Practical Asset Management: It Doesn't Have to Be 'All or Nothing'

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Many texts on asset management are either so theoretical or they include such exhaustive lists of activities that they can be discouraging reads. Water and wastewater utility managers are left thinking that asset management is either an academic exercise or an overwhelming "all or nothing" endeavor. Not true.

Our experience has led us to two encouraging conclusions. First, while asset management is often couched in theoretical terms, it is characterized by practical, common-sense practices and tools that can make utility management easier. Second, the idea that a utility must do everything in an asset management model to achieve significant results is not supported by experience. Each piece of an asset management system has value in and of itself.

Why Should You Care about Asset Management?

The traditional way of doing business—in which each department focuses on its specialty, such as planning, design, operation and maintenance (O&M), or accounting—is no longer the most effective way. The following trends are making changes necessary:

- Many major utility assets are nearing, have reached, or have exceeded their useful life spans.
- The user fees (rates) most utilities charge weren't designed to include sufficient funding to repair, rehabilitate, or replace this aging infrastructure.
- U.S. society has developed a "do more with less" mentality (particularly when it comes to spending public money), so few communities are prepared, based on what they know today, to pay more for water and wastewater services.
- The age of "trust the experts" is over, so we must provide evidence and sound reasoning to convince the public and elected officials that capital expenditures are necessary.

Asset management can help. Basically, asset management is a form of *applied systems thinking*—a way of thinking about complex systems and a set of tools to put those thoughts into practice. With the appropriate software tools, staff can better analyze all utility assets to determine how best to keep the water or wastewater treatment system functioning smoothly. They also can use the information to show stakeholders why capital investments are needed.

Eight Useful Building Blocks

Most organizations will need to implement the following eight "building blocks" to establish a practical, successful asset management program:

Block 1: Update Asset Databases

You can't manage assets effectively without accurate, complete asset databases. These typically include:

- A computerized maintenance management system (CMMS) to store characteristics and historical data on fixed assets.
- A geographic information system (GIS) to store characteristics and historical data on distributed assets.
- A supervisory control and data acquisition (SCADA) system to store historical operating and alarm data on mechanical or instrumentation assets.

Water and wastewater utilities also should maintain a financial asset ledger, but this ledger typically includes only enough detail necessary to support day-to-day decisions on specific assets. All asset databases should meet a few key criteria:

a) *Include all assets in the financial asset ledger and at least one database.* While many agencies have most critical pumping and process equipment in their CMMS database and most distributed infrastructure in their GIS database, major asset classes that are often missed include:
   - Process structures, basins, tanks, and gates.
   - O&M and administrative buildings and roofing systems.
   - Underground process piping and valves.
   - Paving inside treatment facilities; and electrical components and instrumentation.

b) *Use a consistent naming convention.* A single, system-wide naming convention ensures that historical asset data entered in different systems or by different departments remains associated with the appropriate asset.

c) *Capture essential asset characteristics without a blizzard of redundant data.* The essential asset characteristics are:
   - Installation date (to derive age).
   - Manufacturer or material (to estimate expected asset life).
   - Size and/or capacity (for capacity planning).
   - Realistic life expectancy (to forecast rehabilitation and replacement dates).
   - Priority (Based on the effects of asset failure).
   - Estimated replacement cost (to support rehabilitation and replacement decisions and budget preparation).
   - Physical location.

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Block 2: Develop & Implement Maintenance, Repair, Rehabilitation, & Replacement (M3R) Decision Processes

It's not enough to simply collect data on your assets; you need to analyze that data to determine how to keep your assets in top condition. So, if you're collecting data in a SCADA and/or CMMS, here's a conversation you should not hear at your utility:

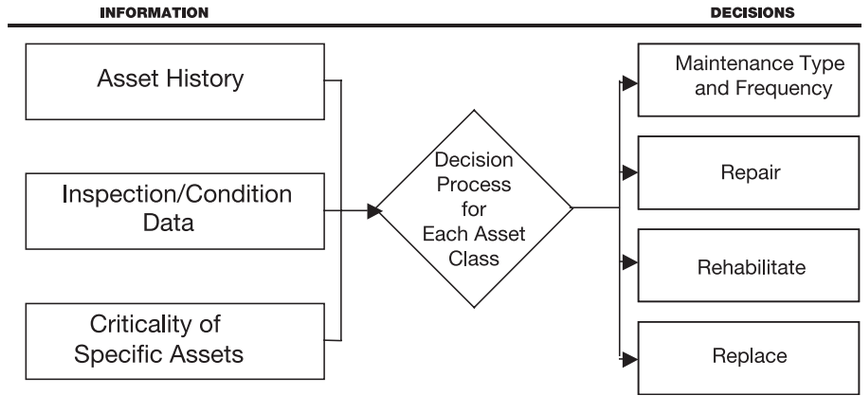
Question: "I see you are collecting lots of data with your CMMS and your SCADA system. How are these data used to determine how often maintenance is necessary and when to repair, rehabilitate, or replace an asset?"

Answer: "We typically repair assets when they break, and we rehabilitate or replace assets when they can't be repaired anymore."

Unfortunately, this conversation is typical. Collecting data and entering it into an information management system is expensive, but many agencies do not use these data to make any decisions because they haven't established guidelines for doing so.

To overcome the "data without information" challenge, begin by developing a structured M3R decision process (see Figure 1). The decision process should vary, depending on asset class and level of service desired. In other words, the decision process for a sewer is very different from one for a pump.

Figure 1. M3R Decision Process



Block 3: Implement Inspection & Condition Assessment Programs for Key Asset Classes

Asset inspection and condition assessment data are critical for sound M3R decision processes. Fortunately, inspection and assessment processes such as closed-circuit TV systems, ultrasonic technologies, vibration analysis, lube oil chemistry, and infrared thermography have become better and less expensive. Also, utility staff can use SCADA data to identify deteriorating equipment well before it fails.

A successful inspection and condition assessment program:

- Is designed to collect the data needed to support M3R decision processes.
- Associates the data with specific assets (rather than facilities, routes, or street addresses).
- Stores and analyzes data in an electronic format (so data can be analyzed more easily and efficiently).
- Collects code-based, rather than text-based, data (because text-based information is difficult to analyze efficiently).

Block 4: Establish & Implement O&M Plans for Each Class of Assets.

Structured, well-planned O&M programs ensure that assets are reliable and

Continued on page 28

Continued from page 27

long-lived. They also support successful asset management programs because O&M crews are the most efficient, effective way to collect data to support M3R decision processes.

On the other hand, O&M crews must understand the type, format, and purpose of the data they are collecting and must have a well-designed information system in which to store, manage, and analyze these data. Otherwise, the collected data will be of little use.

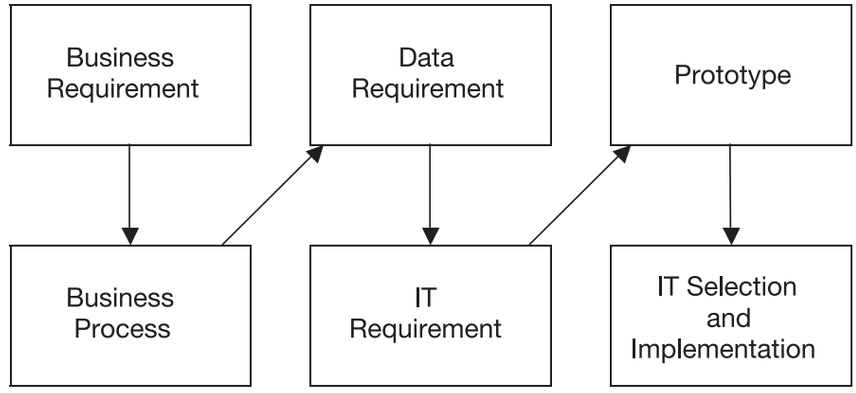
Block 5: Choose Software that Supports M3R Decisions, Maintenance, Inspections, Condition Assessments, & SCADA Strategy

A pitfall we noticed that many utilities fall into is purchasing software before they develop good business processes (including M3R decision processes). Commonly, a utility's IT group buys a software package and tries to modify O&M programs to fit its processes. This approach usually disappoints. Instead, utilities should decide which key business processes they want to use to manage their system and then select software that supports these processes (see Figure 2).

In other words, when implementing a new information system:

- Focus on business needs and decision processes first.
- Keep it simple (collect only the data needed to support decisions).
- Collect data in code-based format instead of text-based format.

Figure 2. Software Selection Tool



Block 6: Identify & Prioritize Repair, Rehabilitation, & Replacement Projects

Once a utility has composed comprehensive lists of maintenance activities and repair, rehabilitation, and replacement projects, each activity or project should be assigned the following:

- Project number and/or name
- Project scope or description
- Justification for project
- Target completion date
- Estimated project cost
- Funding source

Usually the total cost of all the capital projects will exceed available funding, so utility staff should then prioritize the projects based on a set of objective, weighted criteria to avoid falling into "the squeaky wheel gets the grease" trap. Once this comprehensive, prioritized list of projects has been created, utility staff will know precisely what state infrastructure is in. The list can also be used to help explain infrastructure status and costs to policy makers, regulators, and community stakeholders.

Block 7: Identify Budget Requirements & Develop a Funding Strategy

Many water and wastewater utilities now need to fund major rehabilitation and replacement programs, but most ratepayers are used to fees based primarily on day-to-day operation and maintenance costs. Besides rates, utilities can fund capital projects through:

- Bonds (which must be repaid through rate increases).
- State Revolving Fund loans (which also must be repaid through rate increases).
- Revenue-enhancement initiatives (such as water loss management and billing meter upgrades and repairs).
- Cost-reduction initiatives.
- Grants (which are limited because of state and federal budget constraints).

To succeed, utility managers must make policy-makers and community stakeholders understand what improvements need to be made and why. An asset management program efficiently collects and organizes the information needed to justify decisions and explain capital needs to others.

Block 8: Continually Update & Refine the Asset Management Program

An asset management program is not a one-time event; it is a way of doing business. Utility staff must make periodic adjustments to improve overall program performance and address new and changing issues.