Asset Management Gone Bad: Are Trackable Assets Crippling Your Maintenance and Reliability Program?

J.D. Solomon, PE, CRE, CMRP[1]
Jim Oldach, RCM2 Practitioner [1]
Kathryn Benson, PE, CMRP[1]

[1]CH2M

ABSTRACT

ISO 55000 states "effective control and governance of assets by an organization is essential to realize value through managing risk and opportunity… asset management translates the organization's objectives into asset-related decisions, plans, and activities, using a risk based approach". ISO 55000 is greatly influenced from the regulatory and accounting sectors, both of which place a large emphasis on tracking assets. US General Accounting Standards 34 (GASB 34) is a classic example of requirements to capitalize long-lived assets and depreciate them over their estimated useful life, and that all equipment, machinery, vehicles, and structures are trackable assets. In practice, the definition of "asset" is normally driven by a low investment level and is independent of asset function.

This paper will examine whether maintenance and reliability (M&R) programs are benefiting or being harmed by the trackable asset standard. Many M&R programs and their related CMMS, Preventative Maintenance (PM), and Predictive Maintenance (PdM) programs, are collapsing under their own weight from inadequate resources. Where does Reliability Centered Maintenance and the focus on function rather than individual assets fit in? Should PM and PdM programs be performed at the asset or functional areas? Should work orders and cost accounting be tracked in the CMMS system at the asset level or the functional location area? How do asset-based approaches and function-based approaches fit together from a practical standpoint?

KEYWORDS

Asset Management, Maintenance, Reliability, Risk, Computerized Maintenance Management System, ISO-55000, Financial Management, GASB-34

INTRODUCTION

According to ISO 55000 (2014) asset management is the coordinated activities that an organization uses to realize value from assets in the delivery of its outcomes and objectives. Realization of value requires the achievement of a balance of costs, risks and benefits, often over different timescales. However, the definition of an asset is quite broad. An asset is something that has potential or actual value to an organization. ISO 55000 leaves much discretion for an organization in terms of defining its assets.

The term trackable asset is from the accounting sector, and commonly refers to physical inventory that is acquired, managed, and reported on an organization's balance sheet. Commonly it refers to physical inventory that can be located in a warehouse or that is fixed

inventory or real property. Trackable assets may or may not include tags such as bar codes, but it is not uncommon that they do.

When left to the accounting or information management disciplines within an organization, assets within a computerized maintenance management system frequently are tracked to the most finite level possible. Frequently this includes items with values of as little as $1000 to $3000. In practice, maintenance and reliability (M&R) professionals do not consider tracking assets to this level as either meaningful or practical. This is not to say that they do not value the proper accounting or inventory control of items purchased by the organization; it is to say only that tracking daily activity to a fine level of what may be defined as an asset is both not meaningful and not productive.

METHODOLOGY

Asset Management

Asset management has grown into a formal field of practice over the last 20 years in large part due to the focus in the public sector in Australia, Great Britain, and the United States. However, a lifecycle approach based on reliability and risk-based practices has been in place in various private sector industries since the 1950s. Based on standard practices in the aerospace, automotive, and nuclear power industries, the practice now known as asset management can be considered a simplification. In the field of maintenance, asset management has taken a number of different forms in the past. One example is Total Productive Maintenance (TPM) from the 1960s, which at its core is strikingly similar to what we now call asset management in 2015.

According to the United States Environmental Protection Agency (USEPA, 2008), the fundamental questions that asset management are intended to answer the following questions:

- What do I own?
- Where is it?
- What is its condition?
- What is its useful life?
- What is its value?

Standard practice involves: developing a detailed asset inventory; organizing the assets into logical associations, or an asset hierarchy; performing condition assessments on the assets which in turn provides an indication of remaining useful life; developing estimated replacement costs for the assets; and finally developing some form of renewal and replacement forecast that ultimately gets used in the budgeting and capital improvement program (CIP). Along the way, some data base is needed to compile and maintain the data associated with each asset. This can take the form, depending on the size and scope of the organization, of spreadsheets, geographic information systems (GIS), or a broad range of software products that are referenced here as computerized maintenance management systems (CMMS).

There is much support structure that is required for an asset management program (ISO 55000, 2014). This includes a number of aspects that makes a program both effective and sustainable. Some of these aspects include: establishing the organizational context, typically through strategic planning; aligning the program a clear line-of-sight from top to bottom through performance

measures and established levels of services; focusing on optimizing organization structure, succession planning, and workforce development; developing and utilizing some form of risk-based approach; and formalizing key work flows within the organization through business process mapping and value stream mapping.

According to a recent McGraw Hill survey (2013) of practices in the water and wastewater industry in North America, the majority of utilities that describe themselves as having implemented asset management say that they do these top four activities:

1. Asset List and Asset Hierarchy
2. Buy some form of Computerized Maintenance Management System (CMMS)
3. Some form of condition assessment
4. Some form of risk ranking (prioritization)

CMMS

A computerized maintenance management system is exactly that. Prior to the affordable use of computer systems, maintenance systems were developed and implemented on paper.

A Computerized Maintenance Management System (CMMS) is an essential part of an organization's ability to manage, maintain, and operate their facilities, assets, and equipment, as well as to maintain and document the required processes and procedures to do so. Implementation of the CMMS enables Operations & Maintenance (O&M) labor and material cost reductions and improved equipment availability. In addition, the CMMS is also the primary source of data for asset management and operations with respect to planning and budgeting.

Gulati (2012) describes five barriers to successful CMMS acquisition: organization is too small for a system; the payback or savings in inadequate; the Information Technology (IT) group does not give the CMMS a high enough priority; IT and O&M speak different languages and have different goals; and participants fail to reach consensus. A wide variety of CMMS selection and implementation methodologies are available.

Gulati (2012) also describes eight reasons that CMMS projects fail to reach their potential:

1. Selecting the wrong CMMS for the application
2. Employee turnover
3. Lack of adequate training during implementation
4. Employee resistance
5. Being locked into restrictive hardware or software
6. Inadequate supplier support
7. High expectations and desire for quick return on investment
8. Internal politics that allows Financial or IT to lead the CMMS implementation team

Links with Financial Management Systems

The linkages between an organization's maintenance and reliability (M&R) program and its financial management system cannot be overstated. And an effective CMMS is an important part of that linkage. In most organizations (Nyman and Levitt, 2010) the battle for funding between departments as well as different focus areas is extremely competitive. A misconception is that maintenance does not contribute to the manufacture or delivery of anything, and as such

minimal funding is provided. Therefore, it is important for M&R professionals to communicate and sell management in terms they relate. An effective CMMS is an essential tool in this demonstration and communication that effective M&R contributes dramatically to the bottom line.

The same can be said regarding asset management. Of the seven benefits of an asset management program cited by USEPA, three of the seven (namely 1, 3, and 4) relate to financial management considerations:

1. Prolonging asset life and aiding in rehabilitate/repair/replacement decisions through efficient and focused operations and maintenance.
2. Meeting consumer demands with a focus on system sustainability.
3. Setting rates based on sound operational and financial planning.
4. Budgeting focused on activities critical to sustained performance.
5. Meeting service expectations and regulatory requirements.
6. Improving response to emergencies.
7. Improving security and safety of asset

Local government entities in the United States use Generally Accepted Accounting Principles (GAAP) in their financial accounting. GAAP is a set of guidelines that includes standards, conventions, and rules which accountants follow in the preparation of financial statements. These guidelines have been developed to ensure that financial statements are understandable to their users. (BAMI-I, 2105). GAAP is published by the Federal Accounting Standards Advisory Board (FASAB); the advisory board for local and state governments is the General Accounting Standards Board (GASB).

In 1999, General Accounting Standards Board (GASB) released statement 34, or GASB-34, which for the first time required that infrastructure assets be included in financial statements. Two approaches were authorized for use by GASB-34. The first was based on standard accounting depreciation methods (Depreciation Approach or Method 1) while the second (Modified Approach or Method 2) allowed for local and state entities to use actual maintenance expenditures in conjunction with condition assessments for reporting depreciation. For nearly a decade, GASB-34 was believed by many experts in the utility industry to be the primary driver for asset management programs. It has yet to pan out, primarily because the vast majority of local and state governments still use standard deprecation (Method 1 under GASB-34).

However, several key aspects of GASB-34 can be found in the methodologies for developing and implementing asset programs today. These include:

1. Condition assessments must be performed every 3 years or the organization cannot use the Modified Method. A 3-year, rotating basis that cover all of the assets in an asset management program has become a sort of industry standard, although the majority of organizations do not use the Modified Method for financial reporting.
2. An initial cost threshold for capital assets or a network of capital assets is typically $5000. Most local and state government financial offices use this number, or even $1000 or $3000; however, GASB-34 does not require a specific number and leaves this decision to the unit of

local government. But $5000 has slipped into the financial reporting logic and is commonly seen in the definition of an asset in the CMMS.

3. An allocation of between 2% and 4% of a facilities current replacement value is recommended for maintenance and repair. These levels correspond to a useful life of 25 to 50 years. While 25 years is reasonable for mechanical and electrical equipment, the current generation of electrical and instrument and controls (I&C) equipment reaches obsolescence much sooner. Many structures last more than 50 years. However, these rules of thumb have become the standard in many asset management programs, regardless of the M&R experience.

Summary on Methodology

There are a number of underlying approaches and methodologies related to asset management, M&R programs, and financial management. An exhaustive discussion of the many specifics of each approach is beyond the scope of this paper. However, it is obvious that the different perspectives must be both understood and smartly integrated to provide the reliability and effectiveness.

DISCUSSION

Given the three perspectives previously described and the variety of methodologies associated with the implementation of each as a separate entity, several over-arching aspects should be resolved for their integration.

Definition of an Asset

As previously described, ISO 55000 defines an asset as anything of value to an organization. GASB-34 leaves the description of what is defined as a capital asset for tracking purposed to the discretion of the unit of local government, although some GASB guidance has been "codified" to mean a threshold of $5000 initial cost (or less in some cases).

Traditionally M&R programs have not been concerned with the financial-based definition of an asset. M&R programs typically have subdivided "assets" into equipment and equipment parts. Equipment may consist of a single asset or group of assets in a system or subsystem; the operative distinction is related to the importance in terms of reliability to the system and whether some form of maintenance tracking is required. Parts may be "assets" by the ISO 55000 definition, but in the M&R world parts are typically non-repairable items that are small in value and often listed as maintenance, repair, and operations (MRO) inventory.

WERF (2015) describes "Maintenance Managed Item", or MMI, as the lowest level of an asset's physical structure that is to be recognized within an asset register where the registry is structured as a nested hierarchy of physical assets. Typically, an MMI is set at that level of the hierarchy at which an asset is individually maintained or at which management decisions to repair, renew or replace are made. From an M&R perspective, this typically describes an "asset"; however, from a financial management or asset management perspective this may or may not be the operative definition.

Functions versus Assets

According to JA 1011 (1999), Reliability Centered Maintenance (RCM) is a specific process used to identify the policies that manage the failure modes which could cause the functional failure of any physical asset in a given operating context. A key difference in a reliability centered approach is in preserving function, whereas many traditional asset management programs seek to preserve the useful life and condition of individual assets.

The seven questions of RCM, which address the functions of an asset, subsystem, or system, are:

1. What are the functions and associated performance standards of the asset in its present operating context?
2. In what ways does it fail to fulfill its functions?
3. What causes each functional failure?
4. What happens when each failure occurs?
5. In what way does each failure matter?
6. What can be done to predict or prevent each failure?
7. What should be done if a suitable proactive task cannot be found?

Functions can be dived into two categories (JA 1012, 2002). Primary functions are the reason why an organization acquires any asset or system. Secondary functions are often less obvious that the primary function and may, or may not, have serious consequences if lost. Secondary functions can include such things as health and safety, environmental integrity, structural integrity, control/containment/comfort, appearance, and economy/efficiency. Failure relative to the functions may be partial or total, catastrophic or non-catastrophic, or apparent or hidden. Reliability-based M&R programs are concerned with containing and tracking the ways assets or systems fail (failure modes) relative to the functions.

The Role of Maintenance

The five roles of maintenance are:

1. Increase asset performance/reliability to reduce operational costs and liabilities (risk)
2. Dedicate maintenance resources based on liabilities of equipment operation, or in other words, based on asset risk (includes operational, safety, environment & financial)
3. Increase the efficiency and effectiveness of maintenance performance to reduce planned costs and liabilities
4. Increase the efficiency and effectiveness of maintenance performance to reduce unplanned costs and liabilities
5. Document data and information to be used for improving the performance of the maintenance and reliability program

In many cases, the CMMS serves as a practical constraint to the role of maintenance if it is driven too much by the goal of the financial reporting within an organization or if driven too much by a standardized asset management program that ultimately tracks to the point of simply being a compliance program.

The role of a maintenance management system, whether an MMS or CMMS, is to enable the maintenance function. This leads the questions of whether it is really important to tie all job plans, preventative maintenance work orders, and other maintenance activities against each asset, or even if it is really important to track all types of maintenance hours and costs against individual assets.

Leading CMMS systems such as Maximo and Cityworks allow maintenance to be tracked at the asset level or the function location or geographic location. Financial reporting standards such as GASB-34 do not require computerized tracking at the asset level. Ultimately a CMMS can provide computerized tracking and reporting related to asset inventory, physical condition; maintenance activity; replacement asset value, and link to accounting and insurance systems. One fundamental question that should be simply "just because it can do it, should we try to do it?"

RESULTS

The authors of this paper have worked with tens of water and wastewater utilities throughout the United States and several overseas. These range in size from less than 20 employees to hundreds of employees and in scope from full service to single service (water or wastewater, treatment or distribution). Similarly we work with a full range of other industries.

In terms of results, we see the most effective organizations focus on the aspects of asset management that are most important to them. They perform these aspects extremely well, regardless of what the current best practice happens to be. Their characteristics tend to be a truly integrated approach of the M&R programs among all of the disciplines of the organization and they let the O&M function drive the M&R aspects related to the CMMS.

CONCLUSIONS

When considering the effectiveness of developing and maintaining an asset management program, a few key questions include:

- Do we track assets or do we track functions?
- How do we build our preventative and predictive maintenance programs?
- How important is our warehouse program?
- How many people do we need to track data if we have a purely asset-driven program?
- Can we fulfill financial reporting requirements without tracking every asset?

Ultimately the M&R functions of the organization should have the greatest influence over the answers to these questions rather than the financial reporting aspects of the organizations or an asset management office/initiative. There is no doubt that the process should be collaborative across all discipline of the organization while recognizing at the same time that tracking assets for the sake of tracking them is wasted effort. And there will never be enough time or money to do so.

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