

ASSET MANAGEMENT: THE LIFE-CYCLE APPROACH

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ABSTRACT

This paper is a non-technical introduction to asset management — what it is, why it is needed, what its benefits are, and how it might be implemented in a water or wastewater utility.

The paper addresses the “drivers” behind asset management, including the substantial cost savings resulting from an effective program. It then discusses the “management” aspect of asset management, linking asset management to the “classical” generalized definition of management. It concludes by looking at how asset management might be implemented in a water or wastewater utility, and examines some of the institutional barriers that utility managers should be aware of.

KEYWORDS

Asset management, life-cycle costing, cost of asset ownership, competitiveness, GASB 34, CMOM, WIN, WATER-21, sustainable infrastructure

INTRODUCTION — WHY ASSET MANAGEMENT?

The concepts of asset management are becoming increasingly recognized among utilities in the United States and elsewhere. Utility managers are realizing that stronger asset management programs will help them achieve several important objectives:

- *Improved regulatory compliance* — For wastewater utilities in particular, the proposed CMOM regulations will require improved asset management. Since investment in collection system assets usually exceeds those in treatment assets, among vertically integrated utilities at least, CMOM’s emphasis makes financial sense as well.
- *More meaningful financial reporting* — GASB 34 requires reporting of the costs of asset ownership, a cost element not currently present in the audited financial statements of many utilities. While depreciation reporting is an option, the more meaningful “modified approach,” recently endorsed by the American Public Works Association, more accurately reflects the true costs of owning (and maintaining) infrastructure assets. Compliance with GASB 34’s modified approach requires a high level of asset management.

- *Improved reliability* — More structured day-to-day attention to system assets and their conditions means that unexpected failures are less likely, minimizing emergency repairs, costly lawsuits, and customer relations problems.
- *Long-term system integrity* — The concept of “sustainable infrastructure” is gaining increased currency, probably due to visible problems in many American cities where sufficient re-investment in infrastructure has not been made. The current “overhang” of massive required re-investment in existing assets has been explored in the Water Infrastructure Network’s report, “Clean and Safe Water for the 21st Century,” and in its recent follow-up report, “Water Infrastructure Now.”
- *Eligibility for federal funding* — The USEPA and others in government are quite aware that the asset management “handshake agreements” that accompanied the Clean Water act grants of many years ago had little effect, in many places, in preventing the decay of federally-funded facilities through lack of local reinvestment. Thus, “asset management plans” are specifically required to be eligible for State Revolving Fund loans under S.1961, the recently-introduced bill authorizing \$35 billion for the SRFs. We may well see similar requirements in other infrastructure legislation, especially grant funds that may become available as a result of the WATER-21 initiative.

Significant cost savings — Probably the overriding impetus toward improved asset management, however, is the *potential for significant cost savings*. These savings are sustainable because they arise directly from the business practices of the utility.

Consider: The USEPA estimates that improved asset management will likely result in savings of *at least* 20 percent of the costs of asset ownership. This figure becomes very significant when we consider just what a large portion of total costs are represented by asset ownership costs at a typical water or wastewater utility.

Try this “thought experiment”: Estimate what your utility’s total budget would be if it owned no infrastructure assets. Obviously you would have no capital costs: Debt service payments and pay-as-you-go capital expenditures would not exist. But more would happen as well: You would have no engineering unit and no O&M forces. All efforts toward planning, designing, building, and maintaining your infrastructure would disappear. All that remained might be the billing function, small personnel and payroll unit, environmental compliance, and (of course) a director or general manager and governing board.

The difference between your current budget (with assets) and this “thought experiment” budget (without assets) is the *true cost of asset ownership*. The difference is obviously enormous, probably the bulk of current annual expenditures. A savings of 20 percent is very significant.

How does a utility realize these savings? The answer is conceptually simple but requires a fundamental change in the way the business is managed. The remainder of this paper discusses the concepts underlying asset management.

WHAT IS ASSET MANAGEMENT?

There are several definitions of asset management, none generally accepted as authoritative. Thus, the author feels free to offer his own definition, which will be supported by the arguments in the rest of this paper:

“Asset management is a structured program to minimize the life-cycle costs of asset ownership while maintaining required service levels and sustaining the infrastructure.”

This may sound a bit abstract — so let’s examine the elements of the definition one by one:

- *Minimize the costs of asset ownership.* . . . Clearly, asset ownership accounts for the bulk of all costs for most utilities. And any significant reduction in such costs means major savings.
- *. . . while maintaining required service levels.* . . . Even though asset management reduces costs, it improves reliability because it emphasizes detailed attention to assets. And because it emphasizes monitoring the condition of assets *and* their maintenance costs, resources can be better allocated to where they’re needed — and away from where they aren’t.
- *. . . and sustaining the infrastructure.* For some, this will be the real payoff. A sound asset management program is both near-term (maintenance-oriented) and long-term (refurbishment- and replacement-oriented). Its planning horizon is very long — typically, 40 years or more. Planning within this time frame will yield the information required for utility governing bodies to understand infrastructure needs and to fund them properly.

Asset management is marked by its highly structured approach to identifying assets and getting to know them very well. Properly practiced, it involves all parts of an organization and entails a living set of asset performance goals. With a solid program, a plan is established for each of asset from the very beginning; the resources used are measured on an asset-by-asset basis; and the results achieved are measured. The outcome: Managers have the asset-specific knowledge required to choose exactly the right assets, to optimize maintenance activities, and to refurbish and replace assets at just the right times.

WHAT’S THE MANAGEMENT IN ASSET MANAGEMENT?

There are three important concepts in understanding asset management:

- Asset management is not a “general” approach to things. *Each and every asset* is managed on an asset-by-asset basis.

- Each asset is managed against a plan—which means that there is a *plan for each asset*.
- Management of each asset follows a *management cycle*.

Let's look at the classical management cycle, which applies to the management of *any* process:

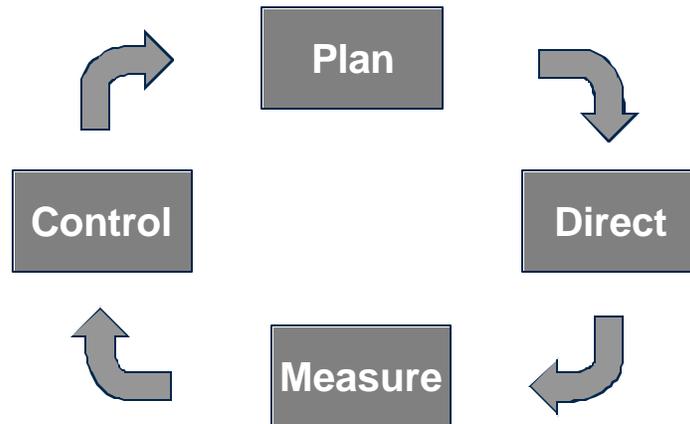


Figure 1: The “classical” management cycle

Asset management activities in terms of each step in the cycle are:

- *Plan* — A life-cycle plan is created for each asset. This plan includes all the activities associated with acquisition, maintenance, periodic refurbishments, disposal, and replacement of the asset. The plan is ultimately expressed *in financial terms*, since (after all) the intent is to manage the asset to minimize life-cycle costs.
- *Direct* — Resources are allocated and asset-related activities are managed in accord with the life-cycle asset plan.
- *Measure* — Costs of the activities directed in the previous step are measured, also on an asset-by-asset basis. The impacts of these activities are also measured, primarily through a condition assessment program.
- *Control* — Based on the results of our measurements, the asset plans are updated, which may involve re-allocating resources toward or away from each asset.

How do most utilities without asset management programs rate with respect to each of these steps today? In the author's experience:

- *Plan* — If the utility has good O&M practices, relevant assets have O&M plans with specific activities and frequencies. These are not normally expressed financially. Further, there are almost never long-range plans for capital activities such as refurbishment and replacement.

- *Direct* — Utilities with good O&M practices use work order or similar systems to make sure that the periodic and reactive O&M work gets done. Costs are not normally collected or analyzed on the asset level, however. Capital activities are approached very reactively with only short-term advance planning.
- *Measure* — Here's where today's processes break down completely. Very few utilities aggregate costs by asset; even fewer have condition assessment programs. Therefore, the value gained by incurring those costs cannot be evaluated. *Without measurement programs, utilities will never know whether the money they spend on assets is just right, too little, or too much.* As a result, utilities tend to overspend "just to make sure."
- *Control* — Since there is no true measurement, there can be no control process and thus no continuous improvement.

It is easy to see that without active management of assets at every stage of the management cycle, utilities will never realize the savings and other benefits offered by good asset management.

WHAT DOES ASSET MANAGEMENT MEAN FOR MY UTILITY?

Let's start answering this question by saying what asset management is *not*:

- *Asset management is not a computer system.* To confuse asset management with a computerized system is like confusing a paycheck with a payroll program. Electronic data processing is a key enabling technology for asset management, but in the final analysis, asset management is a *way of doing business* that is reflected in the day-to-day practices of a utility.
- *Asset management is not a maintenance management system or a GIS.* Maintenance management systems may be valuable supporting tools of asset management, but they deal with only a portion of the asset management cycle. Similarly, GIS-based tools may help manage distributed networks such as distribution or collection systems, but they remain only pieces of the larger puzzle.

An effective asset management implementation is more comprehensive. It may involve integrating all these tools along with other existing systems (accounting, financial reporting, purchasing and stores, payroll, etc.) to create a comprehensive information system that will support an integrated asset management program.

So asset management should not be confused with the tools that enable it. Asset management is and will always be a *set of procedures to manage assets through their life cycles*, based on principles of life cycle costing. These procedures, to be effective, must be implemented in a programmatic way.

Here is a diagram of a comprehensive asset management program:

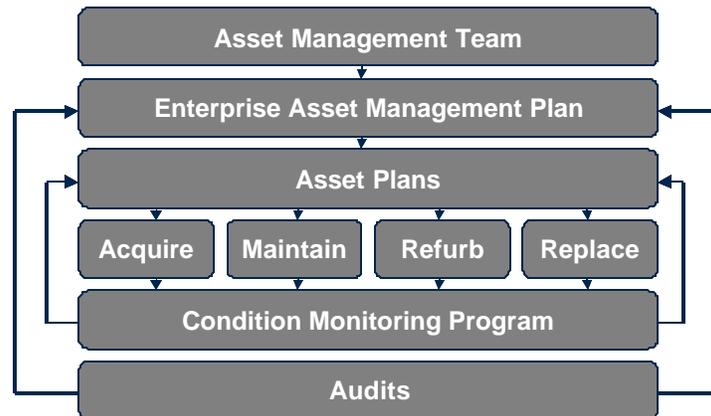


Figure 2: An asset management program

Let's look at the elements of the program one by one:

- The *Asset Management Team* is the cross-functional group responsible for managing the asset management process. Its primary responsibilities are to involve all users of asset management information, gather input, define goals and objectives, prepare the Enterprise Asset Management Plan, and manage periodic audits of asset management performance.
- The *Enterprise Asset Management Plan* is a “living document” that defines goals, objectives, strategies, and specific assignments for the development and maintenance of a consistent and effective asset management program involving all functions of a utility.
- *Asset Plans* are at the heart of the asset management process. Each asset has an Asset Plan that defines the activities required by that asset — maintenance, refurbishments, and ultimate replacement. Each of these activities is associated with its expected cost. In other words, the Asset Plan is both an activity plan and a financial plan. Asset Plans are routinely updated through ongoing condition monitoring and become increasingly accurate (see below).

Asset plans are defined by time period (typically by year) and, when combined, provide a financial plan for all asset-related activities at an enterprise level that looks forward many years. This financial plan supports both near-term budgeting and long-term financial planning processes.

These asset plans are also the primary keys to the substantial savings available from asset management.

- *Asset Condition Monitoring* is the ongoing process of measuring asset condition. This is not just to determine if the asset should be replaced or repaired — the process helps evaluate the frequencies and activities involved in normal maintenance and is used to

update the Asset Plans (note the upward-pointing arrows back to the Asset Plans). In other words, condition monitoring helps to optimize asset management activities to minimize costs.

Condition monitoring also fulfills requirements of regulations such as GASB 34 and CMOM, allowing analysis and reporting of asset condition by segment or for the infrastructure network as a whole. Finally, it helps the utility manage the condition of its infrastructure to prevent unexpected service interruptions.

- *Periodic Audits* — The asset management process includes periodic audits of all elements of the process to ensure that at least four objectives are being achieved:
 - Asset-related costs are being reduced as anticipated
 - Required service levels are being met
 - Asset-related procedures are being conducted as planned
 - Asset plans are being properly updated and improved.

Based on findings from the audits, the Enterprise Asset Management Plan is updated (note again, the upward-pointing arrows).

From this short description, it should be clear that asset management is a *process of continuous improvement*. Its aim is always to optimize asset-related activities to achieve the primary goal of asset management: Minimizing costs of asset ownership while maintaining required service levels and sustaining the infrastructure.

WHAT BARRIERS SHOULD I EXPECT?

True asset management is a different way of doing business for most utilities. As with anything new, difficulties can be expected. In the case of asset management, the difficulties may be four-fold:

1. *Fundamental change* — Asset management is not just “another new program.” It is a fundamental change in the way a utility operates. It does not have a defined ending point; it is a continual cycle of improvement, a permanent change. If an organization fails to recognize this, asset management is unlikely to achieve long-term success.
2. *Detailed measurement* — Asset management depends on continuous measurement, feedback, and updating of asset plans. The level of effort involved in allocating costs to specific assets, tracking these costs, assessing asset conditions, and updating asset plans and asset-related activities is far from trivial. Members of an organization may well resist these new activities if the benefits are unclear.
3. *Increased accountability* — Asset management shines a clear light of accountability on people involved in procurement decisions, IT systems, capital management, and O&M. In the O&M area especially, resource utilization is continuously monitored and areas of inefficiency are spotlighted. It is to be expected that this level of accountability may be resisted.

4. *Inter-function cooperation* — Most importantly, asset management requires an unprecedented level of cooperation, on a day-to-day basis, among the major functions of an infrastructure agency. Engineering, planning, finance, O&M, and information systems must work together closely. Since many utilities tend to be vertically organized with well-developed “silos” in some areas, this cooperation may be difficult to foster.

To many utility managers these barriers will sound quite familiar. Because of the depth, breadth, and permanence of a true asset management program, they may appear even more pronounced than when they were encountered in previous initiatives. Clearly, vigorous leadership and a high degree of institutional strength will be required to make asset management work.

The benefits, though, are likely to be worth the effort:

- Improved regulatory compliance
- More meaningful financial reporting
- Increased system reliability
- Long-term system integrity
- Potentially, eligibility for federal infrastructure funding
- Certainly, significant cost savings.

Asset management resources — Resources for asset management may be found on the Internet on the author’s web pages.

Resources for asset management in general and GASB 34 may be found at:

- http://www.bcwaternews.com/socalh2onews/asset/am_index.htm

Resources for CMOM and its asset management implications are at:

- http://www.bcwaternews.com/socalh2onews/cmom/cmom_index.htm

Information on the WIN Reports, WATER-21, and federal infrastructure funding initiatives may be found at:

- http://www.bcwaternews.com/socalh2onews/asset/isf_index.htm

These pages are updated often with new information. Those interested in following the evolving asset management field should bookmark these pages.