

Making the Transition to Enterprise Asset Management

A Guide to Develop Strategic Asset Management Plans and Maximize the Lifetime Value of Physical Assets

For:

- Senior Leadership
- Asset Managers
- Facilities Managers



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Executive Summary

The task of maximizing and sustaining the value of physical assets to the organization poses challenges to all stakeholders responsible for planning, deploying, using, and managing those assets across the enterprise.

This document provides guidance to key stakeholders who seek to overcome these challenges and bring the benefits of Enterprise Asset Management (EAM) to their organizations.

The guide is useful for:

- Any organization that seeks to transition from basic asset management, typically during O&M on a limited set of assets, to EAM with a diverse set of assets serving a large number of enterprise-wide stakeholders.
- Any organization that currently implements some form of EAM, but seeks to improve the quality of its asset portfolio data and increase the benefits derived from its EAM system.

Senior leaders will learn to recognize typical operational indicators that prompt the need for EAM. They will learn how a lack of holistic information about the asset portfolio can inhibit and delay strategic business decisions, result in missed investment opportunities, increase capital and operational costs, and directly impact mission success. Senior leaders will learn how to guide strategic planners as they work towards achieving two key milestones on the EAM path, namely developing the Strategic Asset Management Plan (SAMP) and the EAM Strategic Technology Plan.

Asset managers and facilities managers will learn about the role they play and the inputs they provide in the development of the SAMP, the EAM Strategic Technology Plan, and the organization's EAM system. They will learn how the workflow automation, computational automation, and outputs from the EAM system help them gain control over inventory, better manage asset lifecycles, improve asset optimization, and produce more efficient processes. Most importantly, they will learn how to transition from managing a small portfolio of assets isolated in an individual facility, to managing a portfolio of diverse assets that serve the needs of stakeholders across the enterprise.

Department and project managers and their teams are typical users of assets. While not actively involved in the development of the EAM system, they are important contributors to its success or failure. They will learn about their role in encouraging adoption of the EAM system by their teams, and the importance of reporting improvements or deficiencies resulting from the implementation of the EAM system. This feedback is essential towards continually improving the EAM system to deliver the expected benefits and is also used as input to the next iteration of the SAMP.

Finally, **all stakeholders** will learn how to evaluate if EAM is really working for their own organizations. With the benefit of the knowledge gained from this document and with the use of examples, stakeholders will observe how the EAM system mitigates or eliminates the adverse indicators that prompted the need for EAM in the first place.



Reader Guidance

Table 1 provides helpful links that guide stakeholders to document sections that address the challenges and needs specifically relevant to each stakeholder’s responsibilities within the organization’s EAM ecosystem.

Stakeholder	Links to Primary Sections of Interest
<p>FOR SENIOR LEADERS</p> <p>Who rely on comprehensive information about the physical asset portfolio to plan, develop, and execute successful business initiatives.</p>	<p>Executive Summary</p> <p>Recognize Your Organization’s Need for EAM</p> <p>Key Milestones on the Path to EAM Success</p> <p>How will I know if EAM is Working for Us?</p> <p>Steps to Success for Senior Leadership</p> <p>Key Takeaways: Value of EAM to the Enterprise</p>
<p>FOR ASSET MANAGERS AND FACILITIES MANAGERS</p> <p>Who seek to maximize the value of a growing and diverse physical asset portfolio for a large and diverse set of stakeholders throughout the organization</p>	<p>Executive Summary</p> <p>Recognize Your Organization’s Need for EAM</p> <p>EAM Processes and Information Flow</p> <p>Value Delivered by the EAM System</p> <p>How will I know if EAM is Working for Us?</p> <p>Steps to Success for Asset Managers & Facilities Managers</p> <p>Key Takeaways: Value of EAM to the Enterprise</p>
<p>FOR DEPARTMENT MANAGERS AND PROJECT MANAGERS</p> <p>Who require access and use of critical assets when needed, at the right location, and in the appropriate condition to achieve target objectives.</p>	<p>Executive Summary</p> <p>Value Delivered by the EAM System</p> <p>How will I know if EAM is Working for Us?</p> <p>Steps to Success for Department Managers & Project Managers</p> <p>Key Takeaways: Value of EAM to the Enterprise</p>

Table 1: Reader Guidance to Sections of Interest for Different Stakeholders



The Challenge

In 2015, an audit discovered [1] that nearly \$6 million in hospital equipment was reported missing from Louisiana State University Hospitals in the United States. Separately, the audit discovered that \$15 million in purchased equipment wasn't properly recorded and tagged before it was turned over to the hospital operator.

In 2016, a major university in North America reported [2] that decaying campus infrastructure placed a significant financial burden on the University. Essential repairs to the University's Science Complex would likely cost between \$80 and \$100 million, and the library could end up costing the university an additional \$10 to \$15 million.

In its 2013 report [3], to the U.S. Congress, the U.S. Department of Transportation estimated that more than 40% of buses and 25% of rail transit assets were in marginal or poor condition. Furthermore, an assessment of transit assets identified a growing \$86 billion backlog in deferred maintenance and replacement needs.

Organizations in the public and private sectors such as federal, state, and local governments, defense, education, healthcare, pharmaceuticals, utilities, energy, retail, real estate, financial services, insurance services, technology, manufacturing and others have to grapple with the task of providing stakeholders with adequate and sustainable levels of service with the physical assets under management.

Asset management is in essence a balancing act – and without the appropriate asset information at hand, often a precarious one. It comes as no surprise then that the ISO 55000 Asset Management standard defines [4] asset management to *“involve the balancing of costs, opportunities and risks against the desired performance of assets, to achieve the organizational objectives.”*

Asset management is in essence a balancing act, and without the appropriate asset information at hand, often a precarious one.

With competing budgetary allocations demanded by a diverse set of strategic initiatives and running projects that are typical across the industries mentioned above, it is practically impossible for organizations to deliver assets that perform at the highest levels at all times, for all initiatives and projects.

So the challenge becomes: how do organizations ensure that enterprise-wide initiatives and projects receive adequate and sustainable levels of service from assets, and at the same time effectively utilize evolving asset data to improve productivity, lower spending thresholds, and plan for future asset needs over different time frames.

Indeed, the challenge is daunting. But there's good news. By developing a Strategic Asset Management Plan (SAMP) [5], and implementing an EAM Strategic Technology Plan to manage assets, organizations begin to gain the benefits of an Enterprise Asset Management (EAM) System. Stakeholders gain powerful visibility to asset data *throughout the organization* that help steer them towards the right asset acquisition, maintenance, and disposal decisions.



Recognize Your Organization's Need for EAM

Organization stakeholders at all levels receive periodic indications about the status of specific initiatives and projects. These indications may originate from a variety of different functional sources. They might indicate a failure to meet specific mission objectives, or a degradation in the adequate and sustainable service delivered by specific assets. **Table 2** highlights the stakeholders representing these functional sources, assets under their purview, and examples of adverse indications.

In investigating these less than satisfactory outcomes, stakeholders might discover that having an integrated, shared view of asset information that cuts across organizational silos is the best and, sometimes, the only way to give mission objectives a greater chance of success and improve service levels delivered by the assets involved. When stakeholders reach this conclusion they have, in effect, decided to commit the organization to EAM. **Figure 1** illustrates the limitations of sample data silos compared with the advantages of EAM for the same stakeholders in **Figure 2**.

Whatever the reason for moving toward an EAM system, or upgrading the organization's current system, the optimal approach to accessing and utilizing the information delivered is based on the stakeholder's strategic and operational goals, and the assets employed to meet those goals.



EAM Stakeholder	Typical Assets Under Management	Examples of Indicators Prompting Need for EAM
Senior Leadership	Properties, Plant & Equipment (PP&E)	<ul style="list-style-type: none"> - Strategic plan calls for sale or rent of some existing facilities. Rentable area for these facilities is unknown. - No measurable source of income to offset budget allocations to divisions at these facilities. - Major capital equipment is missing purchase documents, hence cannot be depreciated.
Facilities Managers	HVAC Equipment, Fire Prevention Equipment, Furniture	<ul style="list-style-type: none"> - Building HVAC reactive maintenance costs rise sharply. - No information on useful life or original cost of HVAC equipment. - No benchmark for capital and operating costs for similar equipment at other facilities. - Difficult to make business case for unit replacements.
Asset Managers (Large Infrastructure)	Airport Assets, Public Transportation Assets, Manufacturing Plant Assets,	<ul style="list-style-type: none"> - Equipment asset survey indicate poor condition for certain assets. - Reason is inefficient preventive maintenance (PM) processes and antiquated PM tracking technology. - Difficult to forecast asset replacement costs without properly restoring and tracking PM schedules and outcomes.
	Energy & Utilities Asset Management	<ul style="list-style-type: none"> - Energy company unaware of exact quantities of fuel assets (gas, oil, coal). - Company buys these assets at high prices in a volatile market. - Purchasing Manager unaware that assets currently stocked are enough to defer the purchase till following quarter.
IT Managers	Routers, Switches, Hubs, WiFi Access Points, Servers, UPS Systems, Cables & Connectors, Phones & Accessories, Computers	<ul style="list-style-type: none"> - IT inventory indicates large number of desktop computers on campus, but their locations are untraceable without an actual walkthrough survey. - Upgrades from desktops to laptops will not meet deadline. - Desktop conditions unknown. - Unable to determine best way to dispose of desktops.
Department and Project Managers	Specialized Equipment (ex: laboratory), Specialized Parts Inventory, Locally Procured Equipment	<ul style="list-style-type: none"> - Specialized equipment arrives and sits at loading dock for weeks before being commissioned. - Causes delays in project. - Destination department has no idea when equipment has arrived until day of commissioning, hindering departmental planning and productivity.

Table 2: Examples of Functional Indicators that may prompt adoption or upgrade of EAM system



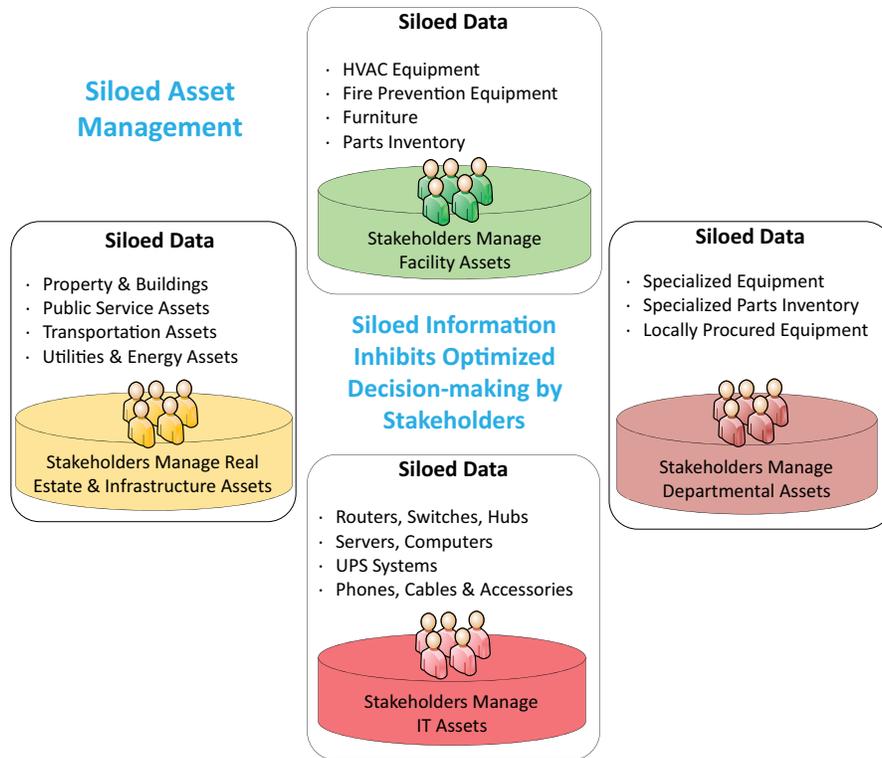


Figure 1: Assets Managed in Traditional Silos Inhibit Decision-Making by Stakeholders

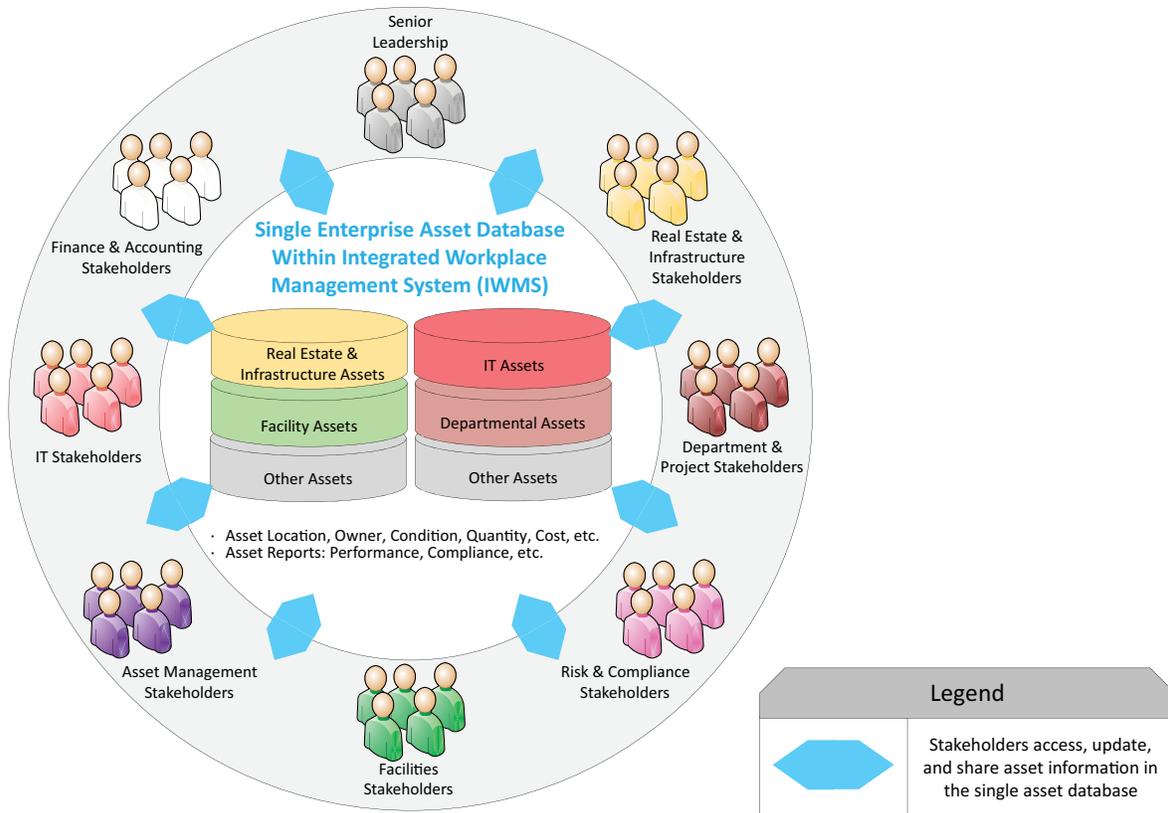


Figure 2: Enterprise Asset Management Optimizes Decision-Making across the Enterprise

INDUSTRY-SPECIFIC ASSET MANAGEMENT

Organizations may use different names to describe asset management as it relates to their core business. Some examples include:

- Airports – Airport Asset Management
- Healthcare – Healthcare Asset Management
- Infrastructure – Infrastructure Asset Management
- Public Transportation – Transportation (or Transit) Asset Management
- Telecom – Telecom Asset Management

Regardless of the core business, an enterprise-class EAM system implementation based on the SAMP and the EAM Technology Plan will help each organization gain control over inventory, better manage asset lifecycles, improve asset optimization, and produce more efficient processes.

EAM Processes and Information Flow

With the commitment to move an organization towards true enterprise asset management, stakeholders at various levels begin to engage and focus towards achieving this goal. Figure 9 in the Appendix illustrates the relationship between the organization’s strategic plan, stakeholders, assets, and processes.

Figure 3 highlights the processes and major tasks that stakeholders will undertake on the journey towards EAM. For each unique asset, processes are sequential and occur once. However, different assets or asset categories may be at different phases in the asset management cycle at any given time.

There are numerous resources such as ISO 55001 [5] that describe the general framework of the five processes in Figure 3. In this paper we will only briefly review the purpose and benefits of each. However, in keeping with the paper’s stated objective, in the following sections, we will learn how workflow automation, computational automation, and metric utilization are accomplished by the EAM system during the acquisition, O&M, and disposal phases, and understand how the expected results are used to successfully accomplish a diverse set of objectives across the entire organization.

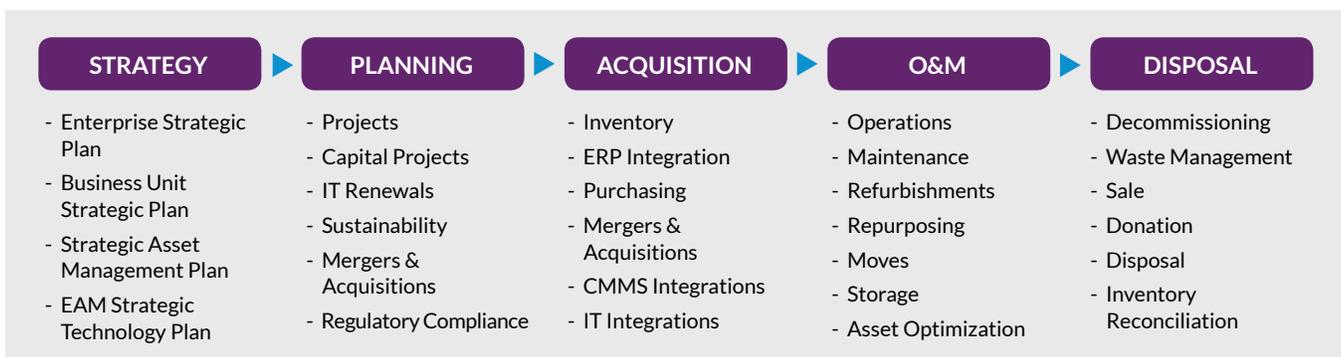


Figure 3: EAM Processes and Associated Tasks



Strategy

Developing an enterprise asset management strategy begins well before the actual management of assets through their lifecycles. The organization sets strategic business goals for growth, typically annually, that may be reflected in its Enterprise Strategic Plan or at a business unit level in a Business Unit Strategic Plan. This plan answers the fundamental question: *How does the business intend to achieve its mission?* The plan defines the business objectives of the organization, products and services to be offered, geographies of operation, capital structure, capital projects needed, workforce staffing, budgets, and forecasts.

The organization needs to access and operate specific assets to execute on the strategy developed as part of the Enterprise Strategic Plan. This is where the Strategic Asset Management Plan (SAMP) becomes most relevant. It describes the required and available asset portfolio, as well as the processes and governance rules used in managing these assets to meet the intended objectives in the Enterprise Strategic Plan.

The SAMP links asset management objectives with enterprise objectives, optimizes the asset portfolio, evaluates and mitigates risk, defines and continually improves the asset management process, and provides a plan to address future requirements in support of the enterprise mission.

The EAM Strategic Technology Plan obtains its inputs from the SAMP. It describes how the organization will use technology to implement the asset management objectives outlined in the SAMP. Both the SAMP and EAM Strategic Technology Plan are covered in more detail in the following section and provide a foundation for understanding the workflow automation, computational automation, and metric utilization that are the value drivers in the implementation of the EAM system.

The SAMP and EAM Strategic Technology Plan provide a foundation for developing the workflow automation, computational automation, and metric computations that are the value drivers in the implemented EAM system.

Planning

While the strategy development process focuses on what the organization wants to achieve for the business and provides a picture of the current and required asset portfolio, the planning process develops plans to put the required assets in place to meet the objectives in the strategic plan. Asset deployment plans must meet the operational and tactical needs of specific organizational projects.

Multiple asset deployment plans may be in development simultaneously and driven by stakeholders at different levels of the organization.



Real estate planners arrange the lease and purchase timetables for property assets. Finance stakeholders assess the financial viability of projects with their associated assets, evaluate lenders for capital projects such as new construction and, periodically, evaluate the organization's fixed assets for acquisition and disposal to meet mission objectives. IT managers plan the IT infrastructure, deploy assets such as computers, phones, peripherals, building systems, and lab equipment, and manage the service contracts needed to maintain these assets. Department managers and technical specialists plan the selection process and purchase quantity for specialized equipment used for the core business such as pharma research and production. Mergers and acquisitions may trigger a flurry of projects to integrate the assets of the two merging organizations. In businesses such as energy generation and transportation, environmental and risk managers may work closely with line managers to develop workflow processes that prevent wastage or the potentially dangerous release of fuel assets such as oil, coal, and gas.

Asset development and deployment plans from the planning process are implemented in the acquisition, O&M, and disposal phases.

Acquisition

The acquisition process begins the lifecycle management of every physical asset and assigns every asset a unique identity within the inventory managed by the EAM system.

Enterprise asset acquisition takes many forms. Assets may be purchased or leased, with the time and place of receipt recorded in the EAM system. Assets discovered during routine surveys are added to inventory. Integrations with silo-based ERP, CMMS, IT, and security systems bring formerly non-trackable assets into the enterprise asset inventory.

Often the impetus to collect asset information in an inventory is from a legal (compliance, certification audits, insurance, etc.) or financial (securing a lease for redundant space) standpoint. Sometimes the inventory is collected via a special project (e.g. condition assessment or a merger). Inventories can also be built during the normal day-to-day activities such as preventive maintenance or moves. Incorporating asset information updates into the routines of these daily activities can reduce the cost of both developing the initial asset inventory and managing assets over their lifecycles.

O&M

The O&M process is cyclical in nature, typically managed in yearly cycles and reported on in monthly, quarterly or yearly cycles. The majority of asset lifecycle management (80% or more) falls within the O&M process. The remainder falls within the acquisition and disposal phases.

The O&M process provides perhaps the most exhaustive information on assets during their lifecycles. Well-implemented EAM systems provide a diverse set of enterprise stakeholders, from executives to department managers, with essential O&M information in graphical and tabular formats to help them maximize the lifetime value of assets and facilitate mission success.



The EAM system collects O&M data and tracks O&M history for both individual assets and asset groups. It is the primary data source for the computation of metrics made available to enterprise stakeholders. Stakeholders can view and analyze information on preventive and reactive maintenance, asset moves, asset refurbishments, asset repurposing, asset storage, regulatory compliance, chain of custody, and financial information such as asset depreciation.

The later section on **Value Delivered by the EAM System** describes in greater detail how diverse stakeholders utilize the O&M information from the EAM System.

Disposal

Assets may be disposed of for a variety of reasons. They become obsolete, too expensive to maintain or repair, represent an opportunity cost if held by the organization, or simply become a heavy weight on the organization's balance sheet. Some assets require mandated decommissioning and proper waste disposal by law; while asset sales and donations require meticulous records to be maintained for tax and financial reporting. An EAM system with automated processes and triggers tracks and manages these tasks in addition to updating inventory records in a timely manner. When integrated with other enterprise systems, the EAM system updates asset disposal information from these disparate systems in a timely manner for proper financial and regulatory reporting.

The organization should begin to measure and observe the benefits listed in the adjacent box when implemented processes and associated tasks begin to deliver the data workflow automation, computational automation, and resulting metrics that lead to more informed decision-making.

Notably, across the enterprise, different functions begin to derive the listed benefits by combining and utilizing asset data and metrics that originate in what were traditional silos, but now made visible and accessible with the workflow and computational automation offered by the implemented EAM system.

Expected Benefits of Asset Management as Defined [4] by ISO 55000

- > **Improved financial performance**
- > **Improved asset investment decisions**
- > **Managed risk**
- > **Improved services and outputs**
- > **Demonstrated social responsibility**
- > **Demonstrated compliance**
- > **Enhanced reputation**
- > **Improved organizational sustainability**
- > **Improved efficiency and effectiveness**



Key Milestones on the Path to EAM Success

Let's discuss two key milestones on the path to EAM success:

- Strategic Asset Management Plan (SAMP) [5] and
- EAM Strategic Technology Plan

Once these two plans have been documented and approved, the organization is ready to implement an EAM system that delivers the workflow automation, computational automation, and metric-based results which lead to more informed decision-making and, in turn, lead to adequate and sustainable levels of service delivered by the physical assets being managed.

While both the SAMP and the EAM Strategic Technology Plan will be unique to each organization, all organizations will be well-served by adopting and integrating industry standard best practices such as ISO 55000 in the development of these two plans.

Strategic Asset Management Plan (SAMP)

The SAMP provides guidance for strategically managing assets to support the mission and for continuously improving the asset management process. The SAMP contains sections for: enterprise, business unit, and project mission alignment; data, process and system governance; asset portfolio inventory and analysis; asset portfolio performance; future asset requirements; risk analysis and risk mitigation strategies; and recommendations for maximizing the value of the asset portfolio to enterprise strategists, business unit leaders and project team leads.

Figure 4 illustrates the relationship between the SAMP, the enterprise mission, and departmental objectives. Let's review the components of the SAMP.

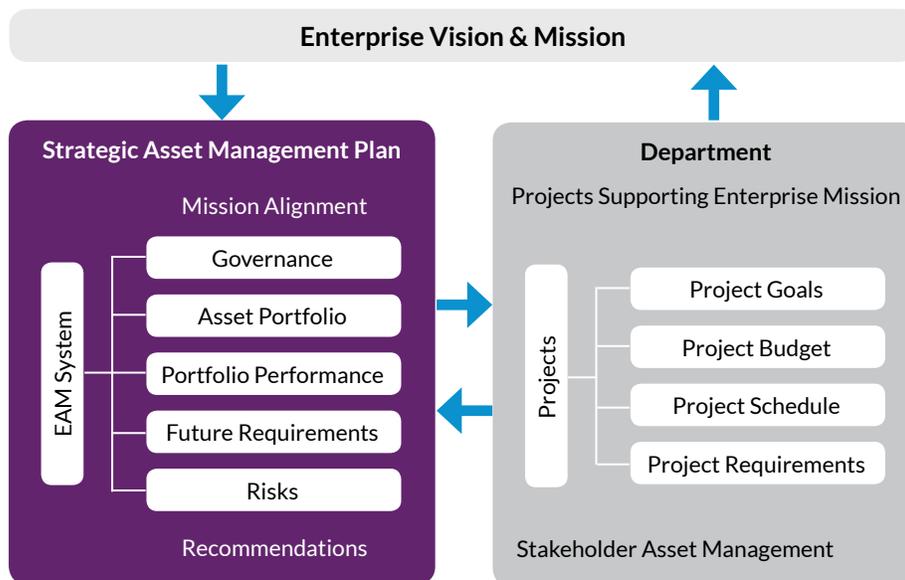


Figure 4: SAMP and its relationship to high level enterprise mission and departmental objectives



Mission Alignment

A properly constructed SAMP aligns the objectives of the larger enterprise mission, and the departmental projects that the managed assets will serve. The SAMP also aligns the stakeholder asset management processes with enterprise-wide asset management goals. High quality guidance provided by the different components of the SAMP described below is crucial to achieving this close alignment.

Governance

Governance describes the policies, practices, and laws by which assets will be managed. Governance rules are developed to ensure that assets are responsibly utilized to maximize their value to the organization, while operating within specified legal and regulatory boundaries.

For example, governance may define the process by which HVAC equipment throughout an organization will be acquired, maintained, and disposed of. Non-compliance with the maintenance process could produce a number of adverse outcomes such as increased maintenance costs and even air contamination that may impact product quality and create an unhealthy working environment for facility occupants.

The EAM System will thus be designed, implemented, and configured to manage the asset portfolio while adhering to the directives provided by governance.

Asset Portfolio

The SAMP includes a comprehensive view of the complete asset portfolio as it exists. In addition, projected additions to the asset portfolio (new capital equipment, new facilities) may also be included.

In organizations that do not have an EAM system implemented, this comprehensive view of the asset portfolio has to be manually developed. To begin, identify stakeholder groups and obtain a prioritized list of assets from each. This list should, at minimum, include assets that have the highest priority and are shared by two or more stakeholder groups. Potential stakeholder groups include finance, facilities, IT, manufacturing, R&D, compliance, EH&S, and project teams.

The listed assets are prioritized using different criteria for each type of stakeholder based on their goals and objectives and how critical the asset is in achieving those goals. For example, an air-tight storage cabinet that holds hazardous materials will not be on a list of assets for finance since its cost is below the financial threshold for accounting. Also, while the facilities department cares about the cabinet, it is low priority for them since they only need to track it for space planning and moves. However, compliance will give it the highest priority since they use it to track the location of many hazardous materials as specified by governance.



Asset Portfolio Performance

Asset performance is the measure of the asset's ability to deliver the required level of service over its useful life. Asset performance requirements are a crucial component of the SAMP. They set the foundation for the organization's mission success. Corporate mission objectives and departmental objectives determine the performance requirements specified in the SAMP.

TYPICAL ASSET PERFORMANCE CATEGORIES

- Technical Performance
- Required Industry Certifications
- Compliance with Industry Standards
- Mission Support KPIs
- Optimal Utilization
- Optimal Capacity
- Service Levels to Stakeholders

Depending on the nature of the core business, asset criticality and mission objectives, organizations place emphasis on different types of assets and on different measures of performance. An in-depth discussion on asset performance criteria is out of the scope of this paper. However, readers will find the performance categories in the adjacent box a good starting point to begin identifying the assets and associated performance requirements that would be candidates for inclusion in the SAMP.

Future Requirements

Once the asset portfolio is known, gaps in the asset portfolio that need to be filled can be identified. These gaps are identified by tracing the objectives in the Enterprise Strategic Plan (organization level) and at the department (project) level with the current view of the asset portfolio.

Some of these objectives are current and some reflect the organization's future strategic direction. Since many assets have a life expectancy that is longer than the time it takes to achieve many objectives, optimizing the value of an asset over its lifecycle often requires matching the asset to multiple and successive objectives over the asset's lifecycle.

Risks

Financial, legal, and mission success risks are assessed and documented based on the current inventory and how it has performed. Projected future asset acquisitions and disposals can also be used to provide a broader forward-looking picture of these risks.

In the absence of a technology-based EAM system, risk assessment poses a challenge. Paper-based asset surveys are difficult to assemble and analyze, asset maintenance records may not be accessible to compliance and risk management stakeholders, and critical asset needs for essential projects may go undetected. Hence, the initial level of effort put into developing all the elements of the SAMP will directly relate to the effectiveness of the EAM system once it is implemented. The SAMP and the EAM system form a closed feedback loop. Once the EAM system is operational, it provides information

The SAMP and the EAM system form a closed feedback loop. Once operational, the EAM system provides information that goes back into the development of the SAMP in successive years. As a result, risk assessment becomes data-driven and reliable.



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Recommendations

After analyzing the information presented by the other components of the SAMP, a set of strategic and tactical recommendations are developed. These recommendations serve to improve and accelerate progress towards meeting the organization’s mission objectives, mitigate risks, maximize the value of assets over their lifecycles, and continuously improve the asset management process. The recommendations are submitted to stakeholders such as enterprise strategists, business unit heads, asset and facilities managers, and project teams. Table 3 presents examples of recommendations that might result from the development of the SAMP.

SAMP Coverage Area	Example of Recommendation	Supporting Information from EAM System	Benefits	Target Stakeholder Audience
Governance	For hazardous material assets, mandate that inventory counting and inventory reconciliation be done by different employees.	Quantities of hazardous materials inaccurately recorded in previous year	<ul style="list-style-type: none"> - Protect assets - Protect employees - Accurate compliance 	<ul style="list-style-type: none"> - Department Manager - Department Staff - Risk & Compliance Managers
Asset Portfolio	For certain equipment assets, exclude depreciation and use asset condition as primary input to forecast maintenance costs.	These asset categories show historically low maintenance expenses over their useful life	<ul style="list-style-type: none"> - Lowers unrealistically high maintenance cost forecasts previously linked to high levels of depreciation 	<ul style="list-style-type: none"> - Finance Managers - Department Managers - Facilities Manager (for facilities assets)
Asset Performance	Commission new public transit buses in first half of next year	Disposal of old buses has begun and new buses have begun arriving at city’s bus depot	<ul style="list-style-type: none"> - Non-disruptive bus service to city - Smooth internal operational transition 	<ul style="list-style-type: none"> - Asset Directors - Mode-specific Asset Managers - Commissioning Team - Logistical and Scheduling Teams
Future Requirements	Hospital expansion will not need originally planned quantities of diagnostic equipment. Reassess budget allocation.	New diagnostic technology commissioned last year has higher rate of patient throughput	<ul style="list-style-type: none"> - Reduce or reallocate capital outlay; - Reduce patient wait times 	<ul style="list-style-type: none"> - Business Managers - Finance Managers - Asset Directors
Risks	Relocate operations from one warehouse facility to another facility in the same city.	Existing facility has multiple roof leaks that are expensive to fix and damage stored goods	<ul style="list-style-type: none"> - Protect stored goods - Increase revenue, and lower operating costs 	<ul style="list-style-type: none"> - Executives - Real Estate Portfolio Managers - Operations Managers - Facilities Managers

Table 3: Examples of Recommendations in the SAMP



EAM Strategic Technology Plan

Typically, asset management systems are implemented using a phased approach as the asset management needs expand from basic asset management of only highest priority assets for one or two stakeholders, to all mission critical and support assets for all stakeholders across the enterprise. In other words, the asset management system scales from doing basic inventory and maintenance management to a comprehensive EAM system that manages the asset portfolio in accordance with the scope and objectives laid out in the SAMP. Thus, the EAM system evolves as it adapts to evolving business strategies and to the corresponding asset needs to implement those business strategies.

To this end, the EAM Strategic Technology Plan sets the functional requirements of the EAM system for the duration addressed in the SAMP. The ISO 55002 [6] standard serves as a helpful aid when developing the EAM Strategic Technology Plan. The plan:

- a) Describes workflow automations such as asset inventory report generation, asset performance report generation, and asset event notifications to stakeholders, among others
- b) Defines computational automations required to support depreciation calculations, generate KPIs and metrics, and perform other necessary computations
- c) Identifies data inputs and specifies information outputs that address the decision-making and process needs of stakeholders
- d) Specifies key capabilities and scalability requirements of the technologies selected to manage the current asset portfolio and potential future additions to the portfolio

A useful way to grasp how the EAM Strategic Technology Plan translates into a real-world EAM system is by understanding the key value areas to which the EAM system contributes. These include asset acquisition, O&M, ERP integration, asset optimization, and process improvement. We will review each of these value areas in the next section.



Value Delivered by the EAM System

In delivering the application capabilities recommended by ISO 55002 [6] and specified in the EAM Strategic Technology Plan, stakeholders will quickly begin to see improvements in the following value areas.

EAM Value Area: Asset Acquisition

Figure 5 shows the asset acquisition workflow processes and highlights some of the benefits delivered by the EAM system for this value area. Assets can be inventoried as individual units, or as asset groups. Enterprise implementations can accommodate diverse asset types including properties, facilities, equipment, and furniture. With these diverse asset types in the system, the EAM system can automatically compute a variety of metrics that would be prohibitively labor-intensive to calculate otherwise.

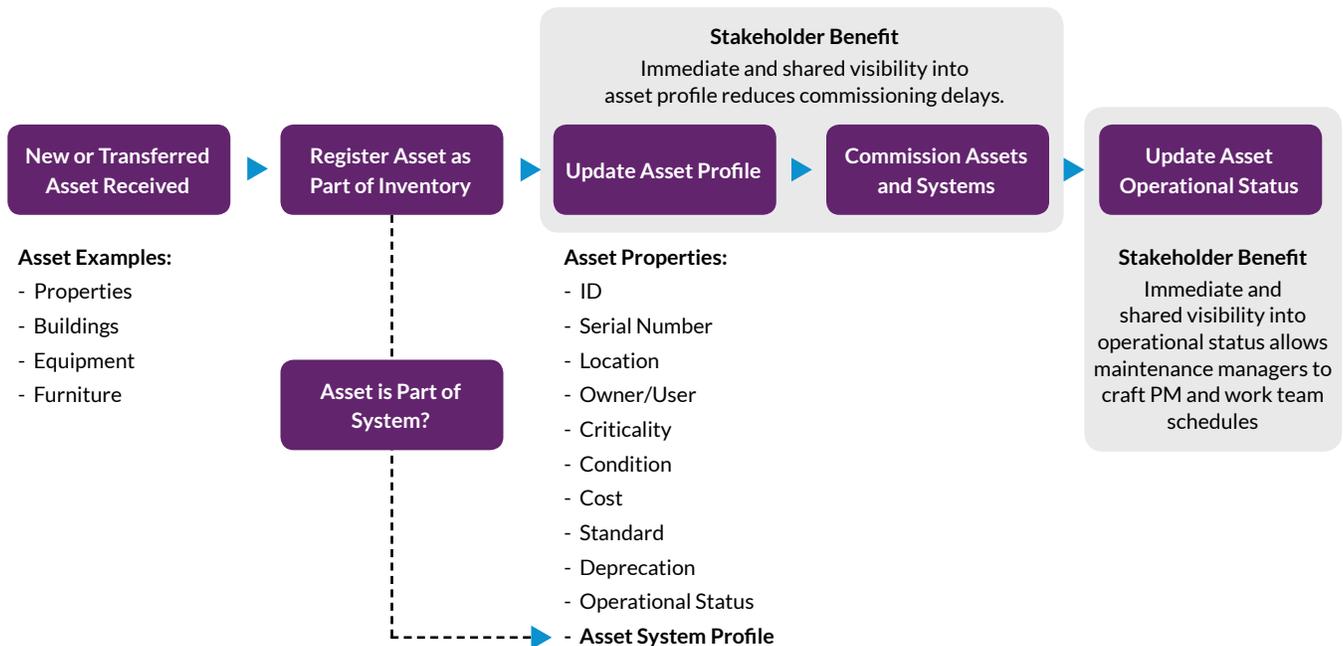


Figure 5: Stakeholder Benefits Derived from Immediate Shared Visibility to Asset Information during acquisition

The single enterprise asset inventory database and reporting capabilities make it easy to avoid and correct duplicated asset information. It also facilitates reconciling information on lines of assets whose ownership, governance responsibility, or status may be unclear.

Assets received at the loading dock are scanned, automatically assigned a unique asset code, and given a unique identity in the EAM system. Asset management staff update the asset’s profile to include its location, cost, condition, owner, criticality, and operating status. An asset standard for asset groups helps assign common properties to the group without entering the asset properties manually for each unit.

Selected assets may be inventoried as sub-assemblies and components of larger systems. This allows for more efficient commissioning processes, effective failure analysis, and easier scheduling and tracking of preventive maintenance schedules.

Updates to the asset profile are immediately accessible by stakeholders. For example, installation technicians update the installation status of a piece of equipment as complete. This status is automatically communicated to commissioning staff who can schedule its commissioning without delay.

EAM Value Area: O&M

With O&M consuming about 80% of an asset’s lifecycle, the EAM system is expected to deliver high value in this area. For ease of understanding, Figure 6 groups asset operations into three groups: managing asset depreciation, tracking activities on assets, and tracking transactions involving assets. The value offered by the EAM system for each of these groups of operations follows.

	Manage Asset Depreciation	Track Activities on Asset	Track Transactions (changes) Involving Asset
Operate and Manage Asset	Examples: - Depreciation - Quarterly Depreciation - Annual Depreciation	Examples: - Work requests on Asset - Assessments and Surveys of Assets	Examples: - Ownership change - Location change - Value change - Condition change
Asset Events ★	Examples: - Asset depreciates down to 0 value - Asset depreciation reaches defined percentage threshold	Examples: - Asset moved to new location - High number of work requests on asset - Asset assessments complete - Asset purchased or sold	Examples: - Asset’s service contract renegotiated for new location - Asset condition set to poor - Asset purchase or sale recorded as auditable event
Stakeholders Making Decisions based on Asset Events	Examples: - Corporate Finance Executives - Divisional Finance Executives	Examples: - Facilities Managers - Site Managers - IT Managers - Move Managers - Space Planners	Examples: - Finance Managers - Department Accountants - Contracts Managers - Department Managers - Internal and External Auditors
Stakeholder Benefits	Examples: - Lower/defer tax on asset - Make informed decisions on asset acquisition and disposal - New assets replacing fully depreciated assets deliver higher efficiencies and lower OPEX	Examples: - Align assets for rapid deployment - Lower OPEX - Increase productivity - Lower asset downtime - Monitor auto-updated KPIs related to activities on assets	Examples: - Increase accountability by recording asset chain of custody - Automated report generation for regulatory, financial and tax reporting - Facilitate audits

★ The EAM system may generate automated notifications and reports for events such as periodic numerical computation results, high/low threshold crossover for asset metrics, critical asset events, and asset forecasts.

Figure 6: Managing depreciation, activities, and transactions during an asset’s lifecycle in an EAM System



Manage Asset Depreciation

The EAM system is configured to automatically compute depreciation for assets and report depreciated values. Different depreciation methods such as straight-line, double-declining balance, or others can be assigned to specific assets. Depreciated values that reach configured thresholds can trigger automatic notifications to stakeholders such as corporate and divisional finance executives. Known asset types that are added to or removed from inventory can have their depreciation formulas automatically assigned.

With the computed depreciation information at hand, stakeholders can answer questions such as:

- Is the organization financially well-positioned to replace certain fully depreciated assets?
- What's the trade-off between operating expense and capital expense for keeping an asset versus replacing it?
- Will it be financially beneficial to change the depreciation method for the next batch of newly purchased assets?
- Should we lease or purchase a specific asset type for a particular project, location, or strategic objective?

The EAM system helps senior leadership answer these questions for high value assets such as real estate and infrastructure assets that reside across city, state, and national boundaries. For project and department level assets, the answers to the above questions help refine governance and procurement policies.

Track Asset Activities

Asset activities are at the heart of O&M. The EAM system, often complemented with mobile technology, helps stakeholders track a large number of activities and their outcomes on managed assets. These include reactive and preventive maintenance calls and their outcomes, asset survey and assessment results, asset profile updates, asset moves, sales, and disposals.

Over time, asset activities and associated metrics paint a comprehensive picture of individual assets or entire groups of assets, and help a diverse set of stakeholders decide on how to maximize the value of the asset or asset group.

With the tracked asset activities and their results at hand, stakeholders can answer questions, such as:

- Which assets are delivering or failing to deliver an acceptable and sustainable level of service to stakeholders?
- Do assets need to be relocated to raise the level of service committed to stakeholders?
- Which specific assets are failing and why?
- Are operating expense costs across the entire asset portfolio in line with expectations for the financial reporting period?
- Are asset failures isolated to specific models, manufacturers, locations, or maintenance programs?
- Will asset O&M be better accomplished by in-house teams or outsourced providers?
- Are maintenance providers meeting their contractual obligations and do some contracts need to be renegotiated?
- Are there urgent risk or compliance issues that need immediate attention from departmental stakeholders or senior leadership?



Track Transactions Involving Assets

While asset activities record the details of the work (asset maintenance) or project (asset move) that an asset is involved in, asset transactions record the resulting change in a particular property of the asset. An asset transaction represents a change in the asset’s ownership, location, value, or condition at the recorded time. The EAM system automatically records these changes as transactions as they take place. The recorded transactions help identify chain of custody and establish accountability down to the level of individual assets.

With detailed asset transactions at hand, stakeholders can answer questions, such as:

- When was a specific asset move completed?
- Was the insurance contract in place on the day the asset was transferred into the organization’s custody?
- Who had custody of a particular asset for the specified time period?
- During the same specified time period, were there any changes to the asset condition?
- When was a particular asset sold and by whom?

The EAM system also has powerful data collation and reporting capabilities that speed up reporting for financial, tax, and compliance reporting.

EAM Value Area: ERP Integration

ERP integration is a high value area for the EAM system, but is often not prioritized due to the sheer disparity and multitude of redundant lists and systems used to manage assets in isolated silos. Figure 7 shows the main information components transferred between the disparate systems into the EAM system which is part of an integrated workplace management system (IWMS).

Surveying and collecting information about these disparate systems may require an initial investment of time and effort, but the payoff can be substantial in the long-term.

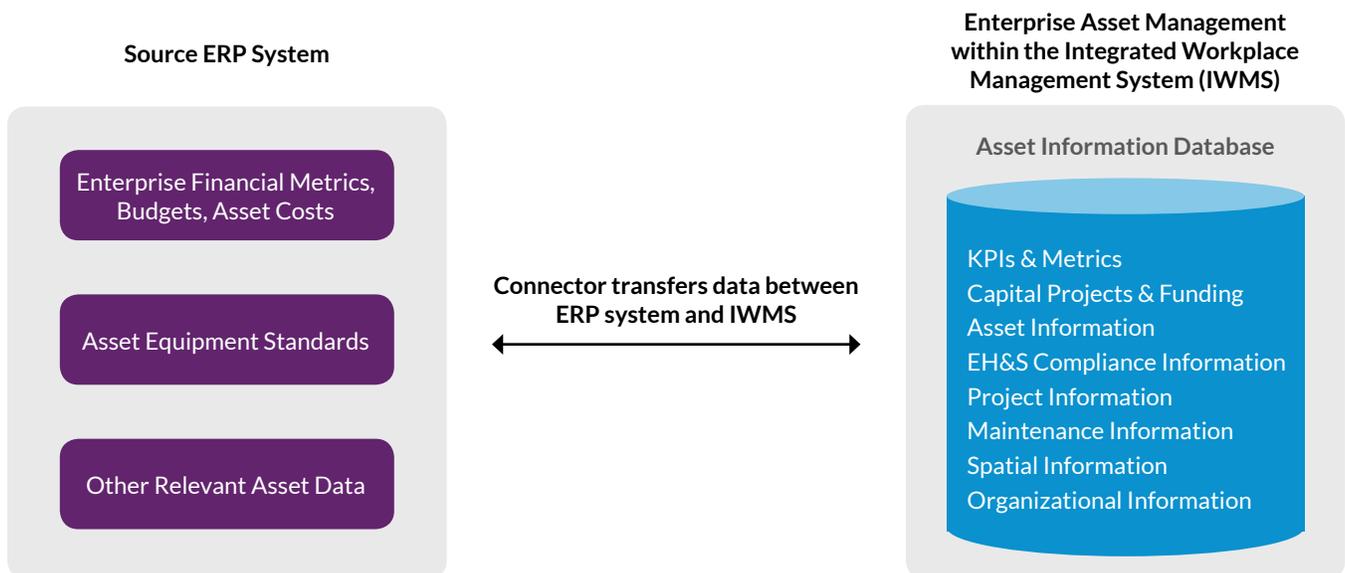


Figure 7: ERP Integration with EAM system as Part of Integrated Workplace Management System (IWMS)

Asset information shared as part of ERP integration helps stakeholders answer questions, such as:

- What additional assets integrated from disparate systems will be managed by the EAM system?
- How do we plan the assessment surveys for these incoming assets?
- Can assets (real estate, equipment, furniture, etc.) be repurposed from or to the former organizational silos to maximize their value to the mission?
- What O&M processes can be consolidated to improve asset performance?
- Can assets from external systems be maintained by existing outsourced contracts to avoid maintenance fragmentation, overlap, and duplication?

ERP systems are designed to manage enterprise financial information. EAM systems are designed to manage the daily operational tasks and information as well as the strategy for optimizing the value of the assets. EAM systems that are part of an IWMS combine spatial and organizational information with the operational asset information to maximize the value of a global asset portfolio. Integrating ERP financial information with EAM IWMS information aligns the strategic objectives of asset management with the enterprise strategic objectives and provides the KPIs to ensure asset value is optimized across the enterprise portfolio.

EAM Value Area: Asset Optimization

Asset optimization is the ability to maximize the value of the asset for the organization. To achieve this, the EAM system provides powerful analysis tools and computes a broad range of metrics that help stakeholders ensure the appropriate assets are in the correct location, at the right time, and in acceptable condition. This results in improved overall Return on Investment (ROI) and Return on Assets (ROA) for the organization.

Organizations place emphasis on the metrics and Key Performance Indicators (KPIs) that are relevant to the core business. Figure 8 shows examples of a variety of often used metrics and KPIs derived from asset data collected in the EAM system. The derived metrics and KPIs help stakeholders understand the performance delivered by assets, their quantitative and qualitative value to the organization, and the current and expected risks associated with underperforming assets. A stakeholder may often evaluate the results of multiple individual metrics and KPIs to arrive at strategic and operational decisions. This is one of the most powerful benefits of the EAM system.

A stakeholder may often evaluate multiple individual metrics and KPIs to arrive at the most suitable strategic and operational decisions. This is one of the most powerful benefits delivered to stakeholders by the EAM system.

In addition, some metrics may be used at different levels of the organization. For example, the Budget Variance metric calculated at the department level (for example, R&D division) is used to realign budgets with local needs. The same metric calculated at the corporate accounting level rolls up expenses (and sometimes revenue) at lower levels of the organization and helps corporate executives understand how the business is performing overall and if budget priorities need to be reassessed.



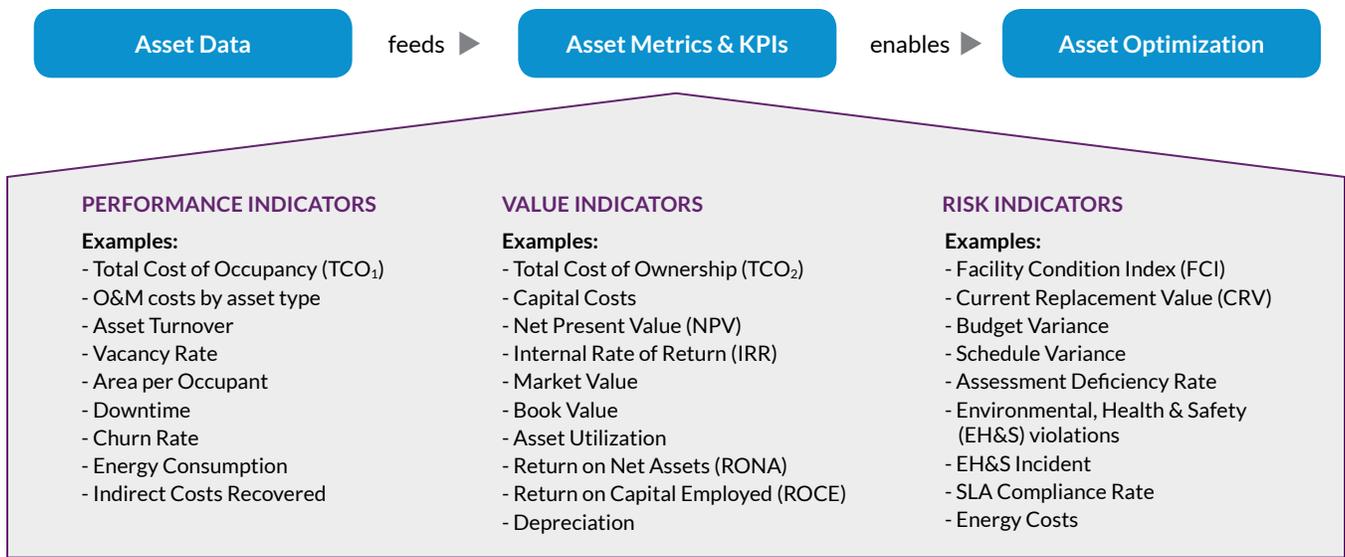


Figure 8: Asset Metrics and KPIs computed automatically within an EAM System

Performance Indicators

These computed metrics and KPIs help asset stakeholders answer questions, such as:

- What is the Total Cost of Occupancy (TCO¹) for all facilities and for individual facilities?
- Are we maximizing the value of each of our properties to the organization?
- Can certain business operations be consolidated into fewer facilities?
- Will a certain property meet the space and occupancy requirements for a new corporate initiative or project?
- Can we improve sourcing, vendor, and real estate selection processes across the organization to lower TCO¹?
- What are the preventive, reactive, and predictive maintenance costs for critical assets or asset groups?
- Were there unforeseen or emergency expenses during a specified period, and how can they be avoided in the future?
- Can we improve TCO¹ by increasing utilization of certain assets, and avoiding the purchase or lease of additional assets?

Value Indicators

These computed metrics and KPIs help stakeholders answer questions, such as:

- What is the Total Cost of Ownership (TCO²) [7] of all assets and for specific assets?
- For TCO², do operational and personnel cost components exceed the expected multiple of the acquisition component, and what is the reason?
- How does the book value compare with the market value for specific assets?
- Is it an opportune time to benefit from market or financial conditions and sell certain assets?
- Do we need to take steps to improve KPIs such as RONA and ROCE and where do we look for improvements?
- Can we improve asset utilization through better inventory management, asset relocation, improved maintenance scheduling, reconstituting work teams, and workforce training?



- Can usable space at some facilities be leased to generate additional income?
- Which fully depreciated assets should we consider replacing and which ones should we continue to operate?

Risk Indicators

Stakeholders utilize these metrics and KPIs to answer questions, such as:

- Are there underperforming facilities that need immediate attention to bring them up to an adequate and sustainable level of service?
- Are negative budget variances the result of hidden costs for asset-specific, location-specific, business-specific, and project-specific assets and do we need to reassess our budget allocations or reassess underperforming assets?
- What are the negative schedule variances, their causes, and possible steps towards resolution?
- Which EH&S violations and incidents require immediate resolution or closer monitoring?
- How do we improve service levels for assets that are not complying with their promised SLAs?
- Are outsourced services delivering the contracted service level to maintain asset performance, uptime, and condition?
- Will rising energy costs require a budget reassessment or restrict operations in certain countries, regions, or cities?

EAM Value Area: Process Improvement

The EAM system is a window into organizational processes at every level of an organization, and also within EAM processes themselves including strategy development, planning, acquisition, O&M, and disposal. Stakeholders can identify and target simple and complex processes for improvement and thus achieve improved asset performance and stakeholder satisfaction.

As asset inventories get updated, and activities and transactions get tracked within the EAM system, powerful reports help stakeholders quickly target and identify alternatives to deficient or redundant processes.

The EAM system helps senior leadership, real estate managers, facilities managers, and department managers answer questions, such as:

- Which regions, divisions, and departments cannot provide updated asset portfolio information required for planning and are there ways to expedite the reporting process?
- Do subject matter experts need to be included on certain asset acquisition projects to improve the quality of those asset purchases?
- For specific business operations, do we need to shorten the response time for urgent reactive maintenance calls that are safety related, and by how much?
- Can we reduce asset downtime and improve stakeholder satisfaction by requiring fewer approvals for certain mid- and low-priority asset maintenance requests?
- Which work teams do we need to reconfigure based on skill sets to improve maintenance call closure rate?
- Should we consider adopting integrated workplace management software and mobile technology to improve work team scheduling and access to real-time reporting from field technicians?



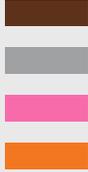
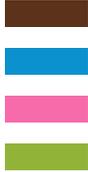
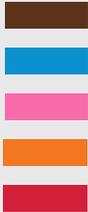
How Will I Know If EAM Is Working for Us?

With the EAM system operative as described in the previous section, gauging its contribution to mission success becomes surprisingly easy. The process automation, computational automation, and cross-silo visibility provide immediate insight into the ISO 55000 value areas listed earlier in this document.

Recall **Table 2** showing the functional indicators that prompt the need for EAM. Only this time, with the EAM system operative, we will identify, in **Table 4**, the benefits of EAM that mitigate and possibly eliminate the outcomes presented by the same functional indicators in **Table 2**.



Table 4: EAM System mitigates or eliminates adverse functional indicators observed without EAM

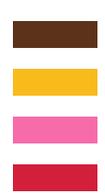
EAM Stakeholder	Typical Assets Under Management	Examples of Indicators Prompting Need for EAM	Mitigation of Indicators with EAM	Asset Domains Supporting Enterprise-wide Decisions	Benefits (ISO 55000)
Senior Leadership	Real Estate Properties Plant & Equipment (PP&E)	<ul style="list-style-type: none"> - Strategic plan calls for sale or rent of some existing facilities. Rentable area for these facilities is unknown. - No measurable source of income to offset budget allocations to divisions at these facilities. - Major capital equipment is missing purchase documents, hence cannot be depreciated. 	<ul style="list-style-type: none"> - Total rentable area for facilities assets is updated with every change in occupancy. - Rental income can be calculated using GIS component of IWMS. - Capital equipment assets have purchase data, useful life data, and other unit data assessable in EAM system. 		<ul style="list-style-type: none"> Improved Financial Performance Informed Asset Investment Decisions
Facilities Managers	HVAC Equipment Fire Prevention Equipment Furniture	<ul style="list-style-type: none"> - Building HVAC reactive maintenance costs rise sharply. - No information on useful life or original cost. - No benchmark for capital and operating costs for similar equipment at other facilities. - Difficult to make business case for unit replacements. 	<ul style="list-style-type: none"> - Reactive maintenance costs traceable to excessive breakdowns in first 3 months of year for specific model of Air Handling Units. - Other buildings with same model show similar patterns for maintenance costs. - Unit warranty has expired and useful life is near 0. - Data now available to develop business case for unit replacement. 		<ul style="list-style-type: none"> Informed Asset Investment Decisions Improved Services and Outputs Improved Organizational Sustainability
Asset Managers (Large Infrastructure)	Airport Assets Public Transportation Assets Manufacturing Plant Assets	<ul style="list-style-type: none"> - Equipment asset survey indicate poor condition for certain assets. - Reason is inefficient preventive maintenance (PM) processes and antiquated PM tracking technology. - Difficult to forecast asset replacement costs without properly restoring and tracking PM schedules and outcomes. 	<ul style="list-style-type: none"> - All PM procedures, schedules, and reports recorded electronically. - PM histories reviewed on demand for every managed equipment asset. - Timely PMs result in accurate asset conditions in asset surveys. - Forecast asset replacement costs with greater accuracy and credibility. 		<ul style="list-style-type: none"> Informed Asset Investment Decisions Improved Services and Output Improved Efficiency & Effectiveness
	Energy & Utilities Assets	<ul style="list-style-type: none"> - Energy company unaware of exact quantities of fuel assets (gas, oil, coal). - Company buys these assets at high prices in a volatile market. - Purchasing Manager unaware that assets currently stocked are enough to defer the purchase till following quarter. 	<ul style="list-style-type: none"> - Fuel asset data including purchase date, purchase price, purchase vendor, purchase quantities, consumption history, and remaining quantities are available on demand from asset inventory. - Purchasing manager can make financially sound fuel asset purchases. 		<ul style="list-style-type: none"> Improved Financial Performance Informed Asset Investment Decisions Improved Organizational Sustainability Managed risk

Legend: EAM Information Domains Contributing to Enterprise-Wide Decision Making

-  Space, Occupancy & GIS
-  Real Estate Portfolio
-  Finance
-  Energy & Sustainability
-  Preventative and Reactive Maintenance
-  Commissioning & Project Management
-  Capital Budgeting
-  Environmental & Risk Management



Continued - Table 4: EAM System mitigates or eliminates adverse functional indicators observed without EAM

EAM Stakeholder	Typical Assets Under Management	Examples of Indicators Prompting Need for EAM	Mitigation of Indicators with EAM	Asset Domains Supporting Enterprise-wide Decisions	Benefits (ISO 55000)
IT Managers	Routers Switches Hubs WiFi Access Points Servers UPS Systems Cables & Connectors Phones & Accessories	<ul style="list-style-type: none"> - IT inventory indicates large number of desktop computers on campus, but their locations are untraceable without an actual walkthrough survey. - Upgrades from desktops to laptops will not meet deadline. - Desktop conditions unknown. - Unable to determine best way to dispose of desktops. 	<ul style="list-style-type: none"> - Desktop computers and all other IT assets tracked electronically by serial number, model, system relationship (if part of a system), location, assigned user, department, re-assignments, purchase/lease cost, and depreciation (if owned). - Accurate information allows laptop upgrades to be completed before deadline. - One third of the desktops will be donated and remaining two thirds will be recycled. 		<ul style="list-style-type: none"> Improved Financial Performance Informed Asset Investment Decisions Improved Organizational Sustainability Managed risk
Department and Project Managers	Specialized Equipment (ex: laboratory) Specialized Parts Inventory Locally Procured Equipment	<ul style="list-style-type: none"> - Specialized equipment arrives and sits at loading dock for weeks before being commissioned. - Causes delays in project. - Destination department has no idea when equipment has arrived until day of commissioning, hindering departmental planning and productivity. 	<ul style="list-style-type: none"> - Specialized equipment scanned and added to inventory at loading dock. - Department manager notified automatically and begins preparing project team for equipment use. - Move manager notified automatically and schedules move. - Move completion triggers notification to commissioning technician. - Commissioned equipment is ready for use on schedule 		<ul style="list-style-type: none"> Improved Financial Performance Enhanced Reputation Improved Efficiency & Effectiveness

Legend: EAM Information Domains Contributing to Enterprise-Wide Decision Making

-  Space, Occupancy & GIS
-  Real Estate Portfolio
-  Finance
-  Energy & Sustainability
-  Preventative and Reactive Maintenance
-  Commissioning & Project Management
-  Capital Budgeting
-  Environmental & Risk Management



Steps to Success

For Senior Leadership

- Identify specific mission objectives, functional areas, and projects that would benefit from the deployment of an EAM system.
- Direct strategic planners to develop the different components of the SAMP and EAM Strategic Technology Plan in a manner that prioritizes the needs of the identified mission objectives, functional areas, and projects.
- Mandate and communicate to all stakeholders the top three benefits expected from the EAM system.
- Create a culture of collaboration which is especially crucial for development of a high quality SAMP and EAM Strategic Technology Plan.

For Asset Managers and Facilities Managers

- Assist with the development of the SAMP and the EAM Strategic Technology Plans.
- Communicate to plan developers the needs of the current and forecasted asset portfolio, recommend workflow process improvements, and request workflow automation and computation of KPIs and metrics required from the EAM system.
- Identify and communicate to the EAM Strategic Technology Plan developers the specific capabilities to be supported by the EAM system, such as support for different asset types and ways in which the system is expected to accommodate future asset portfolio growth.
- Ensure that the SAMP and EAM Strategic Technology Plans directly address, at minimum, the high priority needs communicated to the plan developers.
- To achieve continuous improvement, take an active role in the testing and rollout of the EAM system, and provide feedback to stakeholders implementing and deploying the EAM system.
- Train department managers, project managers, and other stakeholders on the new automation of asset management processes and the asset reporting now available with the transition to the EAM system.

For Department Managers and Project Managers

- Utilize the EAM system to identify, track, and request assets as part of resource planning for individual departments and project teams. Adoption of the EAM system by department and project teams ensures that crucial operational progress aligns with the goals set out by senior leadership.
- Identify teams and projects that would benefit from the tracking of specific assets and work with the asset manager to include these assets in the EAM system.
- Provide feedback to the asset manager on what's working well and suggest improvements to workflow and computational automation when identified. Recommendations made at the department and project levels become important inputs to the next iteration of the SAMP.



Key Takeaways: Value of EAM to the Enterprise

A high quality EAM system delivers a broad range of benefits to multiple stakeholders across the organization.

Senior leaders are able to assess and manage risks to mission success posed by the composition and condition of the asset portfolio, and make decisions accordingly. Information gained from the EAM system helps senior leaders negotiate business transactions from a position of strength, and closely align the asset portfolio with strategic and tactical mission objectives. Automated generation of key metrics such as Return on Net Assets (RONA) provide an accurate assessment of the value delivered by the asset portfolio.

Asset managers, facilities managers, and IT managers are able to deliver the promised level of service with the assets under management, while maximizing the value of the assets to the organization over their lifecycles. The EAM system gives these stakeholders the ability to provide available assets where they are needed, within the appropriate time frame and in the required condition. The workflow automation, automated computation of KPIs and metrics, and results delivered by the EAM system equip these stakeholders to improve productivity across the organization, lower costs, reduce financial, legal, and mission risks, and increase customer satisfaction.

Department and project managers benefit from the powerful visibility into team and project-specific asset information delivered by the EAM system. They can request asset acquisitions, initiate asset assessments, and track asset properties such as acquisition status, maintenance status, condition, and cost as they engage in resource planning for their teams and projects. Automated updates to this information by the EAM system reduces the possibility of project delays, increases productivity, and maintains a high level of morale among stakeholders.



Appendix

A1-The Institute of Asset Management's Conceptual Asset Management Model

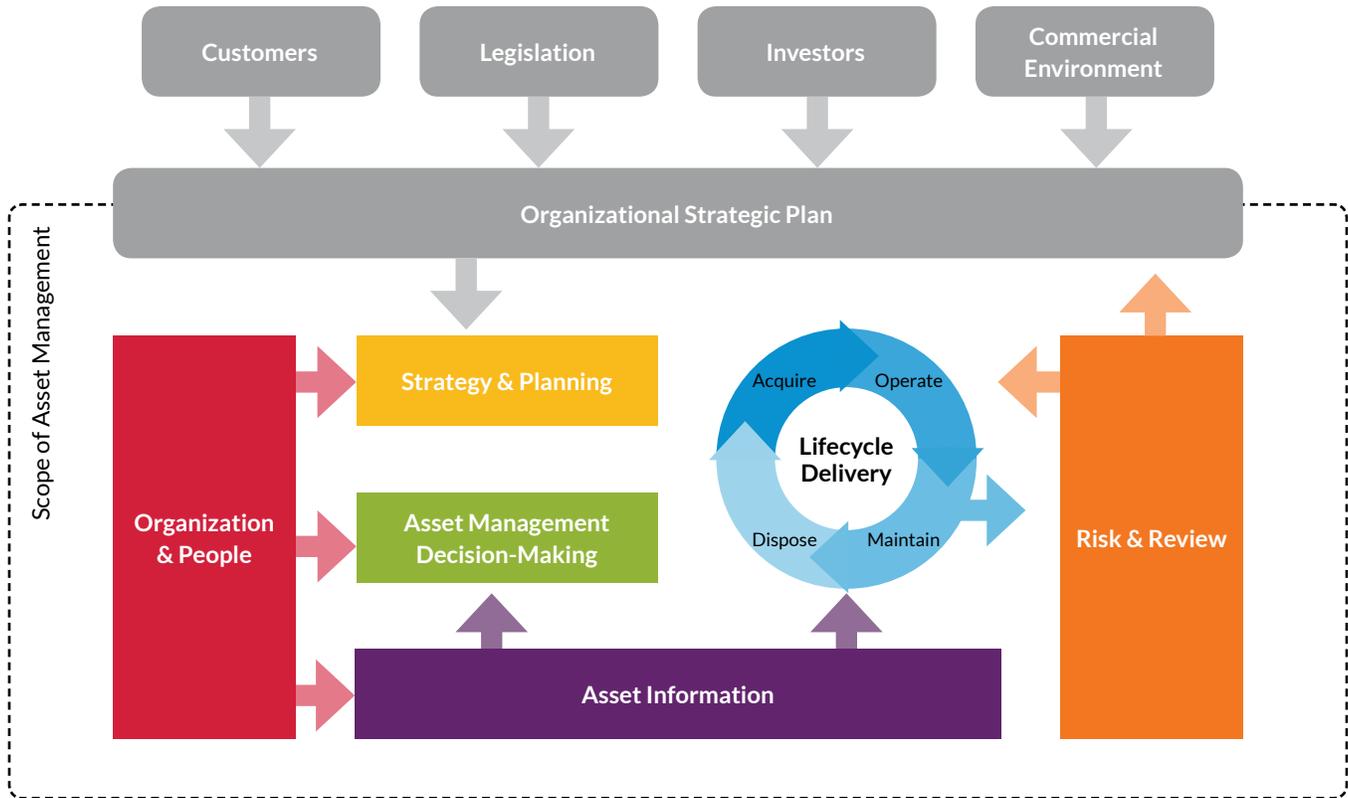


Figure 9: Institute of Asset Management (IAM) Conceptual Asset Management Model [8]

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- [8] Institute of Asset Management, "Asset Management Conceptual Model".





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