Facilities Management: How Public Leadership is Responding to Crisis

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Facilities Management: How Public Leadership is Responding to Crisis

by

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor in Business Administration Department of Graduate Studies College of Business University of South Florida

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Keywords: Facilities Management, Facilities Maintenance, Building Management, Building Maintenance, Deferred Maintenance, Lack of Funding, Growth Cycle, Productivity, Crisis, Assets, Budget Priority, Communication, Knowledge, Strategic Plan, Outsource, Technology, Training, Organizational Structure

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DEDICATION

It is with great appreciation that I extend my sincere thank you to friends, family and business associates who shared their love and support during my journey.
ACKNOWLEDGMENTS

I would like to express my gratitude to the many teachers who led and inspired me to this moment. Special thanks to my Chair, T. Grandon Gill DBA, whose guidance was invaluable. Thanks to Co-Chair Paul Solomon, Ph.D. Joann Quinn, Ph.D., and Timothy Heath, Ph. D. for their counsel and support. I salute my classmates in the inaugural cohort who’s shared intellect, encouragement and humor made this journey invaluable.

Special recognition to the DBA program director T. Grandon Gill, DBA and assistant director Mathew Mullarkey, Ph.D., for developing this program and creating and amazing experience. Lastly, none of this would be possible without the vision and leadership of our Dean, Moez Limayem, Ph.D.
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ABSTRACT

This research presents the results of a qualitative and quantitative investigation to understand the challenges of public sector facilities management and maintenance to include the negative impact of deferred maintenance, its history, the current industry practices and the potential to reverse the negative impact of the current trend.

History has been known to speak loudly, and with accuracy relative to the expansion of public facilities and the challenge to maintain them. The challenge to keep pace with the growing population and the ever-changing requirements for contemporary designs are felt in every sector of our public facilities. Regardless, we, the public trust that those responsible are managing these assets effectively and efficiently. Research indicates that this doesn’t appear to be the case.

This study serves 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 and technology offer new opportunities for organizations to address issues of efficiency that translate directly in a measure of effectiveness. Given the continued outcry for additional funding, it seems that there are challenges that continue to exist despite the innovation offered. This study focuses on those challenges. 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.

This paper also includes 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 throughout an interview process. Fifteen specified data points were addressed, which included questions related to accountability, effective communication, data driven program development, allocation of resources, documentation of work performed, continuous training and education and the use of technology.

In order to reverse the declining momentum, we must first identify the most common areas that challenge facilities managers and understand how they currently address those challenges. This research will address the following questions:

- What do facilities managers perceive to be the greatest obstacles to ensuring their facilities are properly maintained?
- What factors do facilities managers perceive to be the greatest challenge to ensuring sufficient resources are allocated to current maintenance?
- To what degree do facilities managers perceive that more effective communications would positively impact the effectiveness of facilities management and maintenance.

The results of this research presents a comprehensive understanding of the challenges that face public sector facilities leadership teams, the history and creation of excessive deferred maintenance and finally, future opportunities that identifies best practices and presents an artifact that reflects a means to resolve those deficiencies identified within the current facilities management environment.
CHAPTER ONE

A Description of “Public Facilities Management: Moving Toward Crisis”

Note to Reader

Portions of this Chapter have been previously published in the Muma Business Review, 2017,1(14):171-188, and have been reproduced with the permission of the Muma Business Review.

Description

The single greatest asset value of most public entities is their land holdings and facilities. Most would consider it to be unforgivable for any leader to overlook the needs of their greatest asset, yet it happens. Deferred maintenance is a mounting problem that has become insurmountable in some cases. Why is this the case and how did we get here?

Deferred maintenance has been a snowball growing ever larger since WWII and still there are too many public facilities owners who do not have the means (both budgetary and process) to efficiently and effectively manage their facilities’ needs. The high cost of failure ranges from the increased cost of repairs to the increased liability due to injury. Further impact includes shortening of the intended useful life of the building.

For example, on the national level it was estimated that our infrastructure (roads, rails, waterworks and bridges) had a shortfall of $1.6 trillion as of 2007. Then, additional information in
2008-9, indicated our nation’s public school facilities alone required $127 billion just to raise them to a level of ‘good condition’ and $542 billion if alterations and scheduled renewals of existing facilities were included. These costs are staggering; however, when deferred, they rise exponentially and at the same time increase the potential for liability as the facilities continue to deteriorate.

Although unbelievable, this lack of attention to facilities is more common than not. It can be argued that it is not always an intentional deferral due to the lack of funds. In fact, in many cases, deferral can be attributed to the lack of a structured facilities program or even the lack of a true understanding of the facilities’ needs.

This literature review demonstrates:

- Why deferred maintenance was allowed to occur?
- How deferred maintenance has become a ‘standard practice’ given the developing insurmountable backlog, higher costs of maintenance, greater risk and liability and the reduced useful life of the facility.
CHAPTER TWO

A Description of “Facilities Management: How Public Leadership is Responding to Crisis”

Note to Reader

Portions of this Chapter have been previously published in the Muma Business Review, 2017,1(16):199-215, and have been reproduced with the permission of the Muma Business Review.

Description

Imagine yourself as a land baron, the master of a multi-million-dollar property asset portfolio. As the proud owner of such, can you imagine allowing a facilities management program to exist that resulted in a higher cost of ownership, a higher exposure to liability, and a shorter useful life of your investments? It’s unlikely that you would knowingly allow this to occur; but, in fact, you are. The public assets that you see all around you are most likely in the fight of their ‘useful life’ to exist within the current climate of facilities management. Chances are your tax dollars, once invested in assets, are not being spent efficiently or effectively.

This is not a new trend. It began as far back as WWII. The war 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 priority for new construction continued while the responsibility to maintain the existing facilities fell to the back burner as deferred maintenance. Through the years, the 'lag-time' for maintenance has grown as the asset portfolios continue to expand. Beyond the magnitude of simple growth, facilities maintenance is even more challenged as the tax-based funding has become increasingly volatile. At some point, this negative cycle will pass the point of no return.

In this study, a series of interviews were conducted across a wide range of public organizations over the course of four months asked both organizational questions and 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. Within this study, it is our challenge to identify those best practices that currently result in more effective and efficient facilities management. Further, we intended to identify those dynamics that contributed toward undermining success.

For the purpose of comparison and analysis, the complex issue of facilities management was broken into individual components. It was also important to understand the hierarchical structure of the organization to gauge its impact on the program. With this information, the opportunity to create a more efficient and effective facilities management and maintenance program was better understood. This laid the ground work for creating a program that included resolution of the obstacles and opportunity for improved efficiency and effectiveness in the facilities management and maintenance programs.
CHAPTER THREE

A Description of “Failing Facilities Management; There is hope for a better tomorrow”

Note to Reader

Portions of this Chapter have been previously published in the Muma Business Review, 2017,1(17):217-231, and have been reproduced with the permission of the Muma Business Review.

Description

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

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 program 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 was 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 continued to expand.

Based on both the history and the current mounting challenges, the research indicated that it was 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 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 volume of work to increased. The opportunity to solve their greatest challenge 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.
REFERENCES


APPENDIX A

Public Facilities Management: Moving Toward Crisis

By Rebecca Smith, University of South Florida

The single greatest asset value of most public entities is their land holdings and facilities. Most would consider it to be unforgivable for any leader to overlook the needs of their greatest asset, yet it happens. Deferred maintenance is a mounting problem that has become insurmountable in some cases. Why is this the case and how did we get here?

Deferred maintenance has been a snowball growing ever larger since WWII, and still there are too many public facilities owners who do not have the means (both budgetary and process) to efficiently and effectively manage their facilities’ needs. The high cost of failure ranges from the increased cost of repairs to the increased liability due to injury. Further impact includes shortening of the intended useful life of the building.

For example, on the national level it was estimated that our infrastructure (roads, rails, waterworks, and bridges) had a shortfall of $1.6 trillion as of 2007. Then, additional information in 2008-9, indicated our nation’s public school facilities alone required $127 billion just to raise them to a level of “good condition,” and $542 billion if alterations and scheduled renewals of existing facilities were included. These costs are staggering; however, when deferred, they rise exponentially and at the same time increase the potential for liability as the facilities continue to deteriorate.

Although unbelievable, this lack of attention to facilities is more common than not. It can be argued that it is not always an intentional deferral due to the lack of funds. In fact, in many cases, deferral can be attributed to the lack of a structured facilities program, or even the lack of a true understanding of the facilities’ needs. This research will address the following questions:

1) Why is deferred maintenance allowed to occur?

2) How has deferred maintenance become a “standard practice” given the developing insurmountable backlog, higher costs of maintenance, greater risk and liability, and the reduced useful life of the facility?

3) Is there hope for redirecting an asset portfolio that has a failing facilities management plan and is heading toward crisis?

Keywords: Lack of Funding, Growth Cycle, Productivity, Crisis, Asset, Facilities Management, Maintenance Budget, Priority, Communication, Knowledge, Strategic Plan.

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Introduction

Among the many topics that warrant research and study, facilities management and maintenance is near the top of the list titled: Who cares? Engaging a person in a discussion about the challenges that face the facilities management industry is somewhat amusing as you watch their eyes begin looking around the room. They glance at their watch and, at the first opportunity, they shift subjects or worse yet, excuse themselves altogether. They have no idea how these issues impact their life and therefore, have no interest in hearing about them. But, alas, the same conversation held with the owner of an asset portfolio elicits a different level of interest.

This research is pointed toward those who are the owners of high-valued, facilities asset portfolios. Yes, you, the tax-paying general public. This is your asset portfolio being awkwardly managed to the detriment of your interests. This study is intended to bring to light the dim subject of facilities management and maintenance in hopes that more emphasis is placed on properly maintaining your assets with efficiency, and achieving the effective results for which you are paying. Successful facilities management results in lower cost of ownership, less exposure to liability, and a longer useful life of your investments.

Given a refreshed perspective of the importance of facilities management and maintenance, it becomes imperative that we identify those contributing issues that impact the success or failure of the intended mission. As a whole, the overwhelming nature of the process contributes to the lack of action and denies the opportunity for rehabilitation. The sum of the problem must be broken into parts to affect change, and provide opportunity to create a more efficient and effective facilities management and maintenance program.

Methodology

Addressing the research question, we conducted a literature review on the challenge of deferred maintenance within the business of public facilities management. Our approach for the literature review incorporated the following sources: academic databases (Ebsco Business Search Premier), the business press and building industry trade to gain insight from an industry perspective, published government studies, Google and Google Scholar, and references in articles cited. We used keywords in various combinations to include: facilities management, deferred maintenance, pent up maintenance demand, school funding for maintenance, facilities budget, and infrastructure funding. The results of the search formed the basis of this study. Most of the research found was in the business press, industry publications, and government studies (see Tables 1 through 6).

Table 1: Funding decision made by those who lack expertise on issues related to facilities management

<table>
<thead>
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  a) Stop building new assets without first examining the budget for life-cycle costs, including regular maintenance.  
  b) Measure the condition, account for the maintenance needs, and adopt a financial reporting standard that emphasizes asset management.  
  c) Budget for maintenance equal to two percent of asset replacement value and create a reserve fund.  
  d) Execute improved maintenance practices including mandating the use of asset management systems.  
  e) Reward managers and department heads with additional funding if they take a responsible approach to asset management (page 2). |
| Postal, L. (2012, January 13). Statewide shortfall likely to halt school building plans. *Orlando Sentinel*. | • "It has become necessary for difficult decisions to be made on which projects may be funded and which must be discontinued at this point in time," Gov. Rick Scott said in response to the $250 million shortfall in funding. |
Table 1 (Continued): Funding decision made by those who lack expertise on issues related to facilities management

<table>
<thead>
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<tbody>
<tr>
<td>Payton-Jones, K. (2014). A matter of time: Perspectives on deferred maintenance. <em>American School and University.</em></td>
<td>&quot;In K-12 schools, there is a direct correlation between the condition and cleanliness of the school and grades, attitudes, absenteeism&quot; (page 14). The national institute of building sciences did a study that shows poor building conditions definitely impact teaching and learning (page 14). At the end of the day people need to understand what happens when you reduce the budget. How quickly do the buildings deteriorate? How many more days are people missing because they are getting sick? … What is the cost for that&quot; (page 15)?</td>
</tr>
<tr>
<td>Filardo, M. (2016). State of our schools: America's K-12 facilities 2016. <em>Washington, DC: 21st Century School Fund.</em></td>
<td>At its heart, school facility quality is a matter of equity, and responsible planning for the future requires that we have better information about the condition of our nation's schools (page 2). A large and growing body of evidence demonstrates that school facilities have a direct impact on student learning, student and staff health, and school finances. Despite this too many students attend school facilities that fall short of providing 21st century learning environments because essential maintenance and capital improvements are underfunded (page 3). Are districts and states investing the capital funds necessary to ensure their public schools are educationally appropriate, energy efficient, and environmentally responsible (page 3)? Do states and districts have adequate operating funds for cleaning, maintenance, and repairs to ensure buildings and grounds are healthy and safe (page 3)? Are states and the federal government doing enough to ensure equity in education, so all students have access to healthy and safe school facilities that support learning (page 3)? This report identifies four key strategies for addressing the structural deficits in K-12 public education infrastructure (page 4). Recommendations: First, understand current facilities conditions. Second, engage communities in planning for adequate and equitable 21st century facilities. Third, fund and pilot new innovative sources of public funding. Finally, leverage public and private resources.</td>
</tr>
<tr>
<td>Millan, N. (2016). Rising star in Texas. <em>Building Operating Management,</em> 22-27.</td>
<td>What would you do with a million dollars?… He used the resources to perform an exhaustive assessment of every facility in the portfolio and create a facility condition index rating (page 22). The first priority was getting a handle on the situation. The city was mired in $450 million backlog of deferred maintenance (page 24). &quot;...the ballpark was 96 percent reactive. The industry best practice is 80 percent predictive and 20 percent reactive…. I wanted to become more intentional and strategic in how we do our work.&quot; Using the facility assessment, his team crafted a strategic facility plan (page 24). Starting with the most critical needs, the department has been methodically addressing the maintenance backlog and incrementally increasing its percentage of predictive work (page 24). Working closely with the mayor and a key council member, Minnix helped to create a line item in the city’s budget to address maintenance, renewal, and repair (MRR) of municipal buildings (page 24). Minnix values the MRR fund for how it symbolizes the city’s commitment to improving its municipal structures (page 25).</td>
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Table 1 (Continued): Funding decision made by those who lack expertise on issues related to facilities management

<table>
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</table>
| Millan, N. (2016). Rising star in Texas. Building Operating Management, 22-27. (Continued) | • The nature of municipal facilities management presents many challenges besides the simple fact that everything one does is up for public scrutiny (page 25).  
• One challenge is the influence of politics (page 25).  
• We have to spend a lot of time and resources in trying to get buy-in, so that we are all pulling in the same direction (page 25).  
• Once you get down to the City's infrastructure, items like roads used by millions of people every day are higher on the list than the city buildings (page 25). |

Table 2: Lack of understanding of immediate cost (lowest) versus deferred cost (higher)

<table>
<thead>
<tr>
<th>Source</th>
<th>Findings</th>
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</table>
| Westerling, D., & Pofrak, S. (2007). Our legacy of neglect: The Longfellow Bridge and the cost of deferred maintenance. White Paper, 40, 1-36. | • For any asset, there is a 40% drop in quality over 75% of its lifetime, which is followed by a more precipitous drop in the final quarter in the asset's life (page 13).  
• Deferred maintenance is the compounded effect of deferring maintenance from one year to the next. The cost of deferred maintenance in year one will increase significantly in every subsequent year (page 13).  
• DeSitter's law (law of fives) estimates that if maintenance is not performed, then repairs equaling five times the maintenance costs are required (page 13).  
• A model was created that showed how sustained investment would have reduced the overall cost of owning the Longfellow Bridge for the past hundred years (page 13).  
• No matter which entity is responsible, every state asset suffers from the same treatment. We fail to adequately budget for maintenance; even worse, we actively create perverse incentives that discourage state managers from maintaining state assets. Any maintenance spending from an agency's operating budget reduces funds available for programs. The postponement of routine maintenance maximizes operating funds available in the current year, but also hastens the failure of capital assets. The eventual failure of the assets results in an emergency disbursement of capital funds, which are under the Division of Capital Asset Management's (DCAM) control, and do not impact the agency's operating budget. Thus, managers who spend money on maintenance are in effect penalized for trying to maintain their assets. |
| Lawrence, B. K. (2003). Save a penny, lose a school: The real cost of deferred maintenance. Rural Trust Policy Brief Series on Rural Education | • Preventative routine maintenance can extend the life of any facility and, therefore, is a good investment.  
• Deferring maintenance is very expensive.  
• Deferring maintenance reduces air quality, causes breakdowns in infrastructure and mechanics, and creates higher energy consumption, which leaves even less money available for maintenance (page 9). |
• Due to a history of national underinvestment in school facilities, school districts have struggled to keep up with basic maintenance and repairs, renewals, and alterations. The delay of these important responsibilities has led to a backlog of critical projects in many districts, which can trigger emergency repairs and higher expenses (page 12). |
Table 2 (Continued): Lack of understanding of immediate cost (lowest) versus deferred cost (higher)

<table>
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<tr>
<td>Filardo, M. (2016). State of our schools: America’s K–12 facilities 2016. Washington, DC: 21st Century School Fund. (Continued)</td>
<td>• If school districts do not renew their building systems and components on a timely schedule, then deferred maintenance will accumulate, costs for annual maintenance and repairs will rise, and poor basic building conditions will compromise the benefits of alterations for program or capacity adjustments (page 22).</td>
</tr>
</tbody>
</table>
| Carlson, S. (2008). As campuses crumble, budgets are crunched. The Chronicle of Higher Education, 37(15), A1.                  | • If colleges can’t support their existing buildings, yet continue adding new ones, Carlson says, they risk operating in what the facilities industry calls, “run to failure mode,” in other words, running the building into the ground (page 2).  
• Patching a water line might cost $10,000 but replacing that same line would cost $900,000—the motivation to patch is driven by the realities of the budget (page 2). |
| Payton-Jones, K. (2014). A matter of time: Perspectives on deferred maintenance. American School and University.              | • Seventy percent of maintenance costs should be preventative or planned maintenance, and 30 percent of maintenance costs should be emergency maintenance. Unfortunately, in most cases the opposite is true (page 13).  
• “People often use the phrase ‘pay me now or pay me later.’ But when it comes to deferred maintenance it needs to be changed to pay me now or pay me more later” (page 15). |

Table 3: Lack of communication and clear understanding between all responsible parties from funding to fixing

<table>
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<tr>
<td>Carlson, S. (2008). As campuses crumble, budgets are crunched. The Chronicle of Higher Education, 37(15), A1.</td>
<td>• The more specific, or transparent, you can be about stating your needs, whether it be to a board of regents or a state department of administration, the more effective you will be at getting the funds you need (page 4).</td>
</tr>
<tr>
<td>Payton-Jones, K. (2014). A matter of time: Perspectives on deferred maintenance. American School and University.</td>
<td>• Understanding the cost of deferred maintenance and being able to articulate the cost to the boards and committees that will take the next steps to obtain taxes, state help, and/or fundraising is essential for facilities administrators (page 14).</td>
</tr>
<tr>
<td>Hunter, R. C. (2009). The public school infrastructure problem: Deteriorating buildings and deferred maintenance. School Business Affairs, 75(2), 10-14.</td>
<td>• “After each inspection, I completed a school data sheet and developed photo albums illustrating the condition of each school building. The photographs became a valuable tool in presenting evidence to the federal court about the condition of each school building during testimony” (page 13).</td>
</tr>
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</table>
Table 3 (Continued): Lack of communication and clear understanding between all responsible parties from funding to fixing

<table>
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</thead>
</table>
| Millan, N. (2016). Rising star in Texas. *Building Operating Management*, 22-27. | • “I have to continually be able to paint that picture,” Minnix says. “I have to be really in tune to my people, but also be in tune to the political framework that runs this city and be able to share with them what exactly is going on. I have to stay consistent with a message, and I have to do it on a regular basis. It’s not a one-time, ‘I told you. I have to continue playing my music on a regular basis and they’ll start to listen’ (page 25).  
• Besides being in tune with the top levels of city government, Minnix says he makes it a point to connect with the leaders of individual departments from the parks to the libraries to the head of the animal shelter, to understand their day-to-day needs. “You really need to understand the operational needs of everyone you serve” (page 25).  
• One of the first and best things he brought to the department is collaborative teamwork (page 27).  
• He started weekly strategy meetings and reorganized the General Services Dept. to be more collaborative, creating smaller individual workstations with lower partitions heights and greater communal collaborative space (page 27).  
• “My job is not to do their job. When the leader leaves to do the work, there is nobody up front leading” (page 27).  
• Minnix says he can give his team autonomy, and he keeps them accountable for that autonomy (page 27).  
• “When my guys connect to how important it is that the rollup door opens at a fire station, not because it’s an operating door and should work, but because they’re trying to save lives, my guys work differently” (page 27).”  
• “Because they’re connected to this something that’s greater than a wrench and electrical wires. I think our role as leaders has to be to be able to do that whole process. You have to be in tune to your folks, you have to help them develop this mastery. You have to connect them to autonomy and accountability. And you have to connect them to their passion and purpose” (page 27). |

• Good practice calls for enhancing these basic building standards to also extend to the responsibilities of states and districts to reduce the accumulation of deferred maintenance in school buildings, and deliver facilities that support changing instructional methods, technologies, and community needs (page 22). |

Table 4: Far reaching negative impacts due to excessive deferred maintenance

<table>
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| Payton-Jones, K. (2014). A matter of time: Perspectives on deferred maintenance. *American School and University.* | • There is a direct correlation between the condition and cleanliness of the school and grades, attitudes, and absenteeism (page 15).  
• The National Institute of Building Sciences did a study that shows that poor building conditions definitely negatively impact teaching and learning. |
Table 4 (Continued): Far reaching negative impacts due to excessive deferred maintenance

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</table>
| Lawrence, B. K. (2003). Save a penny, lose a school: The real cost of deferred maintenance. *Rural Trust Policy Brief Series on Rural Education* | - Practice recommendations that directly affect maintenance  
- Require regular annual inspection by a certified engineer of conditions in school facilities as they affect health and safety  
- Require state assessment of facilities by an independent evaluator every five years (or whenever a major change to the facility is proposed)  
- Not only does deferred maintenance affect the health and safety of those who use the facility as well as the performance of teachers and students, it also threatens the school itself (page 16).  
- Deferring maintenance reduces air quality, causes breakdowns in infrastructure and mechanics, and causes higher energy consumption, which leaves even less money available for maintenance. The condition of poorly maintained facilities can affect the health and safety of children and adults who use them, as well as their morale and academic performance.  
  a) Impacts on staff and student morale  
  b) Effect of poor conditions on morale  
  c) Impacts on student learning  
  d) Effect of poor conditions on student achievement (page 11)  
- The most frequently cited negative effects (of poor working conditions) were:  
  e) Absenteeism  
  f) Reduced levels of effort  
  g) Lowered effectiveness in the classroom  
  h) Lower morale  
  i) Reduced job satisfaction (page 11) |

Table 5: Overall lack of available funds and/or unstable/absence of fixed funding source for facilities maintenance

<table>
<thead>
<tr>
<th>Source</th>
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</table>
  There is no statewide plan in place to stop the problem from growing worse. |
| Lawrence, B. K. (2003). Save a penny, lose a school: The real cost of deferred maintenance. *Rural Trust Policy Brief Series on Rural Education* | - School districts across the nation are dedicating a smaller percentage of available funds to maintaining and operating the facilities that house America’s youth (from 9.0% in 1993 to 7.4% in 2003) (page 7).  
- The deficit in maintenance spending is likely to get worse as federal mandates for health and safety standards have absorbed money that might have funded maintenance and renovations projects.  
- Few states fund routine maintenance of school facilities, and instead assign this essential responsibility to the local district. Few states even support bonds for maintenance, leaving poor rural communities with limited resources and few alternatives (page 12).  
- 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 (page 7). |
### Table 5 (Continued): Overall lack of available funds and/or unstable(absence of fixed funding source for facilities maintenance

<table>
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<tr>
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<tr>
<td>Carlson, S. (2008). As campuses crumble, budgets are crunched. <em>The Chronicle of Higher Education</em>, 37(15), A1.</td>
<td>• Donors don’t typically want to put their names on pieces of sewer pipe, so the un-glamorous, but very necessary maintenance money usually comes out of the operations budget (page 2).</td>
</tr>
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</table>
| Hunter, R. C. (2009). The public school infrastructure problem: Deteriorating buildings and deferred maintenance. *School Business Affairs*, 75(2), 10-14. | • The condition of the district’s buildings was a direct reflection of the long-standing lack of community support, which was evidenced by the community’s refusal to approve a tax increase for 25 years (page 13).  
• The deterioration of public schools’ buildings is more prevalent in large cities because funding shortfalls have deferred maintenance, and the cities now require huge sums to bring buildings up to acceptable standards (page 12).  
• In Kansas City, this was the case until the judge issued his order (page 13).  
• This district operated under the supervision of a federal court, which ordered the development of a long-range capital improvement plan (page 13). |
| State University System of Florida (2012). *Report to the Florida Board of Governors.* | • “We have a crisis in infrastructure funding amidst State University System institutions” (page 1).  
• The State University System currently relies on state Public Education Capital Outlay dollars—or “PESCO”—as the primary source of both the university construction and building maintenance. However, for the past three years, PECO funding has seen dramatic reduction—dropping from $600 million in 2008 to $7 million today, and projected to 30 in 2013 (page 3). |
| Star Tribune (2007). Get ready for higher infrastructure costs; America’s deferred maintenance tab runs into the trillions. *The Minneapolis Star Tribune.* | • China spends 9 percent, Japan 10 percent, and India 3.5 percent of their gross domestic product on infrastructure. The comparable U.S. figure is 0.93 percent.  
• When it comes to infrastructure, America is more of a follower and no longer a world leader. The United States is on the cusp of a crisis.  
• When the nation’s state transportation officials were asked in a survey whether their infrastructure was capable of meeting state needs in the next 10 years, 83 percent said, “No.” |
| Schweers, J. (2016, January 11). Florida public education budget choice teachers or buildings. *Tribune/Naples Daily News Capital Bureau.* | • “It’s a zero sum game because we take money away from general revenue, and it has to come from somewhere,” said Senator Don Gaetz. |
| Postal, L. (2012, January 13). Statewide shortfall likely to halt school building plans. *Orlando Sentinel.* | • State officials do not yet know which project will be hurt because money entering the Public Education Capital Outlay fund (PECO) has dwindled and looks to keep dropping through 2013.  
• In Florida, 67 school districts received no PECO funds this year and only limited allocations in the past few years, so they are likely to have fewer project on their books relying on that pot of money.  
• “It has become necessary for difficult decisions to be made on which projects may be funded and which must be discontinued at this point in time,” Gov. Rick Scott said in response to the $250 million shortfall in funding. |
Table 5 (Continued): Overall lack of available funds and/or unstable/absence of fixed funding source for facilities maintenance

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<tr>
<td>Postal, L. (2012, January 13). Statewide shortfall likely to halt school building plans. <em>Orlando Sentinel</em>. (Continued)</td>
<td>• PECO raises money through taxes on utilities, then bonds most of it and uses the proceeds to pay for school construction projects. But revenues into the fund have declined to the point where the state cannot issue new bonds.</td>
</tr>
<tr>
<td>GAO Reports. (2008, October). <em>Federal real property; Government’s fiscal exposure from repair and maintenance backlogs is unclear</em>.</td>
<td>• We have to report that our nation’s fiscal policy is on an unsustainable course.</td>
</tr>
<tr>
<td>Dixon, M. (2013). Fund decline puts universities in a bind; Money from telecommunications and electricity has shrunk recently. <em>Florida Times Union</em>.</td>
<td>• University presidents are asking lawmakers again for new ways to pay for construction. • University and K-12 education projects are both funded by the Public Education Capital Outlay (PECO) money, which is made up of taxes on electricity and certain telecommunications. Those taxes have taken a hit in recent years—in part because of increased electricity efficiencies, and the growth of the internet and prepaid cell phone plans, which are not included.</td>
</tr>
<tr>
<td>Filardo, M. (2016). State of our schools: America’s K-12 facilities 2016. <em>Washington, DC: 21st Century School Fund</em>.</td>
<td>• Do states and districts have adequate operating funds for cleaning, maintenance and repairs to ensure buildings and grounds are healthy and safe (page 3)? • Because capital construction is largely financed by local school districts, the poor lending climate and reluctance to burden taxpayers at the recession had a striking impact on spending (page 16). • Additionally, while funding to support facilities M&amp;O combines local, state, and federal sources—all M&amp;O competes with other essential aspects of school district operations, such as salaries and instructional equipment, which also need to be paid for through the same general operating budget. Therefore, school districts, especially those low-wealth districts that have not been able to spend needed capital constructions funds to make major repairs to their buildings, are put in a position where they must stretch their general operating funds to try to make up the difference (page 18). • The federal government helped build the country’s public education infrastructure with funding through the Works Progress Administration in the 1930’s and then again in the post-World War II era with funding from the National Defense Education Act. But during the two decades studied in this report—except for a $1.2 billion emergency school repair initiative in the 2001 federal budget directed to high-need districts and public schools with high concentrations of Native American students—the federal government provided virtually no support for states and districts capital responsibilities for public K-12 school facilities (page 20). • Industry facilities spending standards: Current Replacement Value (CRV)—these standards are derived by estimating the lifespan of the facility and the cost to build a new one (page 23). • A general industry standard for facility M&amp;O (all facilities, not just schools) indicates that building owners should expect to spend a minimum of 2 percent of the CRV annually (page 25).</td>
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Table 5 (Continued): Overall lack of available funds and/or unstable/absence of fixed funding source for facilities maintenance

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<tr>
<td>Filardo, M. (2016). State of our schools: America’s K-12 facilities 2016. Washington, DC: 21st Century School Fund. (Continued)</td>
<td>- To systematically reduce the accumulation of deferred maintenance, states and districts will have to spend at least an additional 1 percent of CRV on deferred maintenance annually over the next 10 years in the highest-needs schools. At the end of the 10 years, the steady level of spending coupled with adequate capital renewals, would reduce the estimated deferred maintenance burden from $271 billion to $81 billion. In order to fully resolve the backlog of deferred maintenance, further investment beyond 1 percent of the CRV annually will be required (page 23). If we as a nation continue to rely primarily on the local property tax, we cannot expect better results (page 29). - Many states have been working to find dedicated revenues to support facilities in their local districts (page 29). - To more fully leverage public facilities investment, a new generation of structures, funding streams, and partnerships will be needed. Leveraging these investments means finding ways to use land and building assets to raise and save funds, such as public-private and public-public development partnerships, revolving loan funds, social impact investing, and other scalable and sustainable financing solutions (page 30).</td>
</tr>
<tr>
<td>Millan, N. (2016). Rising star in Texas. Building Operating Management, 22-27.</td>
<td>- Houston is growing, but Houston is constrained by a city budget cap, which puts a hard ceiling on the amount of revenue it can bring in from its growing population. Like many other cities, it is currently delaying with a looming pension crisis, and Minnix is acutely aware that his budget is a public trust and every dollar must go to the greatest good (page 25).</td>
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Table 6: Funds available for facilities maintenance are diverted to another use.

<table>
<thead>
<tr>
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<tr>
<td>Filardo, Mary (2016). State of Our Schools: America’s K-12 Facilities 2016</td>
<td>- It is important to note that investments in one area can have a major impact elsewhere. For example: if a district does not undertake the cleaning or the required routing and preventative maintenance, then major building systems and components will not last as long as designed.</td>
</tr>
<tr>
<td>Millan, N. (2016). Rising star in Texas. Building Operating Management, 22-27.</td>
<td>- As time has elapsed since the master plan was put in place, stakeholders start agitating for lower-priority projects. While Minnix is focused on addressing safety and MEP concerns, the community wants a pretty building with a fresh coat of paint. And then there’s always the elevator that conks out just before another major project is supposed to launch—yet constituents have a hard time swallowing the idea that budget dollars won’t stretch far enough to cover both. “That’s just the world we live in as the facility manager,” Minnix says. “Every facility manager has to deal with that reality. It’s just different when it’s in the public eye” (page 24). - The nature of municipal facilities management presents many challenges besides the simple fact that everything one does is up for public scrutiny (page 25). - One challenge is the influence of politics (page 25). - We have to spend a lot of time and resources in trying to get buy-in so that we’re all pulling in the same direction (page 25). - Once you get down to the city’s infrastructure, items like roads used by millions of people every day are higher on the list than the city buildings (page 25).</td>
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</table>
Table 6 (Continued): Funds available for facilities maintenance are diverted to another use.

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<thead>
<tr>
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<tr>
<td>Hunter, R. C. (2009). The public school infrastructure problem: Deteriorating buildings and deferred maintenance. <em>School Business Affairs</em>, 75(2), 10-14.</td>
<td>• Our nation must take major steps now to address the school infrastructure problem before it worsens. Clearly, it is easier to defer maintenance and to put these problems off for future generations (page 14).</td>
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Discussion

The existing information regarding public facilities management and maintenance is somewhat telling. While there are nuances that differ between the various sectors of public facilities owners, there are many obstacles to efficiency and effectiveness that are shared.

As a result of studying the past and current industry data, individual themes have emerged that are common contributors to significant obstacles that challenge the success of facilities management. These obstacles are identified in Figure 1.

Each of these obstacles are widely discussed amongst those in the public sector facilities management industry. To that end, some have reported positive impact to their facilities program as they address these obstacles. Each of the issues are discussed:

Decisions Made by Those Who Lack Expertise

Decisions are being made by those who lack expertise regarding the overall issues related to facilities management. Whether it is a county commission board, city council, state government, or an educational school board, chances are likely that there aren’t construction or facilities experts on the board with a vote that drives asset management decisions. This situation creates a void where informed votes are essential. It is vital that continuing industry expertise be available to highlight the importance of facilities management and maintenance, and offerings from third party reports have not shown to have the necessary impact within the decision making arena. According to the information identified in this study, regardless of outside input from staff

![Figure 1: Challenges and Obstacles of Facilities Management](image)

*Image of a diagram showing challenges and obstacles of facilities management*
or industry experts, based on their ultimate vote it appears that those members making the funding decision lack a clear understanding of the need to prioritize funding for their facilities maintenance.

As an example: An incoming director in one of our nation’s largest cities, clearly understood the need to have complete support along with the votes from his leadership’s hierarchy, and made it an early goal to educate his board to understand how critical a quality facilities management program was for their city. He knew that without their support, he would fail. Regardless of how effective his strategic plan was, he needed their vote and their financial support to execute it successfully.

The city of Houston’s general services manager said it best when he noted that one of his biggest challenges is the influence of politics. Making constituents happy is the political mission of the board which may not align with the critical need of the city’s facilities. In order to defend the needs of the city’s facilities, he developed a plan that included a comprehensive presentation of the scope of work required throughout the city. He also prioritized, organized and made clear to them—his strategic plan. In other words, the manager understood the need to “sell” his bosses about facilities management, making them aware, and thus able to focus on the priority to maintain their facilities proactively with certain and consistent funding (Millan, 2016).

Another example cites the Longfellow Bridge which for decades suffered the results of the community’s leadership which, regardless of reports from the industry experts, deferred maintenance that ultimately sank to a level of crisis. The state of Massachusetts suffered a devastating loss as a result of decisions made to defer maintenance of an aging bridge. It was noted that the postponement of routine maintenance hastened the failure of the bridge that was outwardly showing signs of age and distress. Frustration mounted as it became apparent that engineering reports describing the urgent maintenance needs had been solicited and presented to the governing body without resulting in the appropriate actions necessary to address the critical conditions of the bridge (Westering & Pofuk, 2007).

Here is a bit of history that will illustrate a series of events that, to this day, is not unusual in the “political practices” of the public arena. The Longfellow Bridge was built in 1907 and was the center of great political fanfare. According to Westering and Pofuk (2007), “Festivities included a parade, an invitation-only lunch, a grandstand with 2,000 ticketed guests, a program of speeches and evening fireworks” (p. 5).

In 1959, fifty-two years after the political fanfare, some areas of the bridge were reconstructed with decks of reinforced concrete. Decades later, in 2002, at the age of ninety-five the bridge underwent repairs. However, despite the needs cited in the engineering report, approximately one-third of the $3.2 million repair was spent on non-structural issues including sidewalks, lighting and the removal of graffiti. The bridge was re-inspected in 2006 which spawned a complete renovation which began in 2013, was scheduled to be completed in 2016, and is now projected to be completed no earlier than 2018.

During the phase of investigation and thereafter, statements of frustration were made with regard to the absence of acting on a pro-active maintenance program for the bridge. This failure to act in a timely fashion is believed to have contributed to the catastrophic situation that is woefully over budget and years behind schedule (Westering & Pofuk, 2007).

Westering and Pofuk (2007) stated that the deferment of maintenance was caused by a number of factors that included an “unwillingness to prioritize maintenance over new projects” as well as “political incentives that discourage spending on maintenance... The result is a wasteful shortening of service life, a dysfunctional asset construction scheme, and ultimately, diminished quality of life for the Commonwealth’s citizens” (Westering & Pofuk, 2007).
ure forces us to fund emergency repairs” (p. 30). Thus, over the course of decades the governing board chose to defer the necessary maintenance on the Longfellow Bridge which, in hindsight, cost the citizens exponentially more money, not to mention the delays in commuting and the loss of productivity in all areas of the surrounding community. Westerling and Pofrak (2007) state, “The postponement of routine maintenance maximizes the operating funds available in the current year, but also hastens the failure of capital assets. The eventual failure of the assets will result in an emergency disbursement of capital funds” (p. 1).

According to Westerling and Pofrak (2007), “Deferred maintenance is the compounded effect of deferring maintenance from one year to the next, the cost of deferred maintenance in year one will increase significantly in every subsequent year” (p. 1). Studies have been conducted to establish a general guideline for the negative impact to facilities that are subject to chronic deferred maintenance. As an example, “DeSitter’s law, law of fives”, estimates that if maintenance is not performed, then repairs equaling five times the maintenance costs are required” (Westerling & Pofrak, 2007, p. 13).

Westerling and Pofrak (2007) found, “People often use the phrase, ‘pay me now or pay me later’, but when it comes to deferred maintenance it needs to be changed to ‘pay me now or pay me more later’” (p. 15). Refer to Figure 2 to see the impact of deferred maintenance.

Given the well-documented, negative impacts that include increased cost associated with emergency repairs and poor basic facility conditions, it seems illogical that any governing body would allow excessive deferred maintenance to exist within their facilities. Could it be that those making the decision to defer maintenance simply don’t understand the negative impact?

**Problems Ranging from “Funding to Fixing” the Facilities**

There is a lack of communication and clear understanding between all associated parties from “funding to fixing” the facilities. A pertinent question regarding these problems is: What would you do with a million dollars? Those words are inspiring. What a great way to begin the dream of lifting the fog created by obstacles that interrupt a quality facilities management program. Imagine if all your

---

*Figure 10: Condition vs Age Curve for General Assets showing the Effects of Maintenance Activities on the Condition of the Asset (Source: Based on Roberta Reese’s GASB Reporting Model from July 13, 2006 ASCE/USACE Workshop on Condition Assessment)*

*Figure 2: Deferred Maintenance Leads to Poor Condition of Assets*
obstacles were suspended for a moment, and you could focus on eliminating one of the most chronic problems (i.e., communication) that plagues most organizations—clear communication begets clear understanding of the issues across the entire team. It is no secret that miscommunication leads to failure. Stated overall goals aren’t met because the individual’s goals aren’t aligned. Without question, poor communication results in the failure of the targeted mission.

According to Millan (2016), in Houston, Texas, when the question was asked of their incoming director of general services, “What would you do with a million dollars? … he used the resources to perform an exhaustive assessment of every facility in the portfolio and create a facility condition index rating” (p. 22).

Millan (2016) states the director found the city was in a highly reactive mode, responding to immediate building maintenance needs 96% of the time. The industry standard goal for building maintenance is 20% reactive and 80% proactive. The challenge to gain control of the quality, cost, and liability was overwhelming. His decision was to use his million dollars to create a firm footing through an exhaustive facilities assessment. This proved to be very successful as he moved forward. Not only did the assessment provide him with a clear understanding of the comprehensive needs, it provided a platform of data that became his basis of communication with the board, the very group of decision makers whose responsibility it is to support and fund his facilities program.

Communication and buy-in of the plan must include the full spectrum of participants in a facilities management hierarchy. Whether it be those who fund the program or those who ultimately fix the facilities, clear communication is critical. Each must understand the overall mission and their part in achieving the goal. Millan (2016) quotes the director who attributes, “Working closely with the mayor and a key council member, (he) helped to create a line item in the city’s budget to address maintenance, renewal, and repair of municipal buildings” (p. 24). However, he also understood that in order to complete his mission successfully, he had to carefully communicate the goal to his staff and their workers. In summary, he made the comment, “I have to be really in tune to my people, but also be in tune to the political framework that runs this city and be able to share with them what exactly is going on. I have to stay consistent with that message and I have to do it on a regular basis” (Millan, 2016, p. 25).

Through the use of clear communication based on a data-driven strategic program, the city of Houston was able to make great strides from 96% reactive work to 65-70% reactive work over the course of about five years. The director stated, “That plan has been driving the organization for the last five years. So now everybody in the organization has a clear direction on where we’re trying to go” (Millan, 2016, p. 24).

In agreement, Carlson (2008) stated in a report, “The more specific or transparent you can be about stating your needs, whether it be a board of regents or a state department of administration, the more effective you will be at getting the funds you need” (p. A1).

A common theme indicates that clear communication of the facilities’ needs is critical to successful facilities programs. Without complete understanding, governing boards may unknowingly make wrong decisions as they prioritize their budget allocations. The resulting lack of funds for maintenance may be attributable to a lack of clear communication that doesn’t convey the need to those making the funding decisions. “Understanding the cost of deferred maintenance and being able to articulate that to the boards and committees that will take the next steps to obtain taxes, state help, and/or fundraising is essential for facilities administrators” (Payton-Jones, 2014, p. 15).

Could a lack of clear communication between all associated parties explain the decision to detrimentally deferred maintenance?

Far-reaching Negative Impacts Due to Excessive Deferred Maintenance

Within a failing facilities management program there are many levels of the operation that are affected. Certainly, the basic building quality becomes diminished, but beyond the accelerated decline of the asset’s useful life, there are other measurable negative impacts.

First, there are additional resulting impacts from a failing facilities program that further exhaust underfunded budgets. For example: increased liability can become a costly result as lawsuits are filed for personal injuries that may be attributed to a poorly maintained facility and its surroundings. Not only is the cost of the litigation and the settlement claim un-budgeted, the exponentially higher cost of emergency repairs that result from the incident aren’t budgeted either. The entire unscheduled expense takes precedence, thus creating a domino effect that draws money from other budgeted line items, leaving that...
previously funded work, deferred. This vicious cycle, once started, is difficult to turn around.

Further, there is the emotional and psychological impact that failing facilities create. The impact on educational facilities has been studied. Take public school facilities, for example. According to Lawrence (2003), “Deferring maintenance reduces air quality, causes breakdowns in infrastructure and mechanics and higher energy consumption which leaves even less money available for maintenance. The condition of poorly maintained facilities can affect the health and safety of children and adults who use them, as well as their morale and academic performance. The most frequently cited negative effects (of poor working conditions) were:

a) Absenteeism  
b) Reduced levels of effort  
c) Lowered effectiveness in the classroom  
d) Lower morale  
e) Reduced job satisfaction” (Lawrence, 2003).

In stated agreement, Payton-Jones (2014) noted that, “There is a direct correlation between the condition and cleanliness of the school and grades, attitudes, absenteeism.” Additionally, “The National Institute of Building Sciences did a study that shows that poor building conditions definitely negatively impact teaching and learning” (p. 14).

When the decision to chronically defer maintenance is made, is there consideration given to these and other far-reaching impact issues?

**Overall Lack of Funds and/or Unstable/Absence of Fixed Funding Sources**

There is an overall lack of funds and/or unstable/absence of fixed funding sources for facilities maintenance. As with all failures, a struggle to identify ground zero ensues. Whether the focus is city, county, state, federal, K-12 or university facilities programs, they all share a woeful report of lack of available funds.

Payton-Jones (2014) states, in 1996 a "study of facilities conditions at US college and universities estimated at that time that there was $26 billion in accumulated deferred maintenance, $5.7 billion of which pertained to urgent needs” (p. 13).

While according to Carlson (2008), in 2005, the American Society of Civil Engineers said, "American infrastructure is in dire shape and estimated that the country needs to spend $1.6-trillion to bring it up to good condition" (p. A1). In GAO Reports (2016), the GSA reported that, "at the end of 2015 it had over $1.2 billion in deferred maintenance and repair work that was categorized as needing to be performed immediately to restore or maintain the building inventory in acceptable condition” (p. 1).

In Florida, the university and K-12 educational community relies heavily on PECO (public education capital outlay) funds for their capital outlay money. These funds are derived from two fixed utility sources, taxes on the land-line communication telephone system and taxes on electricity. Unfortunately, land-line telephones have become somewhat obsolete over the last years and electric consumption has decreased due to operating efficiencies. While each changing dynamic offers some benefit to our society, there is an unintended and devastating negative funding impact to the PECO fund. Postal (2012) stated that recently, in the state of Florida, Governor Rick Scott said, “It has become necessary for difficult decisions to be made on which projects may be funded and which must be discontinued at this point in time” (p. 1).

At that same time, the State University System of Florida (2012) states in a report to the Florida Board of Governors, “we have a crisis in infrastructure funding amid State University System institutions.” Further reporting in the Florida Times Union by Dixon (2013) cited a drop from $600 million in 2008 down to $7 million in 2012 all with a projection of $0 in 2013. That same year, Dixon stated, “that with a dried-up source of money and an inventory of buildings in need of repair, university presidents are asking lawmakers again for new ways to pay for construction.”

Currently, according to Lawrence (2013), there has been no resolution to the ever-growing need to increase the budgets to maintain our public assets. “Few states fund routine maintenance of school facilities, and instead assign this essential responsibility to the local district. Few states even support bonds for maintenance, leaving poor rural communities with limited resources and few alternatives” (p. 13).

Regardless of the fact that: “preventative routine maintenance can extend the life of any facility and therefore, a good investment,” states feel justified in delegating the responsibility to the local level (Lawrence, 2013, p. 8). Lawrence (2013) continues, “Unfortunately, school districts on average have decreased their investment in maintaining facilities,” leaving the facilities programs in an even more critical situation (p. 8).
Public Facilities Management

Further, the fixed sources of funding are not yielding the funds necessary in education, and both local and state tax based revenue is not able to meet the demand. Special tax assessments have been approved regionally responding to the outcry from their governing leaders. However, facilities management continues to move toward crisis conditions in many areas.

Circumstances have become so dire in some cases that in 2009, Hunter (2009) found the schools in Kansas City were in such disrepair that, "the district operated under the supervision of a federal court, which ordered the development of a long-range capital plan..." (p. 12).

In the face of having a solid facilities program that includes a data driven strategy and the systems in place to implement it—how can it possibly work if the funding just isn’t available?

Funds Available for Facilities Maintenance Are Diverted to Another Use

Funds that are available for facilities maintenance are frequently diverted to another use. It is not uncommon to find that deferred maintenance is the result of diverted funding. Those who are responsible to allocate funding for the facilities management program are often elected to office and feel compelled to act in the interest of politics rather than in the interest of their facilities.

Once again, the decision to defer the maintenance on the Longfellow Bridge came at a high price. Decades passed and countless millions of dollars flowed through their budgets while engineering reports requesting maintenance went unfunded. It wasn’t until recently, when the community was forced to react in crisis mode, that emergency funding was put in place—costing the tax payers exponentially more.

The desire to build a new facility and celebrate its completion clearly outweighs the motivation to fix an un-glamorous underground sewer.

Conclusions

Through the research conducted, we can bring forward an understanding of three basic questions:

1) Why is deferred maintenance allowed to occur?

2) How has deferred maintenance become a “standard practice” given the developing insurmountable backlog, higher costs of maintenance, greater risk and liability and the reduced useful life of the facility?

3) Is there hope for redirecting an asset portfolio that has a failing facilities management plan heading toward crisis?

The focus group of this study was public owners that held large asset portfolios including: cities, counties, universities, and K-12 districts. They were reviewed based on the commonality of being funded through tax revenue and controlled by public governing boards. This provided for similarities in the structure of the organization, the sourcing of funds, and the exposure to public activities.
Why Is Deferred Maintenance Allowed to Occur?

Given the negative impacts of higher cost, increased liability, and a shorter useful life of their facilities, why would organizations choose to defer maintenance? Six common issues were identified that contribute to the problem of deferred maintenance:

1) Decisions are being made by those who lack expertise in the overall issues related to facilities management.
2) There is a lack of understanding of the negative impact to the overall facilities program between immediate cost (lowest), versus the deferred cost (higher).
3) There is a lack of communication and clear understanding between all associated parties from “funding to fixing” the facilities.
4) There are far-reaching negative impacts due to excessive deferred maintenance.
5) There exists an overall lack of funds and/or unstable/absence of fixed funding sources for facilities maintenance.
6) Funds that are available for facilities maintenance are diverted to another use.

Payton-Jones (2014) notes, “not all deferred maintenance need is bad, but we want to be conscious about what we are deferring. For example, if a school is considering a major renovation it may make more sense to defer certain projects in order to get better life out of its systems” (p. 14).

In other words, a deliberate decision to defer maintenance on a facility as a pro-active response to a master plan can sometimes be the best choice. It is when chronic deferment is chosen as a reactionary plan that facilities management begins to creep out of control which is when the real challenge begins. Deferred maintenance carries forward the same needs but with even greater urgency and most probably higher cost.

How Has Deferred Maintenance Become a Standard Practice?

How has deferred maintenance become a “standard practice” given the developing insurmountable backlog, higher costs of maintenance, greater risk and liability, and the reduced useful life of the facility? Deferred maintenance suffers from a snowball effect. Once it begins, it is not remedied in the near term, the money and effort to regain control of the assets grows to become insurmountable. As noted, deferred maintenance can be the result of any one or a combination of the issues above. What seems to be the inevitable end result in most cases, is a perpetual struggle for these public institutions to stay ahead of the facilities’ needs, and prevent the assets from entering into a crisis state.

Funding plays a major role in the perpetuation of the practice of deferred maintenance. It seems that once the facilities reach a state of great disrepair the management enters into crisis mode, with a common outcry of "more money." Hence, the challenge of public institutions—the need for money is not always met with the granting of money. Public organizations are driven with funds that are tax based, even if bonded. Therefore, there is not a steady income upon which to forecast; in fact, the income fluctuates with the economy. On the other hand, public facilities are mostly used all year, every year, regardless of the economy; so the needs of the facilities remain constant. One can argue, as the buildings age, the cost of ownership increases.

Westerling and Poftak (2007) state, “For any asset, it is expected that there is a 40 percent drop in quality over 75 percent of its lifetime, followed by a more precipitous drop in the final quarter of the asset’s life” (p. 13).

Deferred maintenance suffers from a snowball effect. Once it begins... the money and effort to regain control of the assets grows to become insurmountable.

To make matters even more challenging, Carlson (2008) states, "If (asset owners) can’t support their existing buildings, yet continue adding new ones, they are operating in what the facilities industry calls, run to failure mode—in other words, running buildings into the ground” (p. A1). Because of the evolution of facilities management programs that slip into the vicious cycle of owning buildings that are in disrepair, the costs of maintenance increases, liability increases, and the buildings useful life is shortened. The snowball effect hastens. According to Carlson (2008), "it’s a shell game—we are constantly moving money around, trying to deal with the latest crisis. As bad as it is now, it truly is coming to a place where something has to give” (p. A1).

Redirecting Asset Portfolios That Have Failing Facilities Management Plans

Is there hope for redirecting an asset portfolio that has a failing facilities management plan heading toward crisis? There is hope. As a whole, the issue of a failed facilities management program is overwhelming, and out-paces the opportunity for rehabilitation. The sum of the problem must be broken into its parts, and a strategic plan needs to be established in order to affect change. With a strategic plan, the opportunity to create a more efficient and effective
facilities management and maintenance program exists.
Within the literature reviewed, there were examples of facilities that were heading toward, or completely in crisis mode. Their turn-around was based on the development of a strategic plan founded on measured data, that was clearly communicated to all participating members of the entire team with full buy-in, and a strong commitment to disallow deviation from the plan. There must be a dedicated effort to resist all unnecessary expenditures, and stay focused on accomplishing the goals set forth by the strategic plan.
There are, however, factors that can’t be controlled—such as the obstacle of funding. The strategic plan must be designed to withstand such unforeseen conditions. However, in no way can the plan (with funds available) suffer alterations that result in the deferral of required facilities maintenance work. This is the very action that created the snowball that began to roll in the first place.

References
Dixon, M. (2013). Fund decline puts universities in a bind; Money from telecommunications and electricity has shrunk recently. Florida Times Union.


Review
This article was accepted under the constructive peer review option. For further details, see the descriptions at: http://mubusinessreview.org/peer-review-options/

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Facilities Management: How is Public Leadership Responding to Crisis?

By
Rebecca Smith

History has been known to speak loudly and with accuracy relative to the expansion of public facilities and the challenge to maintain them. The challenges to keep pace with the growing population and the ever-changing requirements for contemporary designs are felt in every sector of our public facilities. Regardless, we, the public, trust that those responsible are managing these assets effectively and efficiently. Research indicates that this doesn’t appear to be the case.

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 and 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.

This study also serves as a measurement against the historical performance of public facilities declining momentum, we must first identify the most common areas that challenge facilities managers, and understand how they currently address those challenges. This research will address the following three questions:

- **RQ1**: What do facilities managers perceive to be the greatest obstacles to ensuring their facilities are properly maintained?
- **RQ2**: What factors do facilities managers perceive to be the greatest challenge in ensuring sufficient resources are allocated to current maintenance?
- **RQ3**: To what degree do facilities managers perceive that more effective communications would positively impact on the effectiveness of facilities management and maintenance?

Facilities management has become increasingly challenging over the years. Given our history of catastrophic failures, why do public facilities continue expanding past our ability to responsibly maintain them?

Keywords: Lack of Funding, Growth Cycle, Productivity, Crisis, Asset, Facilities Management, Maintenance Budget, Priority, Communication, Knowledge, Strategic Plan, Outsource, Technology, Training

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Introduction
Imagine yourself as a land baron, the master of a multi-million-dollar property asset portfolio. As the proud owner of such, can you imagine allowing a facilities management program to exist that resulted in a higher cost of ownership, a higher exposure to liability, and a shorter useful life of your investments? It’s unlikely that you would knowingly allow this to occur; but, in fact, you are. The public assets that you see all around you are most likely in a fight of their “useful life” to exist within the current climate of facilities management. Chances are your tax dollars, once invested in assets, are not being spent efficiently or effectively.

This is not a new trend. It began as far back as WWII. The war 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 priority for new construction continued while the responsibility to maintain the existing facilities fell to the back burner as deferred maintenance. Through the years, the “lag-time” for maintenance has grown as the asset portfolios continue to expand. Beyond the magnitude of simple growth, facilities maintenance is ever more challenged as the tax-based funding has become increasingly volatile. At some point, this negative cycle will pass the point of no return.

A series of interviews conducted across this wide range of public organizations over the course of four months asked both organizational questions and 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. Within this study, it is our challenge to identify those best practices that currently result in more effective and efficient facilities management. Further, we intend to identify those negative dynamics that contribute toward undermining success.

For the purpose of comparison and analysis, the complex issue of facilities management must be broken into individual components. It is also important to understand the hierarchical structure of the organization to gauge its impact on the program. With this information, the opportunity to create a more efficient and effective facilities management and maintenance program can be better understood.

Review of Research
Through a literature review, six elements were identified as common areas of concern across the spectrum of public facilities that included: counties, cities, k-12 educational districts, universities, and colleges. While there are nuances that differ between the various sectors of public facilities owners, there are many shared obstacles to efficiency and effectiveness.

![Challenges / Obstacles of Facilities Management](image)

Figure 1: Individual themes emerged as common contributors to significant obstacles & challenges.
Methodology
The subjective issues were discussed during face-to-face interviews that ranged from 60-90 minutes. Each interview was transcribed and mapped based on fifteen specific discussion points. Next, all interview opinions were captured and sorted based on each of the fifteen points. Discussion was encouraged. Following the analysis of each interview, the mapped data was combined from all sources based on each of the fifteen discussion points to distinguish similarities, differences, and trends toward success, or failure, to manage an efficient and effective facilities department.

Most common obstacles to an efficient and effective facilities management program
As a result of studying the facilities management industry, individual themes emerged as common contributors to significant obstacles and challenges. These six issues are identified in Figure 1. Each of these issues is widely discussed amongst the public-sector facilities management industry. To that end, some have reported positive impact to their facilities program as they address these issues, thus qualifying them for further investigation as to their cause and potential remedy. Figure 2 (following page) depicts these six issues noting a more detailed outline of contributing and related factors.

Facilities management departmental structure within the organizations
To further understand facilities management, a general hierarchy of public organizations has been diagrammed. Based on the findings of the study, three options have been outlined that depict different relationships between facilities and maintenance. This includes immediate departmental organizations and immediate leadership up the chain of command.

The components that make up the facilities management division generally include the overall facility management department (operation, renovation, and expansion) and the maintenance department (scheduled and unscheduled maintenance work). It was observed that separate leadership for each of these departments was variable; however, appeared loosely aligned based on the size of the organization. Figure 3 illustrates a completely separate facilities department from the maintenance department. Each director reports to a different supervisor, who then reports to the organizational leader, who ultimately answers to a governing board. This is the most independent organizational model.

Figure 3: Organization style 1 – Parallel with shared leader, once removed
Figure 2: Contributing factors to obstacles and challenges
Smith

Figure 2 (Continued): Contributing factors to obstacles and challenges
Figure 4: Organization style 2 – Parallel with shared leader

Figure 4 illustrates a completely separate facilities department from the maintenance department (as in diagram 1); however, each director reports to the same supervisor, who then reports to the organizational leader, who ultimately answers to a governing board. This organizational model represents some consolidation of leadership.

Figure 5: Organization style 3 - Streamlined

Figure 5 illustrates a facilities department whose director oversees the maintenance department. As a result, there is a single point of command for the facilities and maintenance activities. This organizational model achieves the most streamlined hierarchy through the facilities and maintenance organization.
The study revealed that organizational hierarchy played a role in the facilities' programs relative to their operational agility, quality of communication, and efficiency. This will be further discussed throughout the findings.

**Typical activity life-cycle within the facilities management and maintenance department**

A basic understanding of the maintenance process and the "forces" that act upon it will assist in the overall understanding of the complexities that facilities managers face. Figure 6 depicts the life-cycle of work activities that pass through facilities management and maintenance departments, along with the objective and subjective forces that act upon them. There are five steps beginning with the identification of the work item (issue). From there, funds must be captured (funding request), a decision made to allocate monies for the work item from within the overall budget (budget allocation), and then the work is assigned (assign work) and finally resolved (issue resolved). The process is somewhat basic. It is linear, progressive, and repetitive. The complexities are noted in the surrounding text and include the myriad of forces that are the source of the challenges and obstacles to efficient and effective facilities management and maintenance.

**Findings**

During the study, current practices of facilities management programs across the public sector were identified. Interestingly, each program was individualized in nature; however, the research focused on reports regarding the above six challenges during the interviews. General conversation was encouraged; as other information was shared that offered further insights into their facilities management programs.

**Decisions are being made by those who lack expertise regarding the overall issues related to facilities management.**

Overall, there was broad discussion regarding a lack of understanding relative to the challenges within the facilities department. Absent this expertise, the situation leaves a void where informed votes are essential.

**Governing Level**

Unfortunately, for those elected officials who make up the governing boards, the requirement for facilities management expertise cannot be mandated. Considering the importance of their greatest asset, their properties, it would be helpful and highly recommended that they be "schooled" in the overall issue of facilities management as they assume their position on the board. A general understanding of the fiscal value, the challenges, and the negative im-
Impacts associated with owning public facilities would be helpful in supporting judicious funding decisions. To further their understanding, expert presentations and supporting documentation should accompany each voting action.

Over 60% of those interviewed expressed concern for a lack of expertise in the decision-making process. The most successful facilities programs include a close relationship between the manager, their supervisors, and their governing boards. One of the more successful facilities managers pointed out that data-driven requests forced objective decisions as they matriculate to the governing level. Therefore, subjectivity is reduced, if not removed, from the execution of an effective facilities management plan.

**Leadership Level**

In some cases, it was reported that funding decisions at the board level rely heavily on the data submitted in the budget request prepared by the director of facilities, the director of maintenance, and most probably compiled and reviewed by their supervisor(s). Therefore, it is possible that the lack of expertise regarding the overall issues related to facilities management and maintenance could occur at the leadership level.

Further down in the organization, the practitioner level (directors and supervisors), a lack of expertise was also reported. Based on this study, it was not uncommon for these positions to be filled through internal promotion. For those more successful facilities programs, it was observed that past experience in similar managerial positions provided a better foundation to meet the challenges of managing a large facilities portfolio. In comparison, based on the interview data, those managers who lacked previous high level managerial experience reported greater frustration that appeared to represent a lack of confidence to comfortably control the issues.

In addition to basing their program on data-driven requests, regardless of the level in which it exists, the remedy for a lack of understanding is continuing education for those who currently occupy the positions.

There is a lack of understanding of the negative impact to the overall facilities program between immediate cost (lowest) versus the deferred cost (higher). Chronic deferred maintenance exemplifies the "snowball effect." Broad consensus amongst those interviewed agreed that the longer required maintenance "rolls" from one year to the next, the larger the issue, and the related cost, becomes. The costs compound rapidly and add to the struggles felt from limited budgets. Add to this the volatile income levels from year to year, and these mounting costs can have devastating impacts. There has been mention that the cost of repairing a system not properly maintained is five times more expensive. Emergency repairs are even more costly. Given the exponential impact to the budget, it is hard to imagine that this would be an acceptable practice at any level, let alone facilities valued at hundreds of millions of dollars.

In one case, the deferred maintenance had become such a problem that reportedly, during the annual evaluation of the facilities, the facilities manager started the meeting with, "What school is falling the worst? Okay, let's start there and do what we can."

With regard to the adage "pay me now or pay me later," it seems that "pay me now or pay me more later" is more the case for facilities maintenance (Payton-Jones, 2014). The argument to operate a pro-active maintenance program is strong. Previous research identified the industry standard to be 70-80% pro-active maintenance (based on cost) with 20-30% reactive maintenance. Two-thirds of those interviewed indicated a high percentage of reactive maintenance and, therefore, less pro-active maintenance.

In one case, it was reported that a single roof replacement cost was $1,000,000...the low bidder was not the same for each phase, the warranty on early roofs were negated due to conflicts, the quality of work was inconsistent, and there was no accountability moving forward. The work was broken into phases over a period of years to align with the available funds. The result was disastrous—the low bidder was not the same for each phase, the warranty on early roofs were negated due to conflicts, the quality of work was inconsistent, and there was no accountability moving forward.

This finding mirrors that noted in a recent research review, which included a diagram that depicts the exponential increase in cost that results from deferred maintenance (shown in Figure 7). As is evident, the impact to a limited budget can result in potentially devastating consequences. One of the most successful facilities managers interviewed was clear on this issue when reporting his number one priority is serving the tax paying community by maintaining their facilities, period. Other issues within the organization that affected expense were a distant second in his consideration for spending. Unless and until he had met all of the requirements of the facilities, he refused to defer work.
With the organizational hierarchy in mind, this and other issues matriculate from the facilities leadership through other leaders until it is presented to the governing board for final decision. It is, therefore, important to address each of the levels to reflect the information gathered in the study. The potential for misguided decisions can occur at any level. We have identified in general terms, the “governing board” and “leadership level” (a person of higher authority than the facilities manager).

_Governing Board_

Again, as an elected board, it is not a condition of election that members have acute knowledge of facilities management and maintenance; however, they certainly should be expected to grow their understanding once elected. As a public leader, the study reflects it is imperative that they can identify high-cost, high-liability issues and become effective stewards of the asset portfolio. Conducting workshops, meeting with the organization’s “experts” and their risk managers, would have an immediate impact on their understanding of the negative impacts of fostering chronic deferred maintenance as it grows more expensive and offers greater liability over time. There is no escape, there is only greater risk and expense.

In one case, it was reported that the conversation with the Board ultimately ended with an ultimatum that requested funding for an immediate roof repair that had already been patched for years against continued delay and an ultimate demolition of the school due to the compounding negative impacts of a leaking roof.

_Leadership Level_

The leadership levels referred to here are those within the organizational hierarchy above the facilities manager. Generally speaking, the leadership level responsible for meeting the budget was found to be most sensitive to the impact of chronic deferred maintenance. The facilities managers reported a clear understanding; however, those in higher leadership positions were split regarding their expression of concern. Those leaders who worked more closely with the facilities managers expressed a greater understanding of the impact. Reported experience confirmed that as the number of emergencies grows, the dollars are shifted and the anticipated “scheduled” work loses funding. Thus, there was a premium cost to reactive maintenance drawn from their budget at a higher rate that starves funding from the currently required pro-active maintenance activities, which then pushes them toward deferral as well. This domino effect resulted in a stated sense of futility. Clearly, based on the data of both increased cost and decreased motivation within the facilities department, this downward spiral has to be avoided.
For all members in the facilities' hierarchy, it is incumbent that they understand how vital a healthy facilities program is to their overall success and existence. Therefore, establishing a goal that follows a best practice of no more than 20-30% reactive maintenance becomes critical. The negative impacts are far too great not to develop a level of expertise that supports such a goal.

While the majority of facilities managers were sensitive to the increased cost of emergency maintenance and could identify the associated negative impacts to their maintenance program, the study revealed a general knowledge of the best practice standard of no more than 20-30%. For the most part, each interview discussed their plan to improve, but did not cite their existing performance level, nor did they refer to a measurable goal.

There is a lack of communication and clear understanding between all associated parties from "funding-to-fixing" the facilities.

The most successful facilities managers described a system that featured the use of clear communication based on a data-driven strategic program. Further, the data serves as the basis for the necessary credibility required to defend the needs of the facilities. Therefore, it seems that many of the failing programs would benefit by the implementation of this practice.

Two components were identified as necessary to achieve clear communication. First, the plan has to be based on facts; existing conditions, historic activities, and future expected outcomes. Second, the means of communication must be clear. The data can be accurate, but if the message isn't conveyed clearly, then the needs of the facilities program may go unmet.

A common theme among those interviewed was that clear communication expressing the facilities' needs was critical to successful facilities programs. It was mostly agreed that without a complete understanding of the issues, both governing boards and leadership may unknowingly make wrong decisions as they prioritize their budget allocations. This research confirms that the resulting lack of funds for maintenance may be attributable to a lack of clear communication that doesn't convey the needs to those making the funding decisions.

The "vehicle" of communication found in the more successful programs was achieved through the use of a technology solution. It can be a system developed and reported using "old fashioned" spreadsheets and narratives, or it can be a simple oral presentation with supporting documentation. In any case, if the needs are clearly understood, it can be deemed successful communication.

The challenge mounts against the effective use of "old fashioned" spreadsheets and simple oral presentations as a means of communication as many decades have passed since WWII. Reportedly, asset portfolios have grown to meet the increased needs of the population, and the lack of accurate records and data make the task of establishing a new beginning very challenging. Again citing the more successful programs, effective impact within their facilities is based on the integrated use of technology that is part of a comprehensive solution. Technology offers expedited data-sorting, record-keeping, and task management. In order to move forward an efficient and effective facilities program, it is likely that some level of technology must be incorporated.

The question becomes, how much technology does it take? Should there be a complete adoption of a comprehensive facilities software program, or will simple integration of supporting technology be sufficient? These questions become complex as you consider the skill set range of the affected user group.

**The implementation of a comprehensive facilities software program meets with resistance. The most prevalent reasoning involves the wide range of technical skills.**

**Comprehensive Facilities Software Programs**

A comprehensive facilities software program offers automation that drives greater efficiency. Technology provides internal tracking, data sorting, and historical record keeping, and relieves these needs from staff, thus allowing them time to perform other non-technical duties. It also supports the full life-cycle of facilities management from data capture to managing the execution of activities and, finally, using automation toward a more proactive alert system focused on preventative maintenance.

Based on the information gathered in this study, the implementation of a comprehensive facilities software program meets with resistance. The most prevalent reasoning involves the wide range of technical skills held within the facilities and maintenance staffs. Often discussed was the disparity in age within the maintenance staff. The average age of the workers appears to be mid-to late 40’s to early 60’s. While this group possesses a very high skill level regarding maintenance work, they are less comfortable with technology; some even threaten to quit when pressed to learn basic skills. Conversely, the younger population is more likely to have technology skills; however, they are not proficient with the construction skills of the older generation. Further, it was
widely reported that hiring within that age group was difficult due to the lack of interest in facilities maintenance work. Many contributing factors were discussed including low wages. The public sector has historically been able to overcome lower wages by offering higher benefits; however, this is no longer the case and therefore, the hiring pool has greatly diminished.

Regardless of the contributing considerations, the most effective and efficient facilities management programs resulted, in part, from a comprehensive technology plan. Each had worked over time to educate their existing workforce, through training programs, to bring their technology skills and comfort level to an effective level of performance.

**Manual Programs with Some Integrated Software Support**

The majority of the subjects interviewed reported that some technology was interspersed within their manual facilities operations. It appears technology was included, but was limited to the functions where the staff was willing and able to utilize it. For example, simple Excel spreadsheets for data reporting or work order task management programs were incorporated. Interestingly, at the level of the administrator, the work order program management was automated; however, in many cases, the process was converted to a manual operation for interface with the work staff as work orders were printed to paper.

The result of this simple integrated approach was reported to have some positive impact to the facilities and maintenance operation; however, it was agreed there is room for improvement. Again, much of the conversation centered around the work force and their reluctance to use technology. The leadership expressed continued concern for the incoming work force or, more importantly, the lack thereof. To many, trading a lack efficiency for possessing the capabilities in the field was the better choice.

**There is a lack of understanding that there can be far-reaching negative impacts to building occupants’ performance and morale due to chronic deferred maintenance.**

Within a failing facilities management program there were many levels of the operation found to be affected. Certainly, the basic building quality becomes diminished, but beyond the accelerated decline of the asset’s useful life, there were other measurable negative impacts. For example, increased liability can become a costly result as lawsuits are filed for personal injuries that may be attributed to a poorly maintained facility and its surroundings. Not only was the cost of litigation and settlement claim un-budgeted, the exponentially higher cost of the emergency repair resulting from the incident is also not factored into the budget. The entire unscheduled expense takes precedent, thus creating a domino effect that draws money from other budgeted line items, leaving previously funded work deferred. Reportedly, this vicious cycle, once started, is difficult to turn around.

Further, there is the emotional and psychological impact failing facilities create. The impact on educational facilities has been studied. Take public school facilities, for example. It has been reported that reduced air quality and breakdowns in the infrastructure and operating systems create an overall condition of poorly maintained facilities. To confirm our findings, recent studies have shown that these conditions have an effect on the building occupants in both their academic performance and their morale (Lawrence, 2003). The most frequently reported of these negative effects were:

- Absenteeism
- Reduced levels of effort
- Lowered effectiveness in the classroom
- Lower morale
- Reduced job satisfaction

This study revealed a heightened attention to the exterior building appearance at the time of public events and media attention, so as not to convey the appearance of a diminished maintenance program.
Public Facilities Maintenance

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Figure 8: Sources of funding by sector

Once again, heightened awareness of these far-reaching negative impacts must be part of any successful facilities program. This can be achieved at all levels within the organization from the governing boards to the maintenance workers with clear, data-based communication. This approach was reported in the most successful programs to prioritize appropriate resources to remedy the problems and eliminate the negative impacts.

Overall lack of funds and/or unstable/absence of fixed funding source for facilities maintenance

One-hundred percent of those interviewed expressed the need for additional funds; however, a small percentage of well-run programs wanted to fund their wish list more than their basic responsibilities. Ground zero for 85% was lack of funds, unstable funding, and an absence of fixed funding. The exceptional facilities operations, approximately 15%, felt more comfortable with their budgets. Their shared commonalities included: outsourcing, a well-trained staff supported by continuing education programs, and strong management leadership who developed data-driven programs, and clearly communicated to their leadership and governing boards.

One hundred percent reported heavy reliance on tax based revenue, and all of the sectors experienced some level of negative impact based on funding. The Figure 8 chart depicts a summary of the reported potential sources for funding in each sector. As described, not all potential funding sources are producing revenue. Additionally, some others require regional referendums approved by the tax payers.

Reportedly, the most hard-hit sector in this study, relative to a lack of funding, was educational—mostly k-12 districts with colleges right behind them. The k-12 sector relies on state funding supplemented by county taxes, which, as noted above, vary based on the local voters.

The educational sector has long relied on the PECO (public education capital outlay) fund for a steady stream of revenue to maintain and renovate their facilities. The available state funding source has been hard hit by the fluctuating economy, the increased demand resulting from growth, and the near loss of the stable funding source known as PECO funds. PECO was the dedicated fund that supported the maintenance and renovation of facilities. These funds are derived from two fixed utility sources, taxes on the land-line communication telephone system and taxes on electricity. Unfortunately, land line telephones have become somewhat obsolete over the past years, and electric consumption has decreased due to operating efficiencies. While each changing dynamic offers some benefit to our society, there is an unintended and devastating negative funding impact to the PECO fund. To date, no other fixed funding source has been identified to replace those dollars.

To further complicate the facilities management challenge, research revealed the distribution of PECO funds, in part, relies on the “growth” of the district. For smaller districts that are not reporting growth, the result is devastating. In 75% of this sector, it was reported that PECO funds dropped exponentially over the past five years. In one case funding went from a couple of million dollars down to zero, leaving the district struggling for a means to maintain their facilities. This dramatic revenue impact was also reported by others interviewed. The result—mounting deferred maintenance. In some cases, it was noted that the state had abandoned their responsibilities and left the districts to seek other sources of funding on their own. This in light of the fact that the k-12 districts have no power to tax or raise additional funds outside of working with their county governments.

Unlike the other sectors studied, the k-12 sector is bound to respond to its population growth. It is mandated by the Florida state law through maximum classroom size standards. Another consideration is the age of the facilities’ users. Colleges and universities host adult populations who have flexible schedules with classes being held from 8 a.m. to 10
p.m. They also have the opportunity to limit admissions, which can control growth. But still, they have a fixed asset portfolio that requires maintenance, and the costs increase from year to year as the facilities age. The loss of PECO funds has resulted in similar negative impacts; however, colleges and universities have more flexibility from other funding sources, including private donations, as well as autonomous decision power on how and when to use their facilities.

It was noted that cities and counties have the greatest flexibility regarding the expansion of their facilities programs. While there is a need to maintain their facilities, there are many opportunities to utilize their existing space more efficiently before making the decision to build additional space. However, regardless of this flexibility, they work from tax-based revenue and, as mentioned previously, the amount of funding relies on the fluctuating economy. It is important to mention that municipalities have other dynamics that affect their budgetary spending on their building facilities. They are responsible for infrastructure, such as roads and utilities, as well as providing for public safety. These responsibilities are vulnerable to the communities’ growth. The result often times is special assessments to the taxpayers such as street light assessments, storm water assessments, fire assessments, etc., indicating the desperation of communities to keep pace with their expanded responsibilities and asset portfolios. When the overall budget is faced with increased demand to serve these needs, the impact is felt in the facilities maintenance operation. It was reported that elected officials lean toward prioritizing their municipalities’ services, such as fire, transportation, and utilities. Some members of the facilities management community cited the concern for re-election as the basis of decision, noting that the voters don’t necessarily have or share an opinion of performance based on the condition of municipal buildings. As a result, it becomes incumbent on those in facilities management to fight for resources to meet the demands of their asset portfolios.

Another option reported for municipalities is to issue bonds based on future income and anticipated growth. This provides cash flow to address current responsibilities, but the monies will be repaid with interest in the future. Given the possibility that the economy doesn’t grow as anticipated, this approach can be risky. However, with the immediate challenges met, this practice is adopted as a routine solution to the challenges faced. In some cases, the bonded money was directed to provide additional revenue to the k-12 community. As a note, bonds do not require support from the tax payers.

Municipalities also have the opportunities to levy additional sales taxes, ad valorem taxes, gas taxes, etc.; however, the tax payers must vote to adopt them. Like bonded revenue, sales tax revenue can be directed to support the k-12 funding needs. Given these facts, there is no surprise to the finding that funding sources across all sectors are not sufficient. To date, the fixed sources of funding are not yielding the funds necessary in education, and both local and state tax based revenue is not able to meet the demand. Special tax assessments have been approved regionally, responding to the outcry from their governing leaders; however, facilities management continues to move toward crisis conditions in many areas. Understandably and based on simple logic, as our communities grow, we add facilities to meet the needs, which results in an expanded portfolio that requires maintenance whose costs increase with aging.

On the other hand, it has been said that maybe there is a spending problem, not a revenue problem. If true, many dynamics come into question including, and most of all, measures of efficiency in operations and critical planning based on data driven information that establishes priorities.

The desire to build a new facility and celebrate its completion clearly outweighs the motivation to fix an un-glamorous underground sewer. Funds that are available for facilities maintenance are diverted to another use.

It was not uncommon to hear that deferred maintenance is the result of diverted funds. In many cases, those who are responsible to allocate funding for the facilities management program are often elected to office, and feel compelled to act in the interest of politics rather than in the interest of their facilities.

As explained, the attraction to divert facilities maintenance funds is clearly understood. The desire to build a new facility and celebrate its completion clearly outweighs the motivation to fix an un-glamorous underground sewer. This also holds true for those who are donating to institutions.

In some cases, not all of the funds are diverted, instead an abbreviated scope of work is funded for less cost, while the remaining funds are redirected. This simply delays the inevitable need which becomes more critical as time passes.

There were reported cases when deferred maintenance was used to balance a budget against other high priority needs. The temporary repair was justified; however, when this approach is used for other lower level priority work, it can lead to a fa-
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cilities program in crisis. If this practice becomes standard operating procedure, the potential to work under emergency-funding circumstances exists, and the result can be a domino effect moving toward failure.

In this study, the influence of elected officials serving their personal interests was cited, but not widely discussed at the level of being high on the list of challenges to the facilities managers. It appeared that misappropriation of funds may have resulted more from a lack of communication and understanding from the facilities managers and leaders up to the governing boards.

In either case, the decision to divert funds can occur at both the governing board level and in the leadership level depending on the level of empowerment which is unique to each organization. Regardless of what level directs the diversion of funds, it is vitally important that there is accountability. As stated, in some cases, diverting funds is warranted, and those should be substantiated and documented with full accountability assigned to whom made that decision. By implementation of this practice, there is potential to curtail politically driven decisions that serve individual agendas, not that of the organization or the facilities department.

Discussion

To begin, the focus group of this study was public owners that held large asset portfolios including: cities, counties, colleges, universities, and k-12 districts. They were reviewed based on the commonality of a tax funded revenue, control by a public governing board, and subject to public activity.

This study revealed a number of clear messages regarding facilities management and challenges faced by the managers as they pursue their responsibility to efficiently and effectively maintain the assets to maximize their intended useful life.

First, in response to the research questions, the study presented the following information.

RQ1: What do facilities managers perceive to be the greatest obstacles to ensuring that their facilities are properly maintained?

In this study, an obstacle was defined as an issue the facilities management team felt they couldn’t change. Without question, funding was the number one stated obstacle. Eighty-five percent of those interviewed spoke at length regarding the lack of funds, and how much of an impact it made on their facilities management and maintenance program. The others mentioned a desire for additional funding, but, unlike the 85% noted, their reasoning was to enhance already successful operations.

The following is a list of the most common effects resulting from the lack of funding:

- Building maintenance activities couldn’t be completed to meet the expected level of quality or completeness, which resulted in a general sense of failure leaving all parties with feelings of frustration.
- Lack of the required skilled personnel due to limited wages offered.
- Lack of training programs and continuing education that were available within the organization.
- Lack of systems such as management technology including software solutions along with the hardware to support it.
- Inability to purchase and maintain necessary equipment to perform their jobs.

RQ2: What factors do facilities managers perceive to be the greatest challenge in ensuring that sufficient resources are allocated to current maintenance?

In this study, a challenge was defined as an issue the facilities management felt they could change with the necessary support and authority. The challenges most often identified included:

- Gaining a complete understanding of what their facilities truly required regarding maintenance (a comprehensive facilities’ assessment) to ensure the content of their plan was based on accurate data.
- They felt they lacked the ability to forecast a long-range facilities management plan that was meaningful.
- They felt they lacked autonomy over the priority of maintenance work and projects to provide the necessary flexibility to respond to unscheduled maintenance work (reactive maintenance).
- In some cases, based on the organizational structure, the facilities managers felt frustration from the lack of control they held regarding maintenance activities and the resources required.

RQ3: To what degree do facilities managers perceive that more effective communications would positively impact on the effectiveness of facilities management and maintenance?

One hundred percent of those interviewed perceive communication as having a strong positive impact to 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. In one case, communication was defined as one of the three C's of a successful program: communication, collaboration and cooperation.

Each had a varying degree of commitment to technology—some who felt most comfortable having personal conversations. Regardless of the form, every interview included many references to the need for communication.

As it appears, communication is the common denominator to many functions within a successful facilities management program. Successful communication was noted to impact efficiency at all levels of the operation as follows:

- Funding
- Accountability
- Shared expectations for a common goal
- As a basis of inspiration to improve staff skills
- Creation of a cohesive team that collectively feels empowered to achieve the impossible

Additional Distinguishing Observations

These challenges are not new. Based on a recent study, facilities management has repeated this roller coaster throughout history. Over time, however the peaks are lower and the valleys are deeper. This is attributable to growth, but coupled with a lack of funding for many reasons.

Based on this study, there were observations in common to both successful and failing facilities management programs. Consider the following regarding the more successful facilities management programs and from that, the less effective programs can be described.

Strong management

The most successful facilities programs were led by strong managers. They were schooled, experienced in facilities, and had proven skills as managers. They brought vision to their departments and held responsibility to deliver success. They were focused on the bottom line and realized that trained personnel was a priority and therefore, invested in a strong continuing education program.

Comprehensive asset evaluation basis for data driven decisions

The most successful management programs were data-driven and based on a comprehensive understanding of the facilities' portfolio and its needs. It was noted by one of the managers that Peter Drucker, tagged the founder of modern management, is credited as the originator of the quote, “You can't manage what you can't measure.”

Clear communication

Once a successful data-driven plan had been formulated, successful managers made it their focus to establish clear communications in all directions. That included their supervisors, the governing boards and their working staff. Time was devoted and consensus was the goal, even if modified. A unified plan was more likely to have the funding support. With funding clearly in place, even if deficient, the manager went to work to direct his staff on the final decision. At the end of the fiscal year, there was more support for the accomplishments as everyone had buy-in and shared expectations.

Streamlined organization

The more streamlined the organization, the greater the efficiency and effectiveness of the facilities program. Due to the close relationship between the facilities expansion, renovation, and building maintenance, it appears to be most effective if the relationship is linear, not parallel. Figure 3 depicts a linear organizational structure. This promotes a clear chain of command which allows for accountability. There is no conflict within the facilities related activities and no competition for resources.

Accountability

It was critical that roles and responsibilities of each part of the team were clearly defined and absolutely honored. In the most successful organizations, the governing board was deemed the decision makers of the plan; however, they delegated full authority to their leaders and facilities managers to deliver the plan successfully. They did not micromanage. As a result of establishing accountability, authority was transferred to the most knowledgeable person to execute the plan. This approach minimized confusion, the opportunity for “personal indulgences” and helped to maximize the efficiency of the facilities operation.

Technology

Based on the findings of this study, technology plays a strong role in both efficiency and effectiveness. While computers will never replace the need for the facilities staff and maintenance personnel, they will automatically expedite activity, record information, assist in coordination, and document a number of important data points. Those facilities programs that have incorporated technology into their operations are clearly more efficient. There wasn't a single solution that was identified, instead each used their own combination of available technology. While the
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approach to technology resulted in unique systems, they all incorporated their full staff’s participation with little exception. Again, training was made available to ensure their ability to use the technology assigned to them.

A further reference to technology was noted as a means by which to record historical knowledge. Buildings are expected to have an average useful life of 50 years and some far exceed that. This requires decades of maintenance and therefore generations of workers. The facilities’ history, if not well documented, has presented challenges to efficiency of the operation and the cost of maintenance with impact that threatens its intended useful life.

Currently, there is concern for the aging work force in facilities and the fear that their knowledge of the assets will retire with them. Technology offers an effective means to maintain that history for future reference.

**Outsourcing**

The concept of outsourcing was strong among the more successful facilities management programs. In one case, the facilities manager completely redirected the department by training all of the maintenance personnel to become supervisors and then outsourced all of the maintenance. Not only was the cost controlled, the liability for in house personnel was greatly diminished. The cost was controlled to follow the needs of the facilities. The higher the need, the greater the demand for outsourced service. Conversely, when there was less or no need for the service, the organization was not responsible to carrying the salary expense of direct personnel. This independence from an extended workforce provided the organization the ability to respond to the variable funding source without the result of chronic maintenance deferment. Furthermore, the directly employed workforce is reported to be very pro-active in both their attitude and performance.

**Energy management systems**

Most of all the interviews reported the incorporation of energy management systems and identified the cost savings as a means to increase their spendable budget. The cost was repaid through initial savings (return on investment). Not all additional savings were earmarked and held within the facilities management department, but regardless, the savings contributed to the overall operating budget which provided an increased opportunity for funding.

**Motivation**

Each of the interviews included a parting question that simply asked them to suppose they were king for a day and unchallenged to make necessary changes in their facilities program that would increase its efficiency and effectiveness. The following were their top mentions from most to least prevalent:

- Additional funding
- Change/improve their existing facilities program
- Perform a comprehensive facilities assessment
- Additional manpower

This data is interesting in that the first thought for most managers was to simply have more money; however, right behind that was an indication that the facilities management process needed to be improved, which indicates there is room for improving the efficiency and effectiveness outside of simply increasing the budget. The third most prevalent was to perform a comprehensive facilities assessment, which again, speaks to the identification of potential of internal improvements outside of additional funding.

Given the acknowledgement by those interviewed that there is “room for improvement” based on some internal modifications, there is hope. The improvements, as noted above, are not all expense related. For example: strong management, a streamlined organization, clear communication, accountability, and outsourcing are organizational or behavioral. The expectation must be set from the top positions, facilitated, and continuously reinforced. The study offered examples of this approach that when applied resulted in the most effective and efficient facilities management programs. The impact was dynamic, motivational, controlled, and absent of excessive deferred maintenance.

There are improvements that do have some related expense; technology and the development of a comprehensive asset evaluation. Each offers an immediate return on investment while supporting greater organizational efficiency and a greater understanding of the facilities’ needs. Each supports the critical component of clear communication based on data driven requests.

Within the study, coupled with the expressed need for both technology and the development of a comprehensive asset evaluation, was the expressed frustration for the lack of funding. Interestingly, the logic required to “find the funding” for these improvements is no different that the logic used to fund energy management systems. 100% of those interviewed had incorporated some level of energy management systems within their facilities. They proudly reported that in addition to the environmental im-
pact, the immediate return on investment was the catalyst for their board's support during tough budget years. They further boasted increased efficiency and greater effectiveness.

Given this existing practice of investing in operational improvements and supported by the same logic, it is difficult to argue against appropriating the funds to invest in both technology and the development of a comprehensive asset evaluation reports as these offer the same results for increased efficiency and effectiveness to the facilities management and maintenance programs that energy management systems do.

Conclusions

According to those interviewed, the simple explanation for the lack of effective facilities management is the claim that there isn't adequate funding to meet the growing needs of maintenance. However, there are those who argue that funding isn't the problem, it is the facilities management program and its procedures that have failed.

This study has identified a number of areas within the facilities operation that demand attention. Whether the challenge is the organizational structure, communication, data driven planning, training, or experienced leadership, these issues must be addressed and resolved to meet the industry best practices for efficiency. Within the study, there were facilities managers interviewed whose programs were based on these principles who operated efficiently and effectively. While they welcomed additional funds, it was for the purpose of furthering their success not rescuing their programs. Until efficiency within the facilities management operations becomes a primary focus, the question of appropriate funding cannot be addressed.

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 Lake-land, 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 A General Contractor's license.
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Yours Sincerely,

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APPENDIX C

Failing Facilities Management: There is Hope for a Better Tomorrow!

By
Rebecca Smith

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 delegated responsibility for funding solutions down to the local governments. The results 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 to 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.

Keywords: Lack of Funding, Growth Cycle, Productivity, Facilities Management, Maintenance Budget, Priority, Communication, Knowledge, Strategic Plan, Technology, Training, Outsourcing

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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% reactive 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 95 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 did 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).

Upon further consideration, the challenges were classified into two categories: obstacles and challenges. For the purpose of this research, an "obstacle" was defined as an issue that the facilities management team deemed outside of their control while a "challenge" was defined as an issue that could be changed with the necessary support and authority. The six issues have been categorized and outlined in Figure 2.

Of note, only one issue met the criteria of an obstacle while the remaining five issues were classified as challenges.

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
Failing Facilities Management

Figure 1: Six Challenges/Obstacles of Facilities Management

1. Decision made by those who lack expertise regarding the issues related to facilities management
2. Lack of understanding of immediate costs (lower) versus deferred cost (higher)
3. Lack of communication and clear understanding between all associated parties from funding to fixing
4. Lack of understanding of far reaching negative impact of excessive deferred maintenance
5. Overall lack of available funds and/or unstable/absence of fixed funding source for facilities maintenance
6. Funds available for facilities maintenance are diverted to another use

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
Failing Facilities Management

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.

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 expeditious, 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.
by the software through the normal course of daily activities. The software captures pertinent data and consolidates it to a single page report. The data includes cost, a written description of the work, before and after photographs of the work, who performed the work and their contact information, the dates of activity, and custom notations from staff regarding specific conditions or considerations. As a result, the governing board can be kept fully informed based on current data driven reporting that can be created with a single key stroke from the windshield. The integrated agility of the software provides for data driven decisions by the board to allow for funding changes in both directions. Further, in the allocation phase, work that has been noted for deferral can be shared with the board for their approval prior to executing the facilities spending plan. The same level of reporting can be generated from the windshield for future work plans which provides additional communication regarding the increased expense resulting from work deferral.

**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-
characteristics 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% proactive work with 20-30% reactive 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://mumbusinessreview.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 in 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 A 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 years: 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.
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

Group activities by category

Share for information or pricing

Contract with outsource contractor

Communication with outsourced contractors – data entry screen

Contract Details

- Manage Contracts
  - New Contract
  - Change Orders
  - Contract Status - Contracts

- Create New Contract
  - Classification
  - Amount

- Manage Documents
- Manage Change Orders
- Contract Status - Contracts
Exhibit 5: Communication with In-House Maintenance Staff

Communication with in-house maintenance staff

- Access to screen for detailed in-house management
- Communication from supervisor 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

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