assets and return them to their original life and service potential;
- c) the investment in assets that are held as an investment in their own right, either to provide a financial return or for a future opportunity value.

Management accounting processes carried out by financial and non-financial staff working together should provide essential information for decision-makers on proposed capital investment for assets, by assessing issues such as:

- future demand and trends;
- potential technology changes and innovations;
- utilization and function change;
- obsolescence;
- costs of ongoing operations;
- age and condition of existing assets;
- risk rating;
- costing and funding options.

Using capital investment planning tools, staff can determine the impact on future budgeting, including capital costs, potential changes in operating and maintenance costs, and decommissioning and disposal

costs. Future operational costs arising from new capital investments should always be taken into account as part of the total life cycle costs of the assets. These costs need to be reflected in long-term financial plans.

There will always be a degree of trade-off between operation/maintenance costs and capital investments. The financial and non-financial staff need to assess what savings could be made in the maintenance budget if capital investments are brought forward to allow an earlier renewal of assets. Conversely, increasing maintenance activity can allow the deferral of capital investment for the renewal of assets. The optimal time for capital investment intervention is the point at which the overall life cycle costs of the assets can be minimized. Due consideration of the weighted average cost of capital (WACC) by finance staff should be undertaken to address the appropriate levels of debt/equity funding.

The evaluation and prioritization of capital projects is inevitably necessary in organizations because the size and volume of projects typically exceeds the available resources. Proactive capital investment planning involving alignment is key to prioritizing and ensuring that the required financing is in place at the right time for implementing the prioritized projects.

The capital investment plans need to be developed with full cooperation between financial and non-financial functional areas of the organization. The output of this capital investment process is a major input into long-term financial planning (see 8.3) and budgeting (see 8.4). An organization should view its financial and non-financial planning processes as interrelated and iterative.

For more detail on the capital investment planning process and its objectives, see [Annex A](#).

8.3 Long-term financial planning

Long-term financial planning builds on the outputs from the asset management planning and capital investment planning. It includes all annual operation and maintenance costs over the planning timeframe. It is the process of aligning financial capacity with long-term service or product delivery objectives. The challenge is often one of agreeing a timeframe for such planning, recognizing that the asset management perspective is typically focused on the asset system life cycle. This can be much longer than the typical financial planning and operational planning cycle. Accordingly, financial and non-financial staff, as well as top management, should agree on a long enough timeframe to give useful forward planning information that aligns the financial and non-financial perspectives. The organization should have an appropriate long-term financial planning process that achieves the following:

- a) it stimulates long-term strategic thinking and perspective for stakeholders and decision-makers;
- b) it can be used as a tool to prevent or predict future financial shocks and demonstrate financial sustainability;
- c) it demonstrates to internal and external stakeholders that the organization has a financial strategy in place to meet their demands, now and in the future.

The long-term financial planning process needs to involve the financial and non-financial staff working together to combine the important elements of strategy development, asset management planning and financial forecasting. For more detail on the long-term financial planning process, see [Annex B](#).

8.4 Budgeting

The budgeting process is more efficient when informed by a long-term financial plan that has been developed collaboratively with financial and non-financial staff input. Asset management should be a key driver as part of the corporate objectives for budget development and spending decisions. Financial criteria should form part of the decision-making criteria about how to achieve corporate asset management objectives.

Asset management is implemented from a mid- and long-term perspective and budgeting should also be approached in the same way. When financial and non-financial areas understand the asset conditions and objectives required, they can collaboratively prepare the asset management plan and associated costs using zero-based budgeting or activity-based budgeting, and agree on the budget necessary for

the next year. Whichever method is used, it is paramount that the financial and non-financial staff collaborate to reach an agreed budget.

Inadequate budget provisions can lead to higher life cycle costs in the long run, inequitable charging and financial shocks in future years. The annual budget should recognize the consumption of asset service potential (depreciation or amortization) and appropriately fund it. It is also important that the budget correctly categorizes expenditure for CapEx versus OpEx and provides for any donated assets received in the prior period, as these can have impacts on additional operations and maintenance costs, depreciation, etc. When aligning financial and non-financial functions, it is important to set criteria such as a capitalization threshold for categorizing OpEx and CapEx.

Given there is often a limited budget for expenses, there can be discussions on whether to increase CapEx for asset replacements, thus reducing OpEx. Alternatively, to save on CapEx, it could be decided to keep existing assets running, even if due to age and condition they could require increased OpEx. The decision to go one way or the other can also have an impact on the profit and loss statement through depreciation (especially to the degree that existing assets are fully depreciated) as well as on taxes. Again, good collaboration between financial and non-financial staff is paramount to determine the appropriate proportions between CapEx and OpEx.

9 Performance management

9.1 General

To manage performance, it is necessary to make financial and non-financial evaluations to enable better decision-making by the organization. These evaluations need sufficient and reliable information. This activity is a requirement of ISO 55001:2014, 4.2, which states: “the organization shall determine ... the stakeholder requirements for recording financial and non-financial information relevant to asset management, and for reporting on it both internally and externally”.

Performance management is an essential element in asset management to achieve the organizational objectives. It concerns:

- a) measurements (What are the objectives and targets? What is to be measured? When and how?);
- b) evaluation (Are the plans executed as intended? Are the intended objectives achieved?);
- c) improvements/adjustments of plans to achieve the objectives.

A balance has to be sought when addressing performance, cost and risk. Therefore, these three elements should be measured in relation to each other.

Sound financial management includes both financial accounting (historical) and management accounting (predictive). Performance management is essential to provide aligned financial and non-financial asset-related information for both purposes. Therefore, it should be monitored regularly for the value it adds to managerial decisions, and not only for auditing purposes.

9.2 Performance measurement

Performance evaluation should be carried out in many layers against specific, measurable, achievable, relevant and time-based (SMART) objectives aligned to each layer.

It should start with a self-evaluation by every employee or team. The organization's managers should create a culture that enables and encourages such activities.

A subsequent layer of evaluation can be from regular performance reporting, e.g. with the support of a balanced scorecard. The balanced scorecard should report on financial and non-financial measurements to test the balance between performance, costs and risks. This should be carried out at a regular frequency. The benefits of regular performance reporting come from preparing the report itself

and also from the discussion about it within the team or at other managerial levels. Based on these discussions, improvement actions can be initiated.

Other layers of evaluation can be sought through internal and external audits.

Performance measurement involves both financial and non-financial measures. A significant part of financial performance measurement can involve auditing.

Financial audits should typically address a wide range of issues primarily pertaining to the accounting standards, but also pertaining to asset management practices. The auditor, in forming an opinion as to the accuracy and completeness of the financial reports, should analyse and assess information that is drawn from both financial and non-financial functional areas. Typically, advice is required from a wide cross-section of the organization's functional areas, including top management, on issues such as whether:

- a) the level of corporate governance exercised by the organization over assets is appropriate, particularly in areas of acquisition, existence, proper use and disposals;
- b) the valuation and depreciation or amortization methodologies are in accordance with the relevant accounting standards;
- c) the depreciation or amortization methodology is logical and provides a reasonable measure of the level of remaining service potential and the pattern of consumption of the service potential;
- d) all critical assumptions are supported with sufficient and appropriate evidence;
- e) the asset register is complete and accurate to an appropriate level required for its users and stakeholders can have the required level of confidence in its data integrity, quality and currency;
- f) the accessibility of information is adequate;
- g) valuations have been kept up to date;
- h) the organization is monitoring the health and condition of its assets and their remaining useful life and clearly understands the relationship between the asset condition and its current value.

To manage performance, it is necessary to make rigorous evaluations to enable better decision-making by the organization. These evaluations need sufficient and reliable data that addresses both financial and non-financial measures. This activity is a requirement of ISO 55001:2014, 4.2.

9.3 Performance reporting

The quality of reporting is highly influenced by the quality of the underlying data. When determining its information requirements, the organization should consider:

- a) the information needed to enable decision-making and its quality relative to the cost and complexity of collecting, processing, managing and sustaining the information;
- b) the participation and skills mix of the relevant financial and non-financial staff to provide the types of information required to support decision-making as well as to ensure the completeness, accuracy and integrity of the necessary information;
- c) the need for both lead and lag indicators to be considered and reported on.

Performance reporting addresses internal policies, procedures and processes, including risks, costs, value generated, asset health, life cycle performance, etc. The purpose of such reports is to recognize actual costs, to validate prior decisions, to recognize changes in value and to assess possible future value enhancements. Reporting should be designed and coordinated to effectively and efficiently report on changes in values, systems and processes, addressing the needs of both financial and non-financial functions.

Quantifiable key performance indicators should have a direct relationship to the organization's long- and short-term objectives as stated in the SAMP. They should include both leading and lagging indicators. Every area of the organization can have specific indicators that should be monitored. In defining these indicators, various perspectives can be considered, including financial, customers/stakeholders, the organization's capabilities and internal processes. There is a need for the financial and non-financial functional areas to work together in defining dynamic indicators linked to the organization's context.

Once alignment in shared asset granularity has been achieved, there is a possibility that the performance indicators in different locations can be found to refer to different levels of granularity. Performance management should ensure that the indicators in different locations produce coherent information.

For example, the finance department can set up financial indicators for each individual asset, such as valuation or depreciation. At the same time, the maintenance department can set up OpEx indicators for each individual asset and productivity indicators for entire production lines (asset systems). In such cases, the individual indicators will need to be combined, communicated and accessed in a way that provides coherent information for decision-making.

It is important for good performance management to regularly monitor and assess the performance indicators and underlying data. Knowledge gained from this monitoring and assessment will provide confidence in performance and will support continual improvement.

9.4 Financial reporting in asset management

Accounting standards are used by the financial function for the organization's financial reporting. These standards contain specific guidelines regarding the definition of an asset, when to record an asset, and how to report financial information about an asset. Financial reporting functions typically address past events. However, many organizations are increasingly looking to their financial accounting functions to provide managers with aligned financial and non-financial information to better inform asset management decision-making for planning ahead.

It is useful for non-financial functions to have a basic understanding of financial and accounting principles for asset management to foster discussion and communication between different functional areas within an organization. It leads to better understanding of the terminology and language commonly applied by financial and non-financial staff relating to asset management.

With respect to how an organization should fulfil its accounting functions in terms of asset management, it is desirable that both the financial and non-financial staff should collaborate on financial reporting. This collaboration is important as the non-financial functions can provide useful asset information to the financial functions to improve the accuracy and completeness of the financial reports. For example, information on actual asset condition and remaining life, asset uptime, capacity and efficiency can be useful inputs to incorporate into the financial assessment of the organization's assets.

Organizations should also seek collaboration between the financial and non-financial functions when reporting to stakeholders through management accounting. Management accounting includes items such as:

- a) sustainability ratios (such as renewal actually spent/renewal required in the asset management plan) that demonstrate whether assets are being appropriately renewed or maintained to ensure service level capability;
- b) funding requirements for renewal and replacement of assets and the degree to which these are being funded over the long term;
- c) other key performance indicators as determined by the organization to demonstrate that it is meeting its asset management objectives.

[Annexes C](#) and [D](#) contain more detailed information about accounting, financial reporting and other financial functions.

Annex A

(informative)

Guidance on capital investment planning

The objective of capital investment plans should be to utilize information from the asset management planning process to:

- a) ensure the timely renewal and replacement of assets where they can deteriorate over time;
- b) ensure due consideration of the need for new assets to meet future demand and customer needs;
- c) provide a level of certainty for stakeholders regarding the location and timing of capital investments;
- d) identify the most economical means of financing capital improvements; due consideration of the weighted average cost of capital should be undertaken to address the appropriate level of debt/equity ratio in the funding mix;
- e) provide an opportunity for stakeholder input into the budget and financing process;
- f) mitigate the risk of unanticipated, poorly planned or unnecessary CapEx;
- g) reduce financial shocks, such as sharp increases in tax rates, user fees and debt levels, to cover unexpected capital improvements;
- h) ensure that patterns of growth and development are consistent with the SAMP;
- i) balance desired capital improvements with the stakeholders' risk appetite, financial resources and capabilities;
- j) provide cash flow planning and optimization.

Various agencies have produced frameworks for carrying out prioritization of capital programmes, all of which follow similar general steps.

An example of such a framework is given by Reference [8].

Annex B (informative)

Guidance on long-term financial planning

B.1 General

Long-term financial planning should use forecasts to provide insight into future financial capacity so that strategies can be developed to achieve long-term sustainability, taking account of the organization's objectives and financial challenges.

Financial forecasting requires a process of projecting revenues and expenditures over a long-term period, using assumptions about economic conditions, future spending scenarios and other salient variables. It typically extends to a five- to ten-year horizon (or longer) depending on the organization's needs.

Successful long-term financial planning is predicated on organizations having a robust and current SAMP and asset management plans for the assets involved in providing their core products or services. Organizations rely on these asset management plans to inform on OpEx and CapEx required over asset life cycles. The long-term financial planning process should be driven from asset management plans, which provide expenditure projections that should be fed into the financial planning process. There would typically be a number of iterations to arrive at a final position where all stakeholders are generally satisfied that the particular specified level of service can be afforded. It should be noted that there can be a need for an adjustment by varying service levels to achieve financial constraints. The final position is then funded over the planning period of the long-term financial plan.

The long-term financial planning process should note whether monetary amounts are expressed in real (i.e. today's prices) or nominal (adjusted each year by the expected inflation rate) values. In the latter case, financial staff will be best able to advise on applicable discount rates for net present value. Organizations should annually review long-term financial planning activities and update the plan as needed in order to provide direction to the budget process, although not every element of the long-term plan will need to be revised.

[Tables B.1](#) and [B.2](#) give further details on the typical steps involved in the long-term financial planning process.

As an example, the Institute of Public Works Engineering Australasia and the Australian Centre of Excellence for Local Government have produced a practice note on how to develop a long-term financial plan, including templates and spreadsheets, which is freely available (see Reference [\[22\]](#)). Alternately, [Table B.1](#) shows a typical flow chart for the long-term financial planning process.

Table B.1 — Guidance on long-term financial planning

Long-term financial planning																																																						
Stage	Activity																																																					
1. Asset management planning	1.1 Identify services to be provided and the level of service required from service plans.																																																					
	1.2 Prepare asset management plans for all services/asset categories.																																																					
	1.3 Develop the projected expenditures required to provide services over a 10-year planning period for:																																																					
	— operations;																																																					
	— maintenance;																																																					
	— capital renewals;																																																					
	— capital upgrade/expansion and new assets;																																																					
2. Prepare expenditure projections	— asset disposals (income less costs of disposal).																																																					
	NOTE Projected expenditures from the asset management plan are generally expressed in real dollar values.																																																					
	2.1 Identify the expenditure categories required for the long-term financial plan. This will need to ensure that information is capable of being presented in the same financial statements format as the entity presents its annual budget and end-of-year financial statements, e.g. expense categories, such as employee costs, contractual services and materials, and asset categories, such as buildings, infrastructure, and plant and equipment.																																																					
	2.2 Develop representative proportions of projected expenditure categories from the asset management plan in the categories of the long-term financial plan, e.g. for maintenance (figures are examples only):																																																					
	— employee costs 45 %;																																																					
	— contractual services 25 %;																																																					
	— materials 30 %.																																																					
2.3 Break up the projected expenditures from the asset management plan into the expenditure categories of the long-term financial plan for a 10-year planning period, e.g. for maintenance [figures (\$ 000) are examples only].																																																						
<table><tr><td>Year</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>Employee costs</td><td>\$ 45</td><td>\$ 46</td><td>\$ 46</td><td>\$ 47</td><td>\$ 54</td><td>\$ 55</td><td>\$ 56</td><td>\$ 56</td><td>\$ 57</td><td>\$ 59</td></tr><tr><td>Contractual services</td><td>\$ 25</td><td>\$ 26</td><td>\$ 26</td><td>\$ 26</td><td>\$ 30</td><td>\$ 31</td><td>\$ 31</td><td>\$ 31</td><td>\$ 32</td><td>\$ 33</td></tr><tr><td>Materials</td><td>\$ 30</td><td>\$ 31</td><td>\$ 31</td><td>\$ 32</td><td>\$ 36</td><td>\$ 37</td><td>\$ 37</td><td>\$ 38</td><td>\$ 38</td><td>\$ 39</td></tr></table>											Year	1	2	3	4	5	6	7	8	9	10	Employee costs	\$ 45	\$ 46	\$ 46	\$ 47	\$ 54	\$ 55	\$ 56	\$ 56	\$ 57	\$ 59	Contractual services	\$ 25	\$ 26	\$ 26	\$ 26	\$ 30	\$ 31	\$ 31	\$ 31	\$ 32	\$ 33	Materials	\$ 30	\$ 31	\$ 31	\$ 32	\$ 36	\$ 37	\$ 37	\$ 38	\$ 38	\$ 39
Year	1	2	3	4	5	6	7	8	9	10																																												
Employee costs	\$ 45	\$ 46	\$ 46	\$ 47	\$ 54	\$ 55	\$ 56	\$ 56	\$ 57	\$ 59																																												
Contractual services	\$ 25	\$ 26	\$ 26	\$ 26	\$ 30	\$ 31	\$ 31	\$ 31	\$ 32	\$ 33																																												
Materials	\$ 30	\$ 31	\$ 31	\$ 32	\$ 36	\$ 37	\$ 37	\$ 38	\$ 38	\$ 39																																												
NOTE These projected expenditures are usually in real dollar values.																																																						

Table B.1 (continued)

Long-term financial planning	
Stage	Activity
3. Financial planning	3.1 Prepare the long-term financial plan using projected expenditures from the asset management plan as well as projected expenditures associated with non-asset-related services and responsibilities (e.g. governance) and associated income and borrowing proposals.
	NOTE If it is preferred to compile and present the financial plan in nominal values than in real values of expenditure, the projections in the asset management plan will need to be adjusted for expected relevant price movements, projected expenditures and other values.
	Develop key financial indicators and appropriate financial performance targets.
	3.2 Review the financial affordability of services and the long-term financial sustainability of the entity.
	Review the key financial indicator trend results against the targets over the planning period.
	Review the ability to raise funds to achieve projected expenditures and revise proposals as necessary.
	Review services, service levels and projected expenditures and revise proposals as necessary.
Source: Modified from the Australian Infrastructure Financial Management Manual (AIFMM), 2015 ^[20] . Reproduced with the permission of the authors.	

B.2 Long-term financial planning process steps

B.2.1 General

A long-term financial planning process should include the following steps:

- a) a mobilization phase (see [B.2.2](#));
- b) a decision-making phase (see [B.2.3](#));
- c) an execution phase (see [B.2.4](#)).

B.2.2 Mobilization phase

The mobilization phase prepares the organization for long-term planning by creating consensus on what the purpose and results of the planning process should be, the timeframe for the plan and the parties involved in preparing the plan. The mobilization phase includes the following actions.

- a) Resource allocation: This step includes determining the composition of the project team, identifying the project sponsor and formulating a strategy for involving other important stakeholders. This step also involves the creation of a high-level project plan to serve as a roadmap for the process.
- b) Preliminary gap analysis: This step helps raise awareness of special issues among planning participants, such as the board or non-financial executive staff. A scan of the financial environment is common at this point.
- c) Identification of service policies and priorities: Service policies and priorities have important implications on how resources are spent and how revenues are raised. A strategic plan or a priority setting session with stakeholders can be useful in identifying service policies and priorities.
- d) Validation and promulgation of financial policies: Financial policies set baseline standards for financial stewardship and maintaining structural balance, so a planning process needs to corroborate whether policies are in place (as well as the organization's compliance with those policies) and also identify new policies that could be needed.
- e) Definition of purpose and scope of planning: The purpose and scope of the planning effort should become clear as a result of the previous activities, but the process should include a forum

for developing and recognizing their explicit purpose and scope, as well as for detailing them in documented information.

- f) **Analysis phase:** The analysis phase is designed to produce information that supports planning and strategy development. The analysis phase includes the projections and financial analysis commonly associated with long-term financial planning. The analysis phase involves information gathering, trend projection and analysis as follows.
- 1) **Information gathering:** This is where the organization's context should be analysed in order to gain a better understanding of the forces that affect financial stability. Improved understanding of contextual factors should lead to better forecasting and strategizing.
 - 2) **Trend projection:** After the organization's context has been analysed, the planners can project various elements of long-term revenue, expenditure and debt trends.
 - 3) **Analysis:** The forecasts can then be used to identify potential challenges to financial stability (e.g. imbalances). These could be financial deficits (e.g. expenditures outpacing revenues), environmental challenges (e.g. unfavourable trends in the environment), or policy weaknesses (e.g. weaknesses in the financial policy structure). Scenario analysis can be used to present optimistic, base and pessimistic cases. Risk analysis is usually undertaken as part of this phase.

B.2.3 Decision phase

After the analysis phase is completed, the organization should decide how to use the information provided. Key to the decision phase is a highly participative process that involves stakeholders, staff and customers. The decision phase also includes a culminating event where the stakeholders can assess the planning process to evaluate whether the purposes for the plan described in the mobilization phase were fulfilled and where a sense of closure and accomplishment can be generated. Finally, the decision phase should address the processes for executing the plan to ensure tangible results are realized.

B.2.4 Execution phase

After the plan is officially adopted, initiatives should be put into action (e.g. funding required in achieving goals). The execution phase is where the initiatives become operational through the budget, financial performance measures and action plans. Regular monitoring and reporting of performance indicators should be part of this phase.

Annex C **(informative)**

External financial reporting standards and principles

C.1 Examples of financial reporting

Some examples of external financial reporting are:

- a) annual reports to investors and government oversight bodies for publicly traded companies;
- b) tax reporting to central governmental, federal and local tax authorities;
- c) statutory accounts to national bodies;
- d) group reporting to parent companies;
- e) statistical reporting to national bodies;
- f) specific reporting to regulatory bodies at the sector level;
- g) insurable values.

Many countries have their own local specifications and requirements regarding financial reporting. At the global level, there are some accounting standards generally accepted and commonly used for reporting within large international companies or for public sector organizations. Some examples of financial reporting standards and principles are:

- International Financial Reporting Standards (IFRS);
- United States Generally Accepted Accounting Principles (US GAAP);
- International Public Sector Accounting Standards (IPSAS).

C.2 External financial reporting principles for assets

Most accounting standards include the following accounting principles or values, which are then translated into specific guidelines about how to register an asset within the organization's own accounting provisions:

- a) Fair presentation: This requires the faithful representation of the effects of the transactions, other events and conditions in accordance with the definitions and recognition criteria for assets set out in the accounting standards. Events or transactions through the asset life cycle can include (but are not limited to):
 - 1) an initial recognition on taking asset into use;
 - 2) dismantling obligations;
 - 3) value adjustments;
 - 4) decommissioning or restoration obligations;
 - 5) changes in useful life;
 - 6) major inspections or overhauls;

- 7) not in service;
 - 8) held for sale or disposal.
- b) Accrual basis for accounting: This requires that transactions be recorded based upon events, e.g. delivery, construction in progress (CIP) [sometimes referred to as work in progress (WIP)], assets reaching completion and substantially ready for intended use, rather than at the time that cash or cash equivalents change hands. The accrual accounting and the matching principle requires an organization to recognize the relationship between its OpEx and CapEx (related to physical assets) and the delivery of the required value to the organization during the period of incurrence, again, regardless of when cash payments are made.
- c) IFRS valuation rules: The rules provide options on the methods for how assets are registered in financial reporting, for example:
- 1) “fair value” refers to the method in which the actual value of the asset is recorded and not the historical cost of the asset (being the cost at moment of acquisition); use of fair value is recommended for organizations managing assets, particularly long-lived assets, as it can provide more meaningful information on which to base decisions about asset replacement, depreciation, etc.;
 - 2) use of capitalization threshold: some accounting standards allow the organization to capitalize only the cost of assets above a certain threshold; this threshold is then part of the valuation rule of the organization and should be applied consistently.
- d) Appropriate implementation of accounting standards: This implies that the organization adheres to the principles of the following assertions regarding the registration of its transactions: completeness, existence, accuracy, valuation, obligations and rights and presentation (CEAVOP), for example:
- 1) “completeness” of the fixed asset register (FAR) means that asset units or groups of assets purchased or built are effectively registered in the FAR (note that “fixed assets” generally refer to property, plant and equipment); i.e. technical or operational decisions to buy or purchase (or dispose of) an asset have been communicated to the financial department, enabling them to register the new assets in the FAR at the required componentization level (or write-off in the case of disposal);
 - 2) “existence” of the FAR means that the asset units or groups in the financial FAR are actually present in the organization, i.e. they “exist” in the organization;
 - 3) “accuracy” means that the transactions (purchase, sales, depreciation) are accurately calculated and registered in the FAR;
 - 4) “valuation” means that investments, maintenance and disposals are properly valued according to the applicable accounting standards and valuation guidance; this can require another basis of valuation (e.g. replacement cost also in FAR when accounting standards require the use of market value for reporting purposes);
 - 5) “obligation and rights” mean that the ownership or the control of the assets are properly disclosed;
 - 6) “presentation” means that the financial information and explanations are correctly described and presented according to the applicable accounting standards.

Based on a (financial) fixed asset register in accordance with these parameters, an organization should have a better view on its asset base and therefore can use the data and information in its registers for making decisions regarding its asset management. A comprehensive asset register can also allow the organization to fulfil the needs and expectations of its stakeholders and/or shareholders by presenting a fair view of its asset base in its financial reporting.

Annex D (informative)

Financial accounting functions for financial reporting

D.1 General

Subclauses [D.2](#) to [D.8](#) expand briefly on how an organization should fulfil its accounting functions in terms of asset management to the extent required for conforming to the accounting standards of each country's financial reporting needs. The following information is intended to raise awareness among both financial and non-financial staff of some of the basic accounting provisions for asset management. Such awareness is important to foster better communication between staff to assist them in performing their duties. The following main topics are addressed:

- financial asset registers;
- valuation/revaluation;
- valuation techniques;
- depreciation;
- impairment;
- useful life/remaining useful life;
- residual value.

Non-financial information should be considered by the organization on the above topics, to fulfil its accounting function in a proper manner. As well as the financial reporting functions, which typically address past events, many organizations are increasingly looking to their financial accounting functions to provide managers with essential financial information as part of the asset management functions, to better inform decision-making for planning ahead. In this document, the financial functions refer to life cycle processes and activities such as managerial costing and accounting, budgeting, financing, valuation, taxation and accounting for financial reporting relating to the assets. Non-financial functions can be deemed to be everything else pertaining to managing the life cycle of the assets.

D.2 Financial asset register

A financial asset register (referred to as the "fixed asset register" in some organizations) should contain the data required to register certain transactions during the life cycle of the assets. Records (date, cost, value) in the financial asset register may be historical or current, pending allocations occurred during the period for different reasons, such as acquisition, revaluations, etc.

Such data may include:

- a) acquisition date: the date the asset was purchased or put into service if self-constructed;
- b) acquisition cost: the (historical) cost for which the asset was purchased;
- c) useful life: the period over which an asset is expected to be available for use by an organization, or the number of production or similar units expected to be obtained from the asset by the organization; this period should be identical to the period during which the organization distributes the acquisition cost;

- d) depreciation percentage: calculated as per the depreciation methodology; alternatively, this can be taken to be read as the “percentage of each unit of time (month, year, etc.) or production unit of useful life”;
- e) accumulated depreciation: the accumulated amount of depreciation since the acquisition date;
- f) accumulated impairment: the accumulated amount of impairment since the acquisition date;
- g) book value: the difference between the acquisition cost and the sum of the accumulated depreciation, diminutions and other accounting charges as recorded.

For complex assets, such as infrastructure, accounting standards require a recognition of the component parts of some property, plant and equipment that have useful lives different from that of the main asset. Accounting considerations for identifying components are primarily related to the materiality of the impact on the recorded depreciation expense.

See [6.1](#) for more on the relationship between the financial asset register and other asset registers.

D.3 Valuation/revaluation

Asset values are used by many parts of the organization for a variety of differing purposes, including for financial reporting, insurance purposes, taxation and asset management. These asset values should be held in the asset registers and, accordingly, there is a need for financial and non-financial functional areas to work together for the common benefit of an aligned set of asset registers.

Valuation is the process of estimating the value of anything, including an organization's assets and liabilities. In the financial community, value is defined identically by both major international accounting standards: the IFRS and US GAAP. IFRS 13^[15] defines “fair value” as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price). Where a market price doesn't exist, IFRS 13 applies the depreciated replacement cost.

One of these various uses of “value” is as in “book value”, namely the amount at which physical assets are registered in the financial asset register. At the time of acquisition, the cost is registered as “acquisition cost” or “cost of origin.” This cost is subsequently depreciated either by time or production, and the cost of acquisition net of depreciation is usually called “book value.” While normally book value would vary between its highest level at the date of acquisition, and gradually decrease to zero or residual value at the end of accounting useful life, there can be instances during the asset's lifetime in which book value will need to be revalued, upwards or downwards. At those times, a valuation can be needed to reflect the impact of a new situation in the organization's financial statements. Examples of such new situations are:

- a) an old production line can be used after some modifications for producing a new product;
- b) the sale of an asset;
- c) the longer useful life of an asset;
- d) fair value accounting;
- e) economic environment and market conditions have worsened and impairment (additional depreciation) is called for;
- f) functional and technological changes have occurred to the assets and they are no longer able to perform at the expected level;
- g) technological advances in the marketplace have occurred and the asset(s) are no longer financially viable;
- h) there are associated costs, additional financing requirements or residual investment (e.g. spares).

While various accounting standards can allow values to be recorded in different ways, such as at historical cost, it is widely recognized that for meaningful asset management decision-making, fair value should be used. Unless decisions on issues such as replacing of assets, investing in renewals, depreciation or disposal are based on current market values or their equivalent, it is unlikely that the real costs in current monetary terms will be understood. Financial and non-financial functional areas should understand the requirements, put in place the necessary processes and work together to generate the necessary information required for decision-making on the above issues as well as on associated matters, such as pricing of services.

For valuing assets for asset management purposes, it will also be necessary for the financial and non-financial functional areas to collaborate on the way in which the assets are to be componentized in the asset registers to desirably reflect the way in which they are managed for varying useful life of each component. This can have a bearing on issues like depreciation, replacement or renewal treatments.

When measuring fair value, an entity should use the assumptions that market participants would use when pricing the asset or the liability under current market conditions, including assumptions about expectations and risk. However, not all assets operate in an active trading market. Examples include long-life infrastructure type assets. IFRS 13^[15] requires that “valuation techniques used to measure fair value shall maximize the use of relevant observable inputs and minimize the use of unobservable inputs”.

Unobservable inputs should be used to measure fair value to the extent that relevant observable inputs are not available, thereby allowing for situations in which there is little, if any, market activity for the asset or liability at the measurement date. However, the fair value measurement objective remains the same, i.e. an exit price at the measurement date from the perspective of a market participant that holds the asset or owes the liability.

D.4 Valuation techniques

An organization should use valuation techniques that are appropriate in the circumstances and for which sufficient data are available to measure fair value, maximizing the use of relevant observable inputs and minimizing the use of unobservable inputs. Collaboration between financial and non-financial functions is essential to gather the necessary data.

The objective of using a valuation technique is to estimate the fair value of the asset including the cost to replace its service capacity. The following three valuation techniques are widely used.

- a) **Market approach:** This approach provides an indication of value by comparing the asset with identical or comparable (that is similar) assets for which price information is available. When reliable, verifiable and relevant market information is available, this approach is the preferred valuation approach.
- b) **Cost approach:** This approach provides an indication of value using the economic principle that a buyer will pay no more for an asset than the cost to obtain an asset of equal utility, whether by purchase or by construction, unless undue time, inconvenience, risk or other factors are involved. This approach provides an indication of value by calculating the current replacement or reproduction cost of an asset and making deductions for physical deterioration and all other relevant forms of obsolescence.
- c) **Income approach:** This approach provides an indication of value by converting future cash flow to a single current value. Under this approach, the value of an asset is determined by reference to the value of income, cash flow or cost savings generated by the asset.

Where assets, e.g. infrastructure, do not have a market value or a future revenue stream, the cost approach is the most appropriate valuation technique. The valuation process requires that all three techniques be considered and only those that are not applicable be discarded. Finally, there needs to be a conclusion of value, after giving appropriate weight to the valuations obtained from each applicable technique.

D.5 Depreciation

In general, depreciation refers to the loss in value of an asset during the economic useful life of an asset while allocating a yearly cost of the use of the asset to each year. The depreciation charge for each period is recognized in a profit and loss statement. The remaining value of the asset at the end of its economic useful life needs to be equal to zero or to the remaining asset value (residual value, see [D.8](#)) as estimated by the organization from time to time.

In countries that have not introduced depreciation into infrastructure assets in their accounting standards, their value is not thought to be depreciated due to appropriate maintenance and rehabilitation, maintaining the service delivery capability. The value is stable since the units of production will not be changed from those at the planning stage.

IFRS and US GAAP (or other GAAPs) require that the depreciation method used reflect the pattern in which the asset's future economic benefits are expected to be consumed by the organization. The organization should select the method that most closely reflects the expected pattern of consumption of the future economic benefits embodied in the asset and based on what is allowed from local jurisdictions. That method should be applied consistently from period to period unless there is a change in the expected pattern of consumption of those future economic benefits. Close collaboration between financial and non-financial staff should be encouraged to arrive at an agreed pattern of consumption and the depreciation method.

There are several depreciation methods, depending on the accounting standards to be used or depending on the type of reporting. The following list gives some examples of depreciation methods.

- a) Linear depreciation method or straight-line depreciation or amortization (for intangible assets): If time-based, yearly depreciation is equal to the acquisition cost less any residual value, divided by the useful life of an asset. Again, this applies when assuming the asset is not revalued. This method results in a constant charge over the useful life if the asset's residual value does not change, the useful life does not change or the asset is not revalued.
- b) Diminishing balance method: This method results in a decreasing charge over the useful life.
- c) Units of production method: This method results in a charge based on the expected use or output.
- d) Useful life residual value depreciation: This method can be used for assets with a very long useful life because:
 - 1) assets are valued at a specific value (market value, replacement value, historical purchase value);
 - 2) depreciation (which can be linear or not) to a certain residual value can be determined as a percentage of acquisition cost; once an asset is disposed of, its remaining balance will be taken as that asset's final depreciation.

In cases where the chosen depreciation method does not result in a fair representation of the remaining book value of the asset, the organization should register an impairment (additional depreciation) in order to bring the net book value of the asset to the estimated fair value (see [D.3](#) and [D.4](#)).

D.6 Impairment

Impairment is the decline in the future economic benefits service potential due to extrinsic or intrinsic conditions on an asset over and above the consumption reported through depreciation. An asset is said to be impaired when its carrying amount exceeds the recoverable amount.

Impairment is an accounting treatment that should be applied at the moment an event occurs that has an immediate negative impact on the fair value of all the assets that belong to one and the same cash

generating unit. A change in the expected demand for a product resulting in a shorter useful life of the asset is an example of an event giving cause for the registration of an impairment.

EXAMPLE A shopping centre is strategically located next to a large specialized factory that employs thousands of employees. The factory work moves to a new facility a long distance away, with the consequence that the shopping centre's customer traffic diminishes by 75 % and most of its tenants vacate. This causes the shopping centre to receive a diminishing cash flow, revenues and profits, and consequently to lose significant market value.

This event is registered in terms of accounting by decreasing the current net book value of the asset to the current fair value. It should be noted that some accounting standards, such as IFRS, allow reversal of impairment losses recorded in prior years. It is important to understand how the asset condition and its current value are related and what are these effects on the value.

It is recommended that decisions on impairment for infrastructure assets should be made in a long-term view. Infrastructure assets have long lives compared with facilities and equipment, and their value should not be evaluated by a certain event occurring in a short time period. Also, it should be pointed out that impairment for infrastructure assets can cause the organization to reduce any charged tolls or fees, as well as to influence its creditworthiness and make financing more difficult, which in turn can cause further deterioration of the infrastructure.

As can be seen from the above example, determining whether an asset is impaired needs to involve the non-financial staff who manage the asset on a day-to-day basis. It should also be noted that if there is an indication that an asset is impaired, it could instead mean that the remaining useful life, depreciation method or residual value should be reviewed and adjusted, and no impairment loss recognized. Accordingly, judgement should be used to determine whether it is more appropriate to record an impairment loss or make other adjustments, with decisions being documented, including advice from the relevant functional staff.

Sometimes during impairment reviews it can be found that an asset no longer exists. If this occurs, it is not an impairment but a deferred recognition of a disposal, and an investigation should take place to identify and correct the process failure.

D.7 Useful life/remaining useful life

Useful life for an asset is generally the lesser of the period over which an asset can meet requirements based on technical, performance or economic factors. An asset's useful life determined by an organization can be limited by economic, functional or technological considerations, rather than by physical considerations. For that reason, an asset at the end of its useful life can be in good condition, in which case it can have a residual value. That asset could be productive for another organization, which would determine its useful life for its life cycle in the new organization.

For many long-term infrastructure and equipment assets, the useful life is determined by factors such as obsolescence, lack of maintenance support, decrease in reliability/availability, degradation in performance capability, operational availability and economic replacement feasibility. In particular, this determination requires cooperation between the financial and non-financial (operations/maintenance) groups to enable the right decision to be made as to whether it makes more sense to maintain the asset or to replace the asset.

For accounting purposes, the useful life of an asset is often defined for a particular established asset class and is used to establish the period of time over which the asset is depreciated or amortized. In this case, the useful life can be generally correct. However, for the operational function that uses the asset and has to project when a particular asset needs to be replaced, the user's estimate of useful life is probably more reliable because of additional pertinent considerations. This again highlights the need for the financial and non-financial functions to work together to improve estimation of actual useful life.

The determination of an asset's useful life requires considering various aspects such as:

- a) physical: analysis of failure rates, production capacity, wear and tear in the asset's operation environment;

- b) technological: foreseeable changes that can make the asset or the production strategy obsolete;
- c) functional: the expected evolution of market demand for the product or service that the asset participates in;
- d) economic: anticipation of the period in which the asset can be economically exploited.

Depending on the size and nature of the organization, the amount of analysis and weight given to each of these estimations can be made:

- informally, based on the judgement of appropriately qualified and experienced personnel, or professionally, using available formal methodologies;
- based on recommendations from operational and technical staff in the non-financial areas, as this information is used to determine a residual value at disposition.

The remaining useful life can be estimated from the condition of an asset, when reliable condition deterioration profiles are available. Remaining useful life can increase when an asset's total useful life is extended by rehabilitation work. When not available, the organization can use local knowledge and experience of the operation and service performance of similar assets. Hence, the need to engage both financial and non-financial functional staff to arrive at a consensus on remaining useful life. It is worthwhile for an organization to establish guidelines and thresholds around where alignment and cooperation needs to be.

D.8 Residual value

Residual value is the anticipated value of an asset at the expiration of its useful life. This value can be equivalent to open market value, scrap or salvage value, or a value that reflects the ability of the asset to contribute to the ongoing operation of a business with increased maintenance and operating costs. Assets with a residual life can, for example, be sold to other organizations. Such a sale reflects the residual value of the asset to the first organization.

Residual value only exists where an amount received from disposal of the asset at the end of its life to a third party is greater than the estimated costs of disposal if the asset was already at the age and in the condition expected at the end of its useful life. Some residual values could need to be reviewed each year, considering associated uncertainties.

In some cases, residual value can be a negative number because the asset requires significant disposal cost, such as the demolition of a chemical plant. Again, the assessment of residual value requires advice from both financial and non-financial functional areas.

Annex E (informative)

Non-financial functions in asset management

E.1 General

Non-financial functions in asset management include work on a range of activities over the life cycle of the assets. As an example of these activities, this annex focuses particularly on the various life cycle phases typically applicable for an infrastructure asset system:

- concept phase or defining requirements (see [E.2](#));
- planning and design (see [E.3](#));
- asset creation (construction/acquisition) (see [E.4](#));
- operation and maintenance (see [E.5](#));
- asset monitoring (see [E.6](#));
- rehabilitation and refurbishment (see [E.7](#));
- disposal (see [E.8](#)).

[Figure E.1](#) depicts a framework to describe the various phases over the life cycle of infrastructure assets. There are many possible depictions of such a framework and each organization will likely have a variation on this. For the purpose of this annex, this framework is used to present the way in which the financial and non-financial functions should align as the non-financial functions are performed. The objective is for the financial and non-financial functional areas to collaborate on ways of carrying out asset life cycle activities most cost effectively.

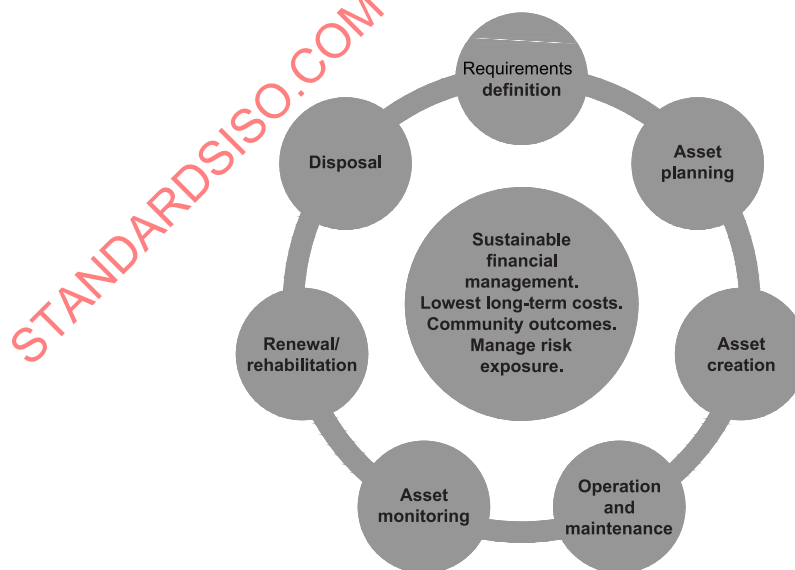


Figure E.1 — Asset life cycle activities

E.2 Concept phase (defining the requirements)

The decision to create a new infrastructure asset is typically triggered by some change in the need for the service provided by the assets. At this early stage of the life cycle of the assets, non-financial functions in asset management usually involve an analysis of:

- a) the organization's strategic or business goals;
- b) the customers' level of service requirements both now and in the future;
- c) legislative and regulatory requirements.

Affordability for the customer is often a key constraint that requires the balance of levels of service and life cycle costs to be understood. This is consistent with the ISO 55000 principles of seeking a balance between cost, risk and performance. Procedures for engagement with customers to test their willingness to pay are well documented in the literature and should involve both financial and non-financial staff.

At the conception stage, it is often a requirement for a business case to be prepared that highlights how competing options can be compared and tested against the organization's asset management objectives. Total cost of ownership (TCO) calculations are desirably performed to inform asset creation decisions. Ideally, TCO should be factored together with non-financial aspects of the decision-making process (e.g. cost/benefit analyses, multi-criteria analysis). There is a need for the financial and non-financial functional areas to collaborate in preparing these business cases.

During the concept phase, there will generally be the following steps, all of which are treated as operational expenses:

- conceptual formulation of alternatives;
- evaluation of alternatives;
- determination of the existence of needed technology;
- final selection of alternatives before moving to detailed design.

E.3 Planning and design

Where there is a need for a new service involving new assets having been approved at the concept stage, the following phase involves confirming the service required to meet customer needs and ensuring that the most effective solution is found to meet that need.

Staff involved in operations and maintenance of the assets should be involved at the planning and design stage to ensure that future operation and maintenance costs are minimized through appropriate design. It is important to note that decisions made at the design stage lock-in future costs for operation and maintenance and, hence, the TCO of the proposed assets.

Determining TCO over the asset life cycle is an important part of this phase and should involve financial staff in developing plans for how the cost of the ongoing services are to be funded, both in current budgets and in long-term financial plans. Funding options range from user fees and charges, rates or levies, subsidies or grants, developer contributions, reserve funds or borrowings. Other options can include public/private partnerships, or contributions from environmental sources or polluters.

E.4 Asset creation (construction/acquisition)

The asset creation phase involves procuring the assets and putting them into service. It typically involves significant CapEx for which financial staff need to be involved. This leads to a number of procurement questions such as the following.

- Is the service/product to be delivered in-house or by outsourcing?

- Are the assets to be constructed by internal staff or contracted out?
- Should the assets required be owned or leased?
- What form of procurement contract would be most suitable?
- Is there scope for trying other arrangements, such as a private/public partnership or alliancing, to transfer risk (including partial mitigation of the risk of the third party's subsequent default)?

Determining the best procurement option will depend on the outcomes required from the procurement process and can start with a simple contract based on labour and commodity rates to complete a task. As proposed works become more complex, a unit rates or lump sum type contract could be more appropriate. On higher risk projects, it is becoming increasingly common for organizations to explore other arrangements, such as private public partnerships or alliancing, as a means of shifting some of that risk to third parties; this can obviously come at a cost premium.

Choosing an option should involve both financial and non-financial staff to determine what is most appropriate and then document the process and set up accounts to monitor the financial recording of transactions involved. At this stage, it will also be important to populate data into both the financial and non-financial asset registers at appropriate levels of detail with componentization that will reflect how the assets will be managed once operational. As work proceeds on the procurement process, associated costs need to be capitalized into the organization's financial management systems to allow future control in terms of recording valuation and depreciation of the newly acquired assets. Similarly budgeting for operation and maintenance costs that will take effect once the assets are commissioned will be important.

E.5 Operation and maintenance

E.5.1 General

Operation and maintenance (O&M) costs often represent a significant portion of an asset's life cycle costs. O&M directly and indirectly influence costs, level of service, risk, performance, reputation, etc.

E.5.2 Operation

The organization's operational functions should run the assets to produce the product and/or service to be delivered at the required level of service and acceptable level of risk. It is fundamental that they operate the assets in a way that minimizes the life cycle cost. In doing so they should:

- a) comply with technical specifications requirements;
- b) monitor the achievement of performance objectives;
- c) staff the operation with the appropriate technical skills;
- d) work collaboratively with the maintenance functions.

The financial and non-financial functional areas need to collaborate to monitor the appropriate balance between the cost of maintaining the assets and investing capital for asset renewal. The aim is to minimize the TotEx over the whole of life of the assets.

E.5.3 Maintenance

Maintenance is concerned with carrying out activities aimed at keeping the assets in service and meeting their functional and performance objectives. Failure to carry out appropriate maintenance activities can:

- a) reduce performance;
- b) lower reliability;