Based on both historic and current studies, the industry of facilities management faces an ever growing challenge that puts our public assets at risk. The outcry for additional funding has become universal. Unfortunately, the federal and state governments delegate responsibility for funding solutions down to the local governments. The result—our public facilities are suffering from chronic deferred maintenance which leads to the increased cost of ownership, the increased exposure to liability, and the decreased expected useful life of the facility. Additionally, there are further negative impacts due chronic deferred maintenance that affect those who occupy the buildings. It has been reported that occupants of the facilities have an overall drop in their performance as a result of poorly maintained surroundings. This affects all levels of education as well as employee performance within public government (Smith, 2017b).

Included in this paper are the results of a study that focuses on the current practices of public facilities management programs. The intent is to identify elements that either support or detract from efficiently operated, effective facilities departments. Given the nature of this industry, both objective and subjective elements were addressed. Objectively, the organizational hierarchy and the associated communications pathways were identified. Subjectively, the lifecycle of the facilities mission was dissected and discussed through an interview process. Fifteen specific data points were addressed which included accountability, effective communication, data driven program development, allocation of resources, documentation of work performed, continuous training and education, and the use of technology (Smith, 2017a).

This study also served as a measurement against the historical performance of public facilities management practice. There have been decades of growth in public assets. During that time, innovation within operational practice along with technology offer new opportunities to organizations to address issues of efficiency that translate directly into a measure of effectiveness. Given the continued outcry for additional funding, it seems that there are challenges that continue to exist despite the innovations offered. This study focuses on what those challenges are. Further analysis based on successful models of public facilities management provides insights as to what practices, if adopted, may drive the lesser achieving programs toward greater effectiveness.

**Facilities management has suffered as a result of vicious cycles of growth followed by stretches of volatile funding. Technology offers a solution to the industry that reduces cost through increased meaningful communication based on data driven requests.**

**Keywords:** Lack of Funding, Growth Cycle, Productivity, Facilities Management, Maintenance Budget, Priority, Communication, Knowledge, Strategic Plan, Technology, Training, Outsourcing
Facilities management and maintenance continues to suffer overall decline as the demand grows in the face of failed and inconsistent funding. "Preventative routine maintenance can extend the life of any facility and, therefore, is a good investment. Unfortunately, school districts on average have decreased their investment in maintaining facilities" (Lawrence, 2003).

Given the challenge of operating an effective program without the necessary resources, it is not surprising that the assets are unable to serve their intended useful life. Further, ownership costs are higher and liability is greater.

A recent study was conducted by the author that included facilities managers from the public sector including cities, counties, k-12 districts, colleges and universities. It found both similarities and differences relative to the challenges and approaches to resolve them. A series of interviews was conducted across this wide range of public organizations over the course of four months. The interviews included both organizational questions as well as operational questions. Fifteen specific points were covered with further discussion encouraged. These interviews were systematically mapped for data and subsequently collated within the group, based on the topic. The objective data was also analyzed for comparison. The study was intended to identify the issues that prevented effectively orchestrated programs, but further focused on what common elements existed among those facilities departments that were most successful and conversely, least successful (Smith, 2017a).

The majority of the managers expressed differing levels of despair, almost to defeat in some cases. A number of challenges were identified both in the process and within the resources. Priorities were handled like burning fires, often with reactive measures at a higher cost and less impact. Many realized the inefficiency and ineffectiveness of their current programs, but felt helpless against the sense of insurmountable challenges.

To add perspective to the issue and understand the momentum of the public facilities management industry, it is important to review its history. It began as far back as WWII. The war had ended, and the nation was starved for public services and the facilities required to house them. The economy recovered, the infrastructure boomed, babies were born, and public facilities were in demand. As described, this was not the problem. Money was available and the public needs were met with development. The problem surfaced years later as the new construction continued as a priority, while the responsibility to maintain the existing facilities fell to the back burner as deferred maintenance. Over time, the lag-time has grown as the asset portfolios continue to expand.

Based on both the history and the current mounting challenges, research indicates that it is necessary for those who manage and govern public facilities to embrace fundamental change within their organizations to increase efficiency and improve the effectiveness. External revenue funds are not likely to be increased, therefore, the solution must come from within their organizations in an effort to "save themselves" from continuing decline.

Per the study, a proven approach to achieve greater success was to increase operational efficiency. Through the use of industry best practices, the cost of operating was reduced and with the savings—the funds devoted to maintenance could be increased. The opportunity to solve their greatest challenges lies within their organization. They can impact only what they control internally. Therefore, the focus of their most effective future must run through their pursuit of higher operating efficiency. The present paper considers a software application designed in light of the findings of the study.

Facilities management and maintenance continues to suffer overall decline as the demand grows in the face of failed and inconsistent funding.

Review of Research

For over seventy years, facilities management and maintenance programs have suffered the vicious cycle of their facilities' growth during economic strength, followed by the challenge of maintaining them during economic downturns. This cycle has become progressively worse, and is currently the focus of great concern for public entities such as counties, cities, k-12 public school districts, colleges, and universities. As the tax paying public, this is not only their problem, it is a shared problem that affects all of us. Research cites the rule of thumb in successful maintenance programs to be 20-30% re-active and 70-80% pro-active. The current trend is exactly the opposite. "Recently, the City of Houston was mired in $450 million backlog of deferred maintenance. The industry best practice is 80 percent predictive and 20 percent reactive...the ballpark was 96 percent reactive" (Millan, 2016).

As properties fail to be pro-actively maintained, they fall into a state of chronic deferred maintenance. The result is our assets are more costly to own, the liability increases, and the expected useful life is shortened. The impact to the tax payer is a demand for more funding to perpetuate the failing facilities' programs (Smith, 2017b).
In a recent study conducted by the author, public facilities managers revealed a number of issues as an explanation to the current challenges they faced in managing and maintaining their properties. One-hundred percent of those surveyed, cited a lack of funding as their main obstacle against managing their facilities with efficiency and effectiveness. While true, it is also a simple argument to substantiate failure. In other words, management fell victim to a lack of funds, thus relieving them from achieving success (Smith, 2017a).

What followed that initial cry of helplessness, was a reassuring recognition that there were changes that could be made internally to improve their facilities programs. Each of those interviewed was asked a parting question that supposed that they were king for a day. All challenges were lifted giving them full rein to make necessary changes in their facilities program that they felt would increase efficiency and result in greater effectiveness. The following were their top mentions from most to least prevalent:

1. Additional funding
2. Change/improve their existing facilities program
3. Perform a comprehensive facilities assessment to create a data driven plan
4. Additional manpower

The promise of hope for tomorrow is found in items two and three. Both acknowledge the potential to take control from within their organization to make positive changes to achieve more effective results. Unlike the futile request for additional funds, improving their programs based on creating a data driven plan was achievable.

There are those that challenge the need for more funding. Their contention is that there has been gross mismanagement of the appropriate funding. This argument supports the need to focus internally for a solution to the challenges that face the facilities departments. Meaningful change must be organic and come from within the organization.

Through research, it has been found that the cycle of chronic deferred maintenance can be reversed through the implementation of industry best practices. “I wanted to become more intentional and strategic in how we do our work. Using the facility assessment, his team crafted a strategic facility plan. Starting with the most critical needs, the department has been methodically addressing the maintenance backlog and incrementally increasing its percentage of predictive work” (Millan, 2016).

In order to be most effective, it may also be necessary to alter the organizational structure to be more streamlined. As described, this approach will require the commitment of the organization’s leadership. However, to begin the adoption of industry best practices would likely be helpful in the effort to achieve greater efficiency. Based on a study conducted by the author, the industry best practices include (Smith, 2017a):

- The incorporation of technology
- A streamlined organizational hierarchy
- Clear communication amongst all team members
- Accountability
- Qualified management
- Continuing education and training
- Data driven plan
- Efficient use of resources

The necessary next step for those facilities programs who seek improvement is to identify and implement a comprehensive plan that incorporates these effective practices.

**The Proposed Theory**

Over the course of interviews with facilities managers, six challenges were identified that were attributed to the increased ineffectiveness of their programs (see Figure 1).

The overall lack of available funds and/or unstable/absence of fixed funding source for facilities maintenance is the only true obstacle. By the definition, resolution of this issue was external to the organization and therefore classified as an obstacle.

**Obstacles**

**Issue number five:** The overall lack of available funds and/or unstable/absence of fixed funding source for facilities maintenance is the only true obstacle. By the definition, resolution of this issue was external to the organization and therefore classified as an obstacle.

**Challenges**

**Issue number three:** Based on our study, the lack of communication and clear understanding between all associated parties from funding to fixing appears
to be fundamental to all other challenges noted.

Issue one, two and four: These issues could be resolved with a clearly communicated explanation based on data driven requests/decisions.

Issue number six: The diversion of funds to another use, if not politically motivated, is a challenge that can be addressed. The study revealed that 78% of the budget allocation decisions occurred above the position of the facilities manager, with 22% including direction from the governing board. Assuming the decision was not politically motivated, it would stand that data driven requests which are clearly communicated would move toward the prevention of the diversion of funding.

In summary, the two main issues identified (which reflect fundamental needs, and the goal to improving efficiency and effectiveness) are clear communication and the need for data driven requests/decisions. This reflects the findings of the study where managers expressed the need to:

1. Change/improve their existing facilities program (second choice after additional funding).
2. Perform a comprehensive facilities assessment (third choice after additional funding).

As identified, the increased use of technology is paramount to accomplishing the goal as the inherent benefits address both efficiency and effectiveness. The following outlines the attributes of technology in each category.

**Efficiency**
- Communication
  - Clear communication
  - Simultaneous communication
  - Elimination of redundant communications
- Technology
  - Cost management
    - Agility in managing and creating budget/spending plans
    - Timely reporting of funding status
  - Data management
    - Current data management to support data driven planning
    - Historical data capture for future reference and analysis

**Effectiveness**
- Data management supporting clear communication
  - Accountability
  - Informed decision making
- Cost management
  - Clear accounting and assignment of expenses
  - Multi-tiered understanding of comprehensive operating cost
  - Comparative cost analysis of systems versus their term of performance

Despite the benefits of technology, seventy percent of those interviewed expressed concern for its failure
within their working staff due to a lack of training. However, based on those interviewed who exemplified success as facilities leaders, one hundred percent relied heavily on technology to gain departmental efficiency. As a result, the incorporation of technology with the appropriate training and support for the users is perceived to be an essential element in reaching the goal of increased efficiency and greater effectiveness.

Applications of the Theory
Our research clearly supports the positive impact of technology based on a study of the more successful facilities programs. Research further revealed three common explanations for the lack of technology:

- Funding
- Departmental personnel lacked the skills to use technology
- The time and effort to upload the data was prohibitive

In reality, each of these reasons are classified as challenges, none of them are obstacles. Consider the following:

Funding
Once incorporated, technology was found to increase the efficiency of the operation and, in return, the created savings paid back the investment costs. One hundred percent of those interviewed had already implemented similar schemes through the incorporation of energy management systems that were funded from the captured operating savings. Therefore, the practice is familiar and acceptable to their organizations.

Departmental personnel lacked the skills to use technology
The overwhelming majority of facilities managers expressed this concern. Those currently working in facilities maintenance are aging, with reports of the average age between their late 40’s and mid 60’s. While the use of technology can be confusing to those less experienced, software can be designed to be intuitive and very user-friendly. Therefore, this challenge can be overcome (Smith, 2017a).

The time and effort to upload the data was prohibitive
Consider an asset portfolio for a county, city, k-12 educational district, college, or university whose age is approaching one hundred years old. Further consider that records kept are not comprehensive or even accurate. Under these circumstances, the concept of developing a data driven request as the basis of operating an effective facilities program can’t exist. As stated above, the need for data driven plans that are effectively communicated is essential to a successful facilities program. Therefore, the time and effort becomes a necessary means to an end if there is a true commitment for improvement.

In addition, the most successful facilities management programs studied, shared the following philosophies and practices. Those that can be facilitated
through the use of technology are noted as such. Others were noted to be organizational in nature.

Technology

- Clear communication
- Comprehensive asset evaluations as a basis for data driven decisions
- Accountability
- Comprehensive plan
- Technology

Other (Organizational)

- Qualified management
- Stream lined organization
- Outsourcing

As illustrated, technology was found to play a key role in the transition toward greater efficiency. There are technology solutions currently available to the facilities industry. However, according to those surveyed in the author’s study, the key to overcoming the concern for integration within the workforce requires that it be intuitive and user-friendly. Those in the study who were not using a comprehensive facilities software solution, consistently referenced a lack of confidence in the technical ability of their workforce.

A Research-Informed Software Artifact

The following is an example software program that offers a comprehensive solution. Note the functionality of the software as it responds to the industry needs beginning with the most critical concern as a user-friendly platform.

User friendly

The term “windshield” refers to the main screen of a software program and is what you view most of the time. Just as a windshield in a car, you observe the most important issues of your navigation looking forward with occasional reference to the side mirrors or rear view mirror. In other words, you drive looking forward, but pivot to observe and respond to issues that arise which are immediate to your mission.

This concept, when applied to the functionality of software, provides the user with a single screen that offers a comprehensive understanding of their mission at-a-glance. In other words, the majority of their focus is on a single screen from which they control the information and activities required to accomplish their mission.

Data driven basis of management

As previously stated, four of the five challenges reported in the study that prevented the successful management of facilities programs were tied to the absence of data driven communication. The four challenges noted are as follows:

1) Decisions made by those who lacked the expertise in those issues related to facilities management.
2) Lack of understanding of immediate cost (lowest) versus deferred cost (higher).
3) Lack of understanding of far reaching negative impact of excessive deferred maintenance.
4) Funds available for maintenance are diverted to another use (assuming not politically motivated).

Exhibit 1 at the end of the article is the “windshield” as seen by a facilities manager. It offers a comprehensive, at-a-glance representation of their daily responsibilities. Note the organization of the screen. All four of the challenges have been resolved through the functions of data driven historical reporting, data driven current managing of work activities, and data driven budgeting and future planning.

Clear communication

The remaining issue reported in the study that prevented facilities managers from achieving optimum success was clear communication. One hundred percent of those interviewed perceived communication as having a strong positive impact on the success of their facilities management and maintenance program. Responses that included “essential,” “critical,” and “number one priority” were among many others that expressed a true commitment to the need for clear communication. Given this critical need, an effective software solution must enable expedient, and simultaneous communication while eliminating redundancy as the message is delivered to various members of the team (Smith, 2017a).

The featured software solution facilitates clear communication in a number of different capacities with an array that spans from the workers to the governing board, while the subject can be from a simple task to a comprehensive annual report. For clarity, both narrative and photographic media is utilized. Exhibit 2 found at the end of the article depicts the various means of communication offered.

Examples of the variety of reports and the variety of data sorting available are shown in Exhibit 3 at the end of the article. Note the indication that allows for choosing photographs. This election attaches a report, referred to as the work activity report (WAR). This report is created in the background...
Communication with outsourced contactors

Maintaining facilities may require both outsourced contracting and in-house maintenance workers. As shown in Exhibit 4, this software solution includes the ability to manage both. In the case of outsourced work, from the windshield the facilities manager can communicate with contractors for pricing, or other information regarding a scope of work prior to contracting. When the contractor has been selected, data can be entered in the “pop-up” data entry screen as shown. Once entered, this screen disappears from the windshield leaving the most pertinent data of cost remaining. During the course of work, the facilities manager can update the data entry screen. From the same screen, the work is designated complete which is then displayed on the windshield.

The communication with the contractor can be completely managed from the windshield screen. The manager acts on the individual work assignment; meanwhile, the software matriculates the status along the bottom of the screen to provide an at-a-glance budget, cost, and completion status.

The ability for the facilities manager to maintain control of the cost against budget as well as instantaneously review the progress of the annual plan maximizes efficiency in the facilities operation.

As previously stated, reporting can be shared at any time and at a moment’s notice to any member of the team. Additionally, with approved access, other members of the team can log-in for instantaneous information.

Communication among in-house maintenance staff

Within the facilities program, some of the work can be assigned to an in-house maintenance staff. Managing a personnel team efficiently is paramount given the funding restraints in the public sectors. Eliminating redundancy within the communication core is vital to achieving the necessary level of efficiency. To that end, the communication pathway that has been designed within this facilities software solution represents expeditious and simultaneous communication within the team, automatic status update communication to those interested parties, and access by others with approved log-ins (see Exhibit 5).

Summary

In summary, the five most common challenges that were cited by facilities managers during a recent study can and have been shown to be overcome through the use of technology. The solution has been designed for ease of use. Given the wide range of existing levels of comfort within the facilities organization, the demand for a user-friendly solution was absolute. Seventy percent of those facilities managers surveyed expressed concern for their staff’s inability to adapt to the use of technology. However, with the simplicity of a single screen, concern for the challenges of a complex operation have been eliminated. Therefore, with the implementation of an internal training program, supported by on-line tutorials in both video and PDF printed formats, the adaptation to a technology solution can be achieved (Smith, 2017a).

Discussion

Based on a recent study, the top performing facilities manager programs were efficient and effectively utilized technology. Their management was qualified, their work staff was trained, they had developed data driven programs, and their communication throughout the organization was clear and occurred on a regular basis. Further, their organizations were stream-lined. A linear organizational structure establishes certain hierarchy which results in greater accountability with less confusion and conflict. Conversely, those organizations who failed to implement the use of technology to drive their facilities programs struggled for success. Other common char-
acteristics shared by lesser performing facilities programs include deficits in the following areas (Smith, 2017a):

- Training at all levels of staff from the workers to the managers
- A comprehensive data driven plan
- Accurate long-range forecast
- Clear communication
- Linear organizational structure (causing internal struggles for power)
- Accountability for decisions

As a result of implementing the basic solutions as outlined in this research, the great majority of public facilities management programs can be improved. For those cities, counties, k-12 educational districts, colleges, and universities that are too small to organize their programs accordingly, they should consider outsourcing their facilities and maintenance department. This will provide greater control over the cost as variable personnel expense is transferred to a subcontracted service working for a fixed fee. The performance expectation for the outsourced provider should be nothing less than the above described solution. Communication must be clear and based on data driven decisions in order to work efficiently and effectively regardless of the organizational chart.

Conclusions

History has been clear as it indicates an ever growing problem in the facilities management of public assets. Properties have been developed, costs have risen, and funding suffers deficiency and volatility. In a recent study, one hundred percent of the facilities managers thought that funding was their greatest obstacle. They clearly identified their lack of control over the issue, and ultimately suggested that changes in their operating procedures within their programs along with an increased use of a data driven plan would have a positive impact toward greater efficiency, hence effectiveness (Smith, 2017a).

The only response to low revenue is to cut expenses. The option to reduce staff does not exist as the research indicated that sixty-four percent of those interviewed felt as though they already lacked skilled staff. Therefore, the only solution is to increase efficiency in an effort to accomplish more with less.

This paper identifies a means to greatly improve inefficient facilities management programs. Through incorporating user-friendly technology, pathways are created for clear communication that is based on shared data.

Meeting the stated needs of clear communication and a data driven program, there should be immediate and measurable positive impacts. These impacts include greater efficiency within the workforce and a higher level of clarity within the chain of communication, therefore, less confusion and mis-guided decisions. The assets maintenance will move toward the industry standard of 70-80% pro-active work with 20-30% re-active work. Further, the positive impact on the building occupants will enhance their performance which will continue to contribute to the overall improvement in the public facilities arena.

References


Review

This article was accepted under the constructive peer review option. For further details, see the descriptions at:

http://mumabusinessreview.org/peer-review-options/

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Rebecca Smith is president and founder of A.D. Morgan, a construction management and general contracting firm with offices in Tampa, Bradenton, and Lakeland, Fla. Smith and the company received the Ernst & Young Entrepreneur of the Year Award for the State of Florida for the category of construction and real estate (1998). That same year, it received the Tampa Chamber of Commerce Small Business of the Year award. Smith earned a bachelor’s degree in design architecture and a master’s degree focusing on building construction from the University of Florida in Gainesville, Fla. She holds a Class Â General Contractor’s license.
Exhibit 1: Historical Reporting, Current Managing and Future Planning

**Historical reporting**

Single issue – Select detailed report on a single issue that includes: cost, date, who performed work, contact information, associated notes, and photo of work completed.

Single building – Select detailed reports for work needed, budget allocation, work contracted, and summary status.

Portfolio of buildings – Just as a single building, but for a portfolio of buildings (i.e., campus, region, etc.).

**Current managing (activities & budgets)**

Single issue – Manage complete life cycle of a work issue beginning with a data driven need, the intent to allocate funding, the actual contracting of the work as well as the tracking and final status of completion.

Single Building – Manage the progress of funding from a data driven request, to the intent to allocate, to actual contracting, to tracking of the final status both at-a-glance (shown here), or supported with detailed reporting as noted above.

Portfolio of Buildings – As noted for a single building, but will include data for entire portfolio of buildings.
**Future planning**

**Single issue** – A single issue can be identified with funding and work to be completed at a future date. This data can be moved around from the dashboard between: the following fiscal year, five years, ten years, fifteen years, or twenty years. Note, the data appears in summary totals at the bottom of the windshield.

**Single building** – At-a-glance summary of total cost of future or deferred work for five, ten, fifteen, or twenty years. Note, detail reports are available for each time frame.
Exhibit 2: Communication with the Governing Board

Communication to the governing board is driven from the windshield and can include historical, current, or future planning data. All types of reporting are noted in the adjacent diagram along with the associated icon. For each of the topics, a variety of reports are available that include data sorts by work category, building, and by work that has been deferred. For each type of reporting, photographs can be attached for greater clarity. All reports can be emailed directly from the windshield or printed for submittal.
Exhibit 3: Detailed Reporting Source/Option to the Governing Board
Exhibit 3: Detailed Reporting Source/Option to the Governing Board (Continued)
Exhibit 4: Communication with Outsourced Contractors

Communication with outsourced contractors – data entry screen
Exhibit 5: Communication with In-House Maintenance Staff

Communication with in-house maintenance staff

Access to screen for detailed in-house management

Portfolio
- New Project
- Update Project
- Project Status
- Task Status
- Task Log
- Task History

Communication from source / to worker

Auto status alert to source of complaint

Email copy of issue report with photos

Email ‘chat’ between workers

Communication with in-house maintenance staff – email chat

S-10 / #75 Messages

Mark Rhodes - posted at 5/3/2017 7:38 PM
Matt, were you able to test this seal on the window?

Matt Gottlieb - posted at 5/3/2017 7:37 PM
Yes, water tested and it looked good.

Mark Rhodes - posted at 5/3/2017 7:38 PM
Thanks.

* Add New Message

Create Message Clear