

May/June 2005

VOLUME 21

NUMBER 3

Facilities Manager

The official publication of APPA: The Association of Higher Education Facilities Officers

Forum perspectives

Educational Facilities
LEADERSHIP
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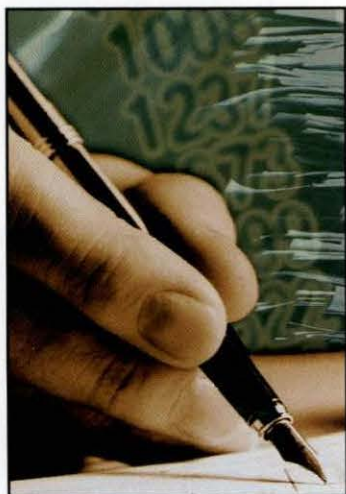
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Facilities Manager

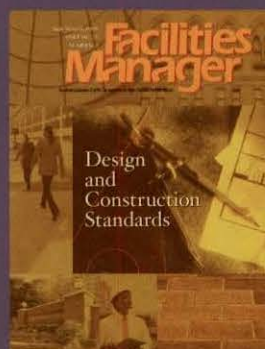
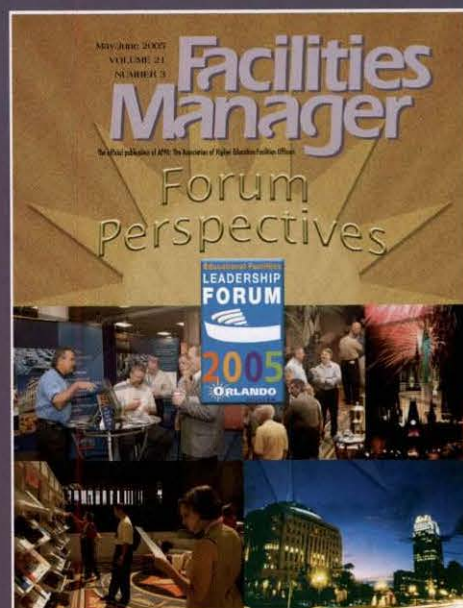
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Global Partner in Learning

From the Editor

by Steve Glazner

The APPA staff, the Educational Programs Committee, and the Welcome Committee are making final preparations for the 2005 Educational Facilities Leadership Forum, set for August 4-6 in Orlando, Florida. The Forum will take place at the Walt Disney World Swan & Dolphin Resort, where APPA held its successful 1997 annual conference.

The program of concurrent educational sessions will include areas of concentration such as code advocacy, safety and security, information and technology, utilities, and environmental stewardship. In addition, selected courses will give you the opportunity to obtain continuing education units (CEUs) for certain courses to help you in your professional development.

Also, you will not want to miss our exceptional keynote speakers this year:

- David Pearce Snyder, Life Styles Editor of *The Futurist* magazine, "Trends in Higher Education/ State of the Changing Face of Campus Life"
- Brooks H. Baker III, APPA Past President, and Doug Erickson, APPA Board Member-at-Large, "An Update on APPA's Code Advocacy Initiatives"
- Diana Oblinger, Vice President of EDUCAUSE, "Technology, the Millenniums, and You"

In this issue of *Facilities Manager*, we bring you features on geographic information systems, campus sustainability costs, and maintenance management systems. In addition, we

include an update on APPA's Center for Facilities Research and an executive summary of the most recently completed CFaR project.

As always, if you would like to comment on any of our articles, please send your letters to the editor. One appears below.

To the editor:

"The Non-Architect's Guide to the Design Process," [March/April *Facilities Manager*] does not mention a requirement for sustainable expertise and experience. Hiring the right consultant is the single most important project opportunity. Not including sustainability in the criteria may get you a "starchitect," but you will be paying for it for generations. Sustainability is always a criteria in our selection.

JR Fulton, RA, LEED AP
Project Manager, Capital Projects
University of Washington



After Hurricane Charley, Munters restored St. Joseph's hospital in only two weeks. Services included cleaning, water removal, drying and mold remediation.

Hospital in Port Charlotte, Florida. After Hurricane Charley peeled off the hospital's roof, soaking all floors and flooding the first level, Munters took only two weeks to get them back in operation.

"We had never experienced a hurricane of Charley's magnitude," said Miles. "In the past, we had some internal flooding during storms, but Charley was the most powerful storm to hit our area since 1960." As a precaution, Miles had spoken with Munters three days prior to the storm. "I felt it was prudent to find out how soon they could arrive if we needed assistance. Even with pre-planning, we were very surprised to see Munters arrive at our site at 6 a.m. the day after the storm," said Miles. Munters had up to 50 people on site, removing debris and ducting the entire hospital for drying.

"YOU HAD TO SEE IT TO BELIEVE IT!"

That's how Gary Miles describes the work Munters accomplished in the wake of Hurricane Charley at St. Joseph's

Continuous water removal was needed, while rains continued as the hospital rushed to finish a temporary roof. The hospital also needed document drying services. Munters performed freeze drying of documents and restoring of x-ray films, managing thousands of items and returning them in a useable condition.

After two weeks of continuous effort, Munters had the hospital back in operation. "Munters personnel were courteous, helpful and they got the drying and restoration work done right," said Miles. "Their dedication was apparent from day one. Two weeks really wasn't all that long compared to the amount of damage we experienced," said Miles. "You almost had to see it to believe it. We are very satisfied with the results they provided us."



by Betsy Colgan

In Memoriam

Gerald (Jerry) E. Boyea was killed this past February as the result of a vehicle accident. He served as director of facilities and/or planning at the University of Texas-Permian Basin; Oklahoma City University; West Virginia State College; and Bradley University. His time spent in facilities was a second career, after a 30-year distinguished military career. Following his employment at Bradley University, Jerry and his wife Nancy settled in Hendersonville, North Carolina, where he launched a small business to meet the needs of older people.

Mark These Dates on Your Calendar

June 19-23—Leadership Academy (Tracks I-IV), Las Vegas. For more information and to register, visit www.appa.org/education/professionalleadershipacademy.cfm.

August 4-6—Educational Facilities Leadership Forum, Orlando. Registration is now open. For more information and to register, visit www.appa.org/education.

September 18-22—Institute for Facilities Management, Norfolk, Virginia. Registration opens June 1; www.appa.org/education.

September 18-22—Supervisor's Toolkit: Nuts and Bolts of Facilities Supervision. Norfolk, Virginia. Registration opens June 1; www.appa.org/education.

September 18-22—Leadership Academy—Track I. Norfolk, Virginia. Registration opens June 1; www.appa.org/education.

And don't forget **July 8-11, 2006**—The Campus of the Future, Honolulu. Visit www.campusofthefuture.org for more information.

Election Results

APPA Officers for 2005-06 will assume their new roles at the August Forum in Orlando. They are: **President-Elect** Christopher K. Ahoy, Iowa State University; **Vice President for Professional Affairs** Alan S. Bigger, University of Notre Dame; **Secretary-Treasurer** Robert J. Carter, University of Guelph.

The Bylaws change passed and will become effective immediately. Many thanks to the Tally Committee for tabulating the votes: Chair Al Stearns, member emeritus; Patrick Andriuk, Episcopal High School; and Al Guggolz, member emeritus.

User ID and Password

If you have visited the APPA website in the past several months, you have probably had the experience of being asked to enter your user ID and password. The user ID is a unique number assigned to each individual by our database system. This number will travel with you whether you change locations or employers. The password can be changed at your discretion, and protects your privacy and the security of our database. **It is important that you use the user ID you were given to avoid creating additional records, as well as increased frustration, wait time, and retrieval difficulties. If you have misplaced your user ID, contact APPA Member Services at memberservices@appa.org or call 703-684-1446 ext. 227 or 232.**

Florida Chapter Meets

The Florida chapter of APPA (FLAPPA) held its first annual conference, "Establishing Partners for Success" at the University of Central Florida on March 17-18, 2005. E. Lander Medlin, executive vice president of APPA, opened the conference with a speech titled "Building Collaborative Relationships." Also speaking at the conference were Brooks H. Baker III, APPA past president and SRAPPA President Joe Fisher. Over 20 Business Partners exhibited and provided a venue for discussion on the many areas of interest FLAPPA members share.

Five educational tracks with each one containing core and elective sessions were presented at this first chapter meeting. The conference was attended by more than 100 attendees



Lander Medlin, executive vice president of APPA, addresses the first annual FLAPPA chapter meeting.

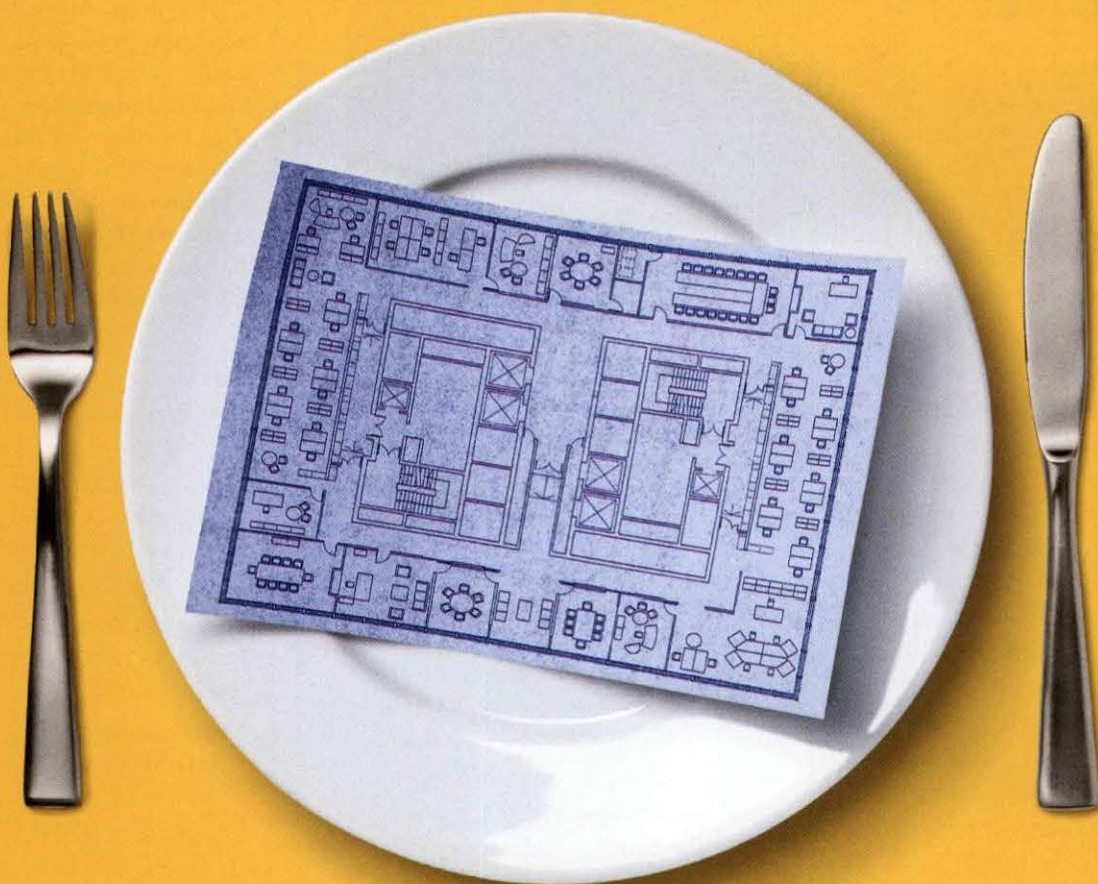
from public and private institutions of higher education from around the state of Florida.

FLAPPA officers elected at the conference were: Dan Young, Embry-Riddle Aeronautical University, president; Brian H. Wormwood, University of Central Florida, vice president; Montel Watson, University of Central Florida, secretary-treasurer.

Continued on page 8

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J. Paul Getty Museum and Central Garden

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Getty Center Receives LEED Certification

The J. Paul Getty Museum, a museum devoted to the visual arts, is the first facility in the country to be awarded a LEED-EB (Leadership in Energy & Environmental Design-Existing Buildings) certification in the post-pilot phase of the program. LEED is administered by the U.S. Green Building Council and is the nation's most widely recognized and accepted green building rating system.

"As a certified green building, the Getty Center is providing a healthy and conducive climate for employees and visitors, resulting in a more productive workforce and a better-served consumer base," said Bradley Wells, vice president of finance and administration.

For more information on the Getty Museum visit www.getty.edu. Information about LEED certification can be found at www.usgbc.org/LEED.

APPA Seeks Campus Photos

You may have noticed that the cover of the January/February 2005 issue of *Facilities Manager* showed a college campus. That was the University of Florida and was sent

to us after our last request for campus photos. What better way to show off your campus and promote your school! With this in mind, we invite you to send us your favorite pictures of your campus. Photos may be used in upcoming APPA promotional materials, such as brochures, flyers, and catalogs, or on book covers or on the website. Please submit electronic files only—jpeg or Tif files with a resolution no less than 200 dpi (use the best quality setting on your digital camera). In the subject line of your e-mail, label the e-mail as "APPA Campus Photos." Send your photos to Betsy Colgan, director of communications, at betsy@appa.org. Please provide a credit in the event that one of your photos is used.

Brian Andersen Memorial Fund Established

Utah State University has established the Brian Andersen Memorial Scholarship fund to help facilities employees who are working full time and attending school continue on in their education.

Andersen began his employment at Utah State as a refrigeration technician and rose through the ranks to become director of operations in facil-



Stanley Consultants contributes \$5,000 to the Brian Andersen Memorial fund. From left to right, Reid Olson, USU Center Energy Plant Manager; Ron Godfrey, USU Vice President for Business and Finance; Walt Jones, Stanley Consultants; Darrell Hart, USU Assistant Vice President for Facilities; and Ben Berrett, USU Director of Facilities Operation.

ities, receiving his MBA from Utah State. His success story and untimely death at age 48 was the catalyst for creating this scholarship fund.

Utah State is seeking an endowment of \$25,000 and was recently helped toward this amount by the contribution of \$5,000 from Stanley Consultants, see photo above. For more information on this fund or to contribute to it, please contact Darrell Hart at darrell.hart@usu.edu.

Emory Certified Gold

Emory University's Goizuetta Business School has been certified at the Gold level under the LEED Green Building Rating System for Existing Buildings (LEED-EB). To understand the process in becoming gold certified, read Robin Smith and Steve Wiggins' article in January/February 2004 *Facilities Manager*, "An Owner's Experience with the LEED-EB Pilot Program," on pages 48-53.

New IEHA President

Hazel Reese, C.E.H., director of campus services at the University of South Carolina, has been elected IEHA president for 2004-06.

Continued on page 10

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Continued from page 8

Reese has been a member of the International Executive Housekeeper Association since 1983.

IEHA provides services to its members to help them achieve personal and professional growth. It also offers a variety of educational opportunities for housekeeping and facility management professionals to improve their

services and work performance. For more information on IEHA, visit www.ieha.org.

Library Building Awards

The American Institute of Architects (AIA) announced the recipients of the 2005 AIA/American Library Association Library Building Awards. These awards highlight the

finest examples of library design by architects licensed in the United States. Winners included APPA member institutions The Ohio State University, Carnegie Library of Pittsburgh, and Harvard University. For more information, visit www.aia.org.

Green Star Awards Submissions Sought

The Professional Grounds Management Society is looking for the nation's top school and university grounds managements programs. Top programs will be awarded at the Awards Banquet at the Society's 2005 School of Professional Grounds meeting in November. Deadline for entry is August 5, 2005. For more information, visit <http://www.pgms.org/greenstarawards.htm>.

Sprinklers Save Lives

A recent survey by the National Institute of Standards and Technology and supported by a U.S. Fire Administration initiative for fire safety in college housing, showed that automatic sprinkler systems can significantly increase the chances of survival during a dormitory fire. The study compared the hazards of fires in smoke detector-equipped dormitories with and without fire sprinklers in the room of fire origin.

For more information on this study, visit www.buildings.com.

Cleaning in Spanish

The Cleaning Management Institute has several Spanish language training videos now available. Videos from basic carpet cleaning to floor maintenance to restroom cleaning are now available at www.cminstitute.net/displaycommon.cfm?an=5. 🏠

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Executive Summary

Member Feedback Reveals APPA's Strengths and Direction

by E. Lander Medlin

During the past year we have engaged you in several member opinion surveys and focus groups to gather information about your perspectives on the facilities profession and the association's services. Your responses have greatly enhanced our understanding of the facilities profession, our comprehension of your needs and expectations as an educational facilities professional, and have provided valuable feedback for the direction and focus of the association. Your responses are guiding the development and provision of APPA's programs, products, and services in order to tailor them to meet your specific needs.

To provide a profile, most survey respondents and focus group participants were male between the ages of 45 and 54; are directors or assistant directors of institutional organizations; have been in their position between 5 and 12 years or more; are well-educated with at least one-third possessing a master's degree or higher; and prefer to receive information via e-mail. Also of note, a great number of you hold dual higher education association memberships in NACUBO and SCUP. And three-quarters of the respondents told us that collaboration with other institutional or association peers was critical to their success and an essential APPA service in creating needed peer-to-peer networking opportunities.

This is of particular importance given the upcoming joint conference in July 2006 in Hawaii. Given the importance placed on networking,

this joint conference will provide an even greater benefit than we might have originally expected. Therefore, don't miss this unique opportunity to collaborate with colleagues across these three professions in an event that will focus on the campus of the future. For more information and details about this joint conference or to submit a presentation proposal, please visit our joint website at <http://www.campusofthefuture.org>.

As a result of your feedback, APPA will continue to increase its education/training offerings, improve its research/information resources, and provide more recognition/networking programs and opportunities in the coming years. Here are some survey highlights and actions APPA is taking in response to your feedback.

First, your positive level of satisfaction with several of our offerings was compelling. Those most noteworthy were:

- *Assisting members with their professional challenges.* APPA received very high marks in assisting members with their professional challenges, keeping them informed, providing a forum for exchange of ideas, communicating with peers, and enhancing the credibility of educational facilities professionals.
- *Strength of educational programming.* APPA's professional development and continuing education opportunities are numerous. However, the Institute for Facilities Management received the highest approval ranking. Yet, equally good marks were received for the Leadership Academy and the Educational Facilities Leadership Forum (formerly known as the annual meeting). The benefit of these programs was

considered two-fold—an increase in knowledge and information about the profession and an increase in connectivity or network with peers across the industry.

- *Overall quality of customer service.* The ability of the APPA staff and volunteer leaders to ensure high-quality customer service is significant given the small size of the operational organization. We are pleased that our focus on member service is noticed and appreciated.
- *Offering a broad scope of tools and resources.* This is good to know since APPA's staff and volunteer base expends a great deal of their time focused on the delivery of practical and applicable tools for its members. Our staffing guidelines trilogy (trades maintenance, custodial, and grounds management) and performance indicators/benchmarking books, along with the timely information provided in *Facilities Manager*, continue to be viewed as exemplary.
- *Opportunity to network with peers and other professionals.* This category received the highest ranking. APPA was considered "probably the best" in its efforts to network or connect peers with other institutional or association peers. Much credit needs to be given to our six regions and myriad chapters for their efforts in this category of achievement.

Receiving high marks in the areas of professional development, customer service, and availability of tools and resources is essential since these three areas are considered critical strengths for an association. Our strength in these areas affords us the opportunity to concentrate on the improvement of other key areas. Since the survey results were tabulated, a

Lander Medlin is APPA's executive vice president. She can be reached at lander@appa.org.

few new services are now available and well worth mentioning:

- **Supervisor's Toolkit: Nuts and Bolts of Facilities Supervision.** A week-long educational program focused on training front-line employees in key supervisory skills is now available both internationally through the APPA office and via local delivery by institutional and/or regional providers/trainers. Don't hesitate to call the APPA office or visit the APPA website (<http://www.appa.org>) for details on how this program can be delivered at your time and place of choice.
- **More useful and timely information.** APPA provides a short, informative bi-weekly e-newsletter called *Inside APPA* that will keep you updated on both industry and APPA news. Unfortunately, your "spam" blocking service may be keeping you from gaining access to this valuable member benefit. If you are not receiving this e-mail newsletter, contact your spam blocking provider or the APPA office to assist you in ensuring you receive this information every two weeks. In addition, please take note that APPA has established a column focused on regulatory and compliance issues in *Facilities Manager* called Code Talkers. Make sure you stay up-to-date with the advice and guidance of your colleagues by reading each issue of this new column. Also, my column in the March/April 2005 issue highlighted the top ten critical industry issues you mentioned throughout these surveys and focus groups. We will continue to track more information related to these issues on the website. Finally, CFaR is now in place with four projects recently completed and seven pending, with two projects formally sponsored by APPA (see the article on page 34 of this issue). Consider engaging in a research project of your own; by sharing your knowledge and expertise, you and your organization can gain the recognition you deserve for this excellent work.

- **Enhancing the credibility of facilities professionals.** The single most important goal in APPA's strategic plan is to increase the credibility of the facilities profession with senior institutional officers. Our 2006 joint conference with NACUBO and SCUP is but one way we can improve our collaborative efforts. Others include strengthening the strategic alliance agreements we have with several other associations/organizations (e.g., Professional Grounds Management Society [PGMS]; Association of College & University Housing Officers-International [ACUHO-I]; Council of Higher Education Management Associations [CHEMA, including NACUBO, SCUP, and NAEB]; Washington Higher Education Secretariat [WHES]; International District Energy Association [IDEA]; International Sanitary & Supply Association [ISSA]; American Society of Healthcare Engineers [ASHE]; and RS MEANS). Visit our website (<http://www.appa.org>) for more details on these relationships and what they may offer you in return member benefits. Finally, we have increased our media outreach efforts substantially over the past couple of years with reporter quotes in articles in the *Chronicle of Higher Education*, the *Wall Street Journal*, *Greentree Gazette*, *Inside Higher Education*, and other trade press magazines and publications. Please don't hesitate to let us know what else we can do to improve in this important area.

As we look to the future, we know we must strengthen our research capability through programs like CFaR to keep our members up-to-date on changing technologies and conditions and to provide them with the latest information to make knowledgeable decisions for their organizations and institutions. We also know that our member demographics are changing and the impact of generational differences on the profession and the association must be better understood. In this regard, incoming

president Jack Colby has launched a task force to study the importance of credentialing and certification from the perspective of future members. We will keep you informed as the picture of our involvement in this area further develops.

We appreciate your willingness to engage in these important feedback loops. This type of feedback is invaluable in helping us set the focus and future direction of the association and ensures that we are continuing the to meet the needs and expectations of our members now and well into the future. 🏢



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Overview of NFPA 730 and 731, NFPA's New Security Standards

by Raymond A. Grill, P.E.

Over the last three plus years, a newly formed technical committee of the National Fire Protection Association (NFPA) has developed two new technical documents dealing with security in the built environment. This new technical committee is called the Technical Committee on Premises Security and they have prepared NFPA 730, *Guide for Premises Security* and NFPA 731, *Standard for the Installation of Electronic Security Systems*.

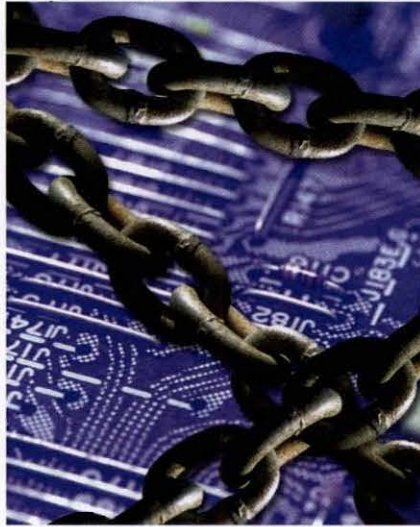
These documents will be presented to the membership of NFPA for approval at its annual meeting June 6-10, 2005, held in Las Vegas, Nevada.

The Process

This project was first started by NFPA in 1994 at the request of interested members of the association. The project was cancelled, and then restarted in 2000 when the NFPA Standards Council approved a scope for the Premises Security project.

The scope of the Technical Committee on Premises Security states: "This Committee shall have the primary responsibility for documents on the overall security program for the protection of premises, people, property, and information specific to a particular occupancy. The Committee shall have responsibility for the installation of premises security systems."

Raymond A. Grill is president of Sako & Associates, Inc, a national security consulting firm. He also serves as the secretary of the NFPA Technical Committee on Premises Security. This is his first article for Facilities Manager. He can be reached at rgrill@rjagroup.com.



NFPA's standards development procedure is a consensus process that allows any interested party to participate. These documents have been available for public review and comment since August 2003.

Standards versus Guides

The development of security standards by NFPA has been controversial. There had been a strong contingent of end users who initially expressed strong concern over the development of security standards, particularly in light of the litigious nature of our society. The main concern was trying to develop a "one size fits all" standard that may not take into consideration the multitude of factors that are required to be incorporated in the development of a security plan for a facility.

From the onset, the committee was in reasonable agreement that the document providing criteria for design and installation of electronic security systems (NFPA 731) should be a standard. The committee had numerous debates on what type of document NFPA 730 would become. Ultimately, the committee wrote NFPA 730 as a guide.

NFPA 731, *Standard for the Installation of Electronic Security Systems*, is written to be referenced by other documents. Reference documents could include bid specifications and contract documents.

NFPA 730, *Guide for Premises Security*, is informative in nature and, does not include any mandatory requirements.

NFPA 730, Guide for Premises Security

The scope of the *Guide for Premises Security* is broad in nature and will allow for inclusion of new information and guidance in many areas of security for future revisions. The guide describes features and practices that can be implemented in buildings to reduce security vulnerabilities.

Chapters 1 through 4 provide basic information on the document, including the scope, purpose, and application statements. The overall goal of the guide is to provide a framework for assessing the security needs of a facility and to provide guidance for implementing a security program to address those needs.

Chapter 5 provides a seven-step process for developing a vulnerability assessment that is the cornerstone for a security plan.

Chapter 6 provides a comprehensive review of perimeter security measures. These measures include fences and other physical barriers, protective lighting, ironwork (e.g., bars and grills), glazing materials, passive barriers, and electronic security devices.

Chapter 7 describes the usage of and provides guidance for the application of various types of common physical security devices including builders hardware, locks, doors, windows, safes, vaults, and strong rooms.

Chapter 8 provides guidance in the development of interior security measures to protect specific areas or information. This chapter also reviews the different types of systems and equipment that can be deployed as security measures.

Chapter 9 discusses guidance in the application of security personnel and provides direction in this area. Security personnel can be an effective and necessary component of a security program.

Chapter 10 provides guidance on the development of a security plan and recommends features that should be included.

Chapters 11 through 22 provide direction in the development of security plans for specific occupancies and lists unique issues that should be considered in developing those plans.

Colleges & Universities

Chapter 11 provides guidance regarding security for educational facilities including colleges and universities. It reviews the history of the *Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (Jeanne Clery Act)*, a federal law that requires colleges and universities to disclose certain timely and annual information about campus crime and security policies, and provides the basic requirements of this Act.

This chapter discusses the goal of a campus security program and elements of the program necessary to meet the goal and the *Jeanne Clery Act*. The elements of the program are identified and each element is discussed. They include:

1. Record keeping system
2. Communication system
3. Training program
4. Campus law enforcement
5. Security surveys
6. Access control system
7. Security for campus housing
8. Security for research facilities
9. Security equipment

The scope of the Technical Committee on Premises Security states: "This Committee shall have the primary responsibility for documents on the overall security program for the protection of premises, people, property, and information specific to a particular occupancy. . ."

NFPA 731, Standard for the Installation of Electronic Security Systems

As discussed earlier, NFPA 731 is written as a standard and is intended to be referenced by other documents such as bid specifications and local jurisdictions or building codes. The scope of NFPA 731 covers the application, installation, performance, testing, and maintenance of physical security systems and their components.

The purpose of the standard is to define the means of signal initiation, transmission, notification, and annunciation as well as to establish levels of performance and reliability of elec-

tronic security systems. The standard also establishes minimum levels of performance, quality of installation, and where redundancy is required.

Looking into the Future

NFPA 730 provides a tool for systematic security program development. NFPA 731 provides a baseline for quality electronic security system design and installation. As end users, engineers, and manufacturers become more aware of these documents, it is expected that they will eventually become the foundation for development of security plans in the built environment. 🏢

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Membership Matters

APPA's Greatest Benefit to Members—Networking

by Philip L. Cox

With the approach of the 2005 Educational Facilities Leadership Forum in Orlando, I am reminded of one of the greatest advantages of APPA membership—networking. Because one's personal network is such an important factor for success, it deserves our careful planning and attention. Our networks should be thoughtfully grown, nurtured, and exercised; not left to dumb luck or chance.

Larry Tanenbaum recently shared leadership insights from the business of professional sports during a guest lecture at Cornell's graduate school of management. Tanenbaum, a Cornell alumnus and CEO of an international construction firm and chairman of a private equity investment fund, has become known as the most influential sports figure in Canada.

He is chairman of the Board of the Maple Leaf Sports and holds interests in the Toronto Raptors as well, thus splitting his energies between professional hockey and basketball. Tanenbaum spoke of the importance of integrity, dedication, and communication as essential ingredients in successful leadership. He also stressed the importance of networking by saying, "Your leadership is revealed through the building of your network."

Giving several examples from the world of professional sports, he clearly made the point that effective networks can lead to a competitive edge. Many business successes are



born out of opportunities that arise out of effective networking.

Susan RoAné, who was a keynote speaker at the 1996 APPA Annual Meeting in Salt Lake City, consults on the subject of how to build effective networks and how to make them work for you. Her books, *The Secrets of Savvy Networking* and *How to Work a Room*, are filled with tips for making the most of networking opportunities. RoAné writes, "Networking is a reciprocal process based on the exchange of ideas, advice, information, referrals, leads, and contacts where resources are shared and acknowledged."

"Networking enhances both personal and professional aspects of one's life and increases your power, position and influence, and quality of life."¹

I have benefited immeasurably, both professionally and personally, from the hundreds of friends and colleagues I have come to know through APPA. What a tremendous support structure! I cannot think of any group of individuals more willing to exchange, share, and acknowledge information and experiences than APPA members. After more than 22

years of APPA membership, I am still in awe of the openness of APPA members who generously share their knowledge and wisdom. What better way could there be to foster information and experience exchange than by attending the annual Educational Facilities Leadership Forum in Orlando this summer where several hundred educational facilities professionals will come together for just that purpose. Why not take advantage of this golden opportunity to further build and exercise your network? 🏰

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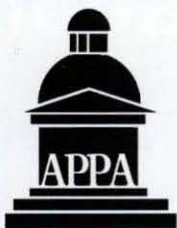


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Phil Cox is director of facilities management, Cornell University, Ithaca, New York and a past president of APPA. He can be reached at plc4@cornell.edu.



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GIS Tools for Planning, Management, and Communication



by Robert D. Hewitt, P.E. and Rebecca B. Higgins, P.E.

Geographic information system (GIS) technology has evolved to the point where non-specialists can harness the power of GIS to facilitate master planning, guide operational management, and enhance communications at a college or university. This article describes current GIS technology and presents a variety of tools available to the facility manager and planner. The article illustrates the use of GIS tools to 1) increase the effectiveness of master planning, 2) improve the efficiency of operations management, 3) communicate with students, faculty, and public communities, and

Robb Hewitt is development associate for Trammell Crow Residential, Needham, Massachusetts, and can be reached at rhewitt@tcredidential.com; he formerly was a geotechnical engineer at Haley & Aldrich, Inc. Rebecca Higgins is staff engineer for Haley & Aldrich, Inc., Boston, Massachusetts; she can be reached at rhiggins@haleyaldrich.com. This is their first article for Facilities Manager.

The authors wish to thank Patrick Willoughby at Wellesley College, Laurie Baise at Tufts University, and Daniel Sheehan at MIT for providing examples of GIS uses at educational institutions. They also thank Russell Schuck and Bonnie Sloan at Haley & Aldrich for helping with editing and preparation of the figures.

4) create an educational tool. Case studies from Wellesley College, Harvard University, Massachusetts Institute of Technology, and Tufts University are presented to illustrate applications of GIS technology.

Introduction to GIS

A geographic information system (GIS) is a computerized database management system which can be used to capture, store, retrieve, manipulate, analyze, and display spatially-referenced information, otherwise known as *geospatial data*. A broad definition of geospatial data is a dataset that identifies the geographic location and characteristics of natural or manmade objects or features as these relate to a particular geographic region on earth. Since datasets can include a wide array of information such as physical, biological, cultural, demographic, or economic, they are valuable tools in the natural, social, medical, and engineering sciences, as well as in business, marketing, and planning (Mark *et al.*, 1996).

Example types of datasets that may be useful for implementing GIS applications at colleges and universities include:

- Aerial photographs
- Zoning data (e.g., residential buildings vs. classroom buildings)
- Building information (floor plans, building/classroom names, building heights)
- Roadways and bike/walking paths
- Emergency routes

- Utility information (types, locations, invert elevations)
- Subsurface information (geology, groundwater levels, areas of contamination)
- Underground storage tank locations and tank details
- Hazardous waste generation and collection locations
- Maintenance schedules of buildings, landscaping, and utilities

Typically, the relevant data are stored in one centralized database and displayed as different layers within a GIS. An advantage of using a centralized database linked to a GIS system is that various layers can be displayed at once, allowing for meaningful analysis in a user-friendly and efficient manner. For example, potential new building or utility corridor locations can be evaluated by overlaying potential locations with available information (e.g., existing utilities, soil conditions, utilities).

Implementation of GIS at Colleges and Universities

Given the power of modern personal computers and the internet, creating a GIS platform for an educational institution has become a less costly and achievable goal. Once the necessary hardware and software are acquired, available data is gathered to create base layers for the GIS platform. In addition to information specifically related to the college or university, there are numerous statewide and nationwide resources for GIS datalayers. For example, MassGIS (<http://www.mass.gov/mgis/>) is a website maintained by the Commonwealth of Massachusetts Executive Office of Environmental Affairs that provides free downloadable GIS datalayers such as roadways, water bodies, zoning, conservation/recreation areas, demographic data, and aerial photographs.

Once the basemaps have been created, facility-specific information such as campus building and classroom information, floor plans, utility plans, and geologic and hydrologic information can be compiled and added to the system. For hardcopy data in existing files, the information can either be scanned as images or the pertinent information can be entered manually into the database system with locational references (e.g., X and Y coordinates or latitude/longitude) to allow mapping of the data. If the image is a map, it can be scanned and georeferenced (using tools within GIS) to the same coordinate system as the base plan to allow the map to be overlaid with other layers.

Once the data and map layers are compiled into a GIS platform, the benefits of storing, manipulating, and retrieving data from the system for management and decision-making purposes soon overcome the cost of the data gathering efforts. A successfully implemented GIS system at a college or university can provide a variety of beneficial uses, which may include:

- Efficient data management, analysis, and visualization
- Enhanced master planning and decision making
- Effective operations management

- Educational tools for students
- Enhanced communication with students, faculty, and the public

The following sections further describe the benefits gained from implementing a GIS and are illustrated by recent examples of GIS use at colleges and universities.

Management, Analysis, and Visualization of Data

Over the years of storing paper data, some of the information may be lost, damaged, or destroyed. Fire and water damage can have devastating impacts on hard copy files. Having an electronic database of the information (with backup at an alternate location) provides better insurance against lost or missing data. Additionally, a vast amount of data compiled in one centralized system is more readily accessible than if the information is stored in file cabinets or on separate computer systems in different departments. Data can be accessed remotely and can be used by many users at the same time. As additional data becomes available, the database can be easily updated. Both historic and newly acquired electronic data can be readily combined and utilized by multiple personnel to allow better analysis and visualization of spatial data.

The following two examples illustrate GIS and database applications for management and evaluation of groundwater quality and geologic information.

Groundwater Quality and GIS—Wellesley College

Wellesley College recently conducted a substantial construction and remediation project to revitalize a 20-acre parcel of land impacted by environmental contamination. The contamination was the result of the manufacturing process by the former parcel owners. To monitor the effectiveness of the remediation, a quarterly groundwater testing program is conducted from a network of 75 monitoring wells located across the 20-acre site. Data are collected in the field and imported to a database to store the sampling information and test data. The data are analyzed and presented spatially using GIS applications to investigate spatial variation across the site, evaluate changes since previous readings, monitor changes in groundwater flow direction, and identify the impact of off-site sources of contamination.

Figure 1 illustrates the use of GIS to analyze and display groundwater flow and potential contaminant migration pathways from the contaminant source across a portion of the campus.

Geologic Information and GIS—Tufts University

Research conducted at Tufts University involved the use of a GIS and database system to investigate the spatial relationship among geologic data across a 2.5-square mile study area in Cambridge, Massachusetts (Baise and Higgins, 2003). The study area is shown in Figure 2. The project entailed compiling approximately 1,000 hard copy logs of subsurface explorations including 7,200 geologic samples gathered from over 70 years of exploration programs. The study area in which

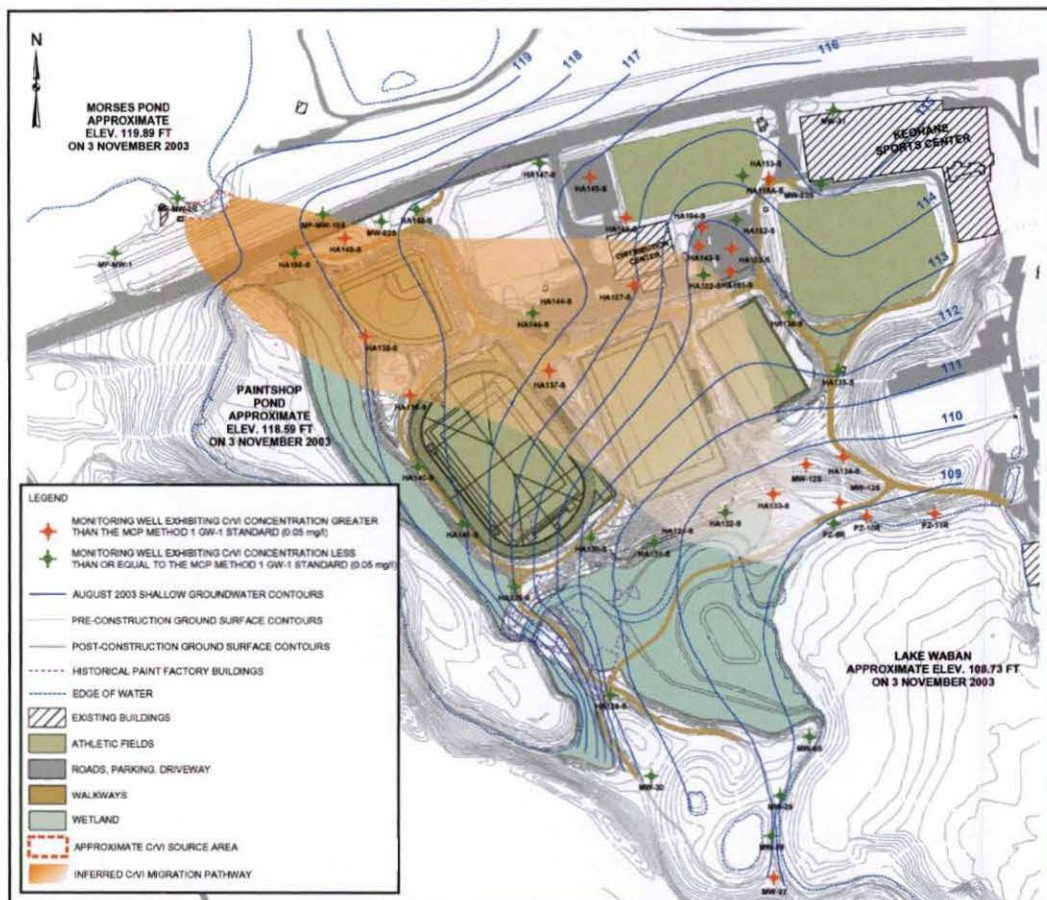


Figure 1
Use of GIS to Display
Potential Contaminant
Migration Pathway—Wellesley
College

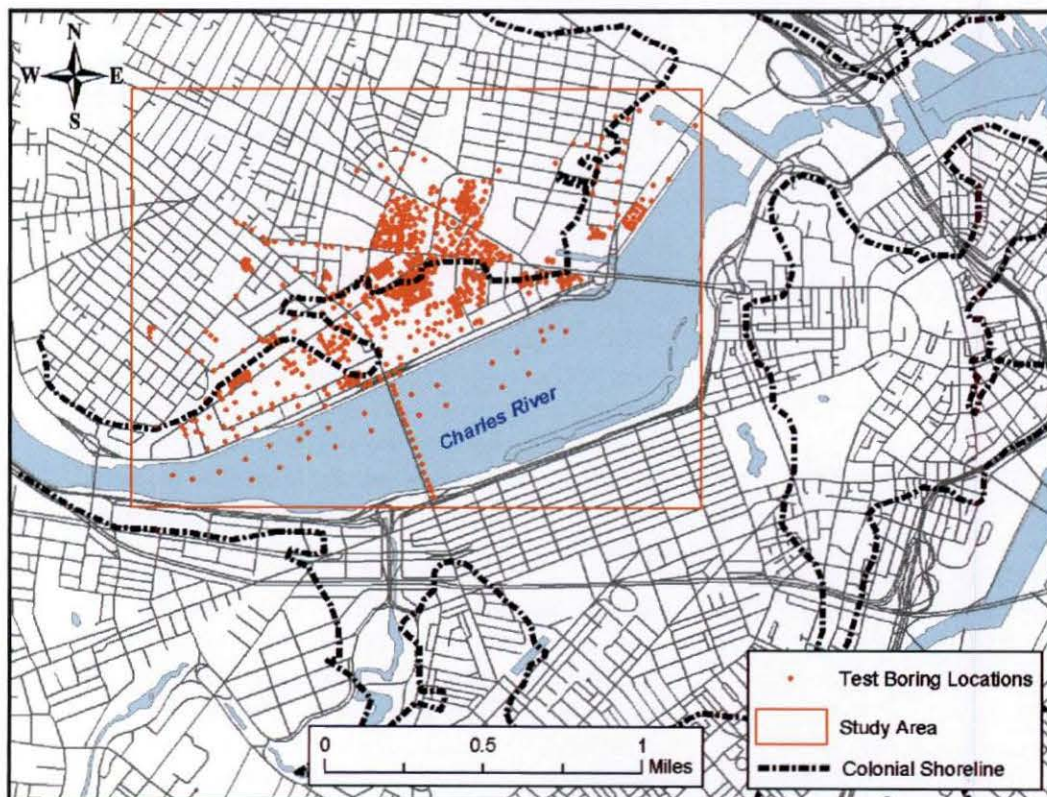
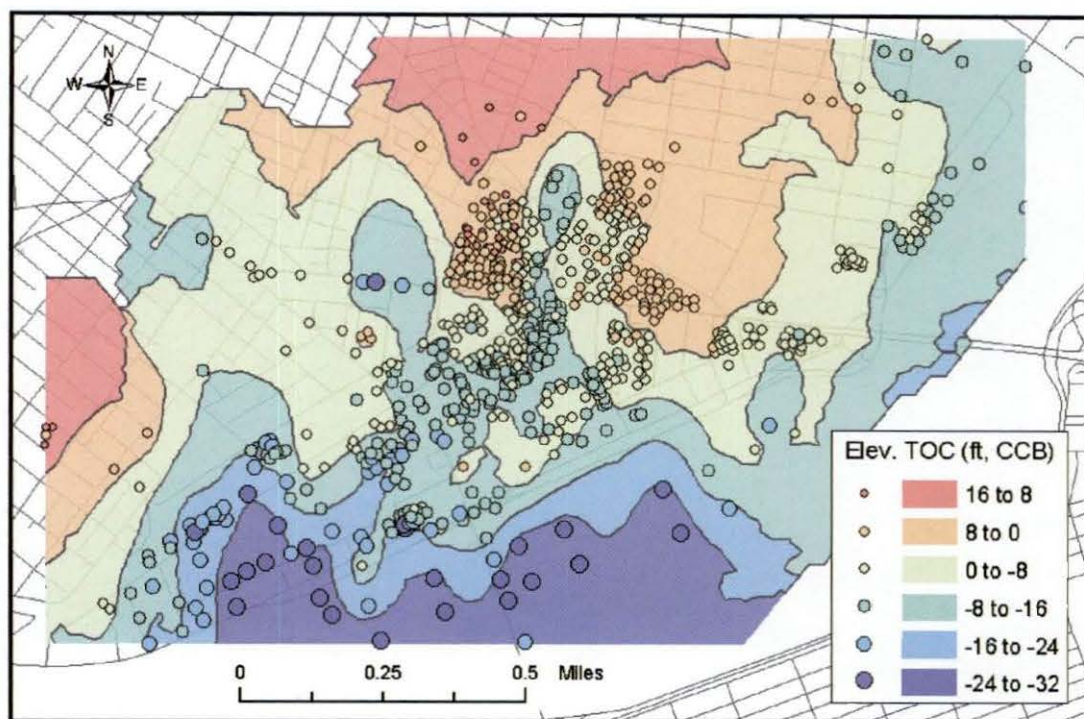


Figure 2
Study Area and Subsurface
Data Points for Research
Conducted at Tufts University

Figure 3
Elevation of Top of
Marine Clay Stratum
(Higgins and Baise,
2003)



these were conducted included the campus of the Massachusetts Institute of Technology (MIT), in Cambridge, Massachusetts. The subsurface information included on the exploration logs was entered into a relational database and displayed and analyzed using GIS. The information was then analyzed using geostatistical tools within the GIS software in order to interpolate “continuous” geologic surfaces across the study area.

One stratigraphic unit explored during the research was the marine clay deposit, known locally as the Boston Blue Clay, which underlies the region. Due to the complex depositional environment adjacent to the Charles River, the surface and the thickness of the clay deposit varies significantly across the region. Figure 3 shows an interpolated map generated from tools in GIS showing the top of the marine clay layer across the campus based on the information compiled in the database. The map indicates that the top of the clay deposit slopes downward toward the Charles River, varying by almost 50 feet over approximately one mile. Tufts University used the GIS to assess the spatial variability of different geologic units and to study potential liquefaction hazards associated with natural sand deposits.

Tools for Master Planning

While the examples discussed above were conducted for research purposes, the compilation of subsurface information over a campus-wide area also can be extremely useful for master planning purposes. Subsurface information can be used to evaluate potential foundation conditions, as well as to identify areas to avoid due to premium construction costs. For example, the depth and thickness of the clay deposit in the Boston area is critical to selecting the foundation types (shallow vs. deep foundations) for new buildings, as well as

for evaluating potential building settlement. These issues can have significant cost impacts to the project and should be carefully considered when selecting a potential building site.

In addition to cost premiums associated with foundation selection, soil and groundwater contamination also play an important role in identifying cost premiums associated with proposed development areas, particularly for campuses located in urban areas or on filled land where contamination is more likely. Chemical contamination information can be incorporated into the database system to identify development sites where costs for remediation may be higher than other areas of campus.

Furthermore, the compilation of available subsurface information collected from previous campus developments into one system enables the identification of areas where additional subsurface information may or may not be required. Since the spatial data could be presented showing locations of previously performed investigations over a large time period, future field programs for new structures and utilities could better use the available information and thereby reduce the costs associated with field geotechnical and environmental characterization programs.

The following examples from Wellesley College and Harvard University illustrate how GIS is being used for evaluating potential sites for new buildings and master planning purposes.

Wang Campus Center—Wellesley College

GIS was used by Wellesley College as a tool for siting studies for the new Wang Campus Center and Davis Parking Garage (intended to consolidate existing parking areas and promote a “walking campus”). The college used GIS to pro-

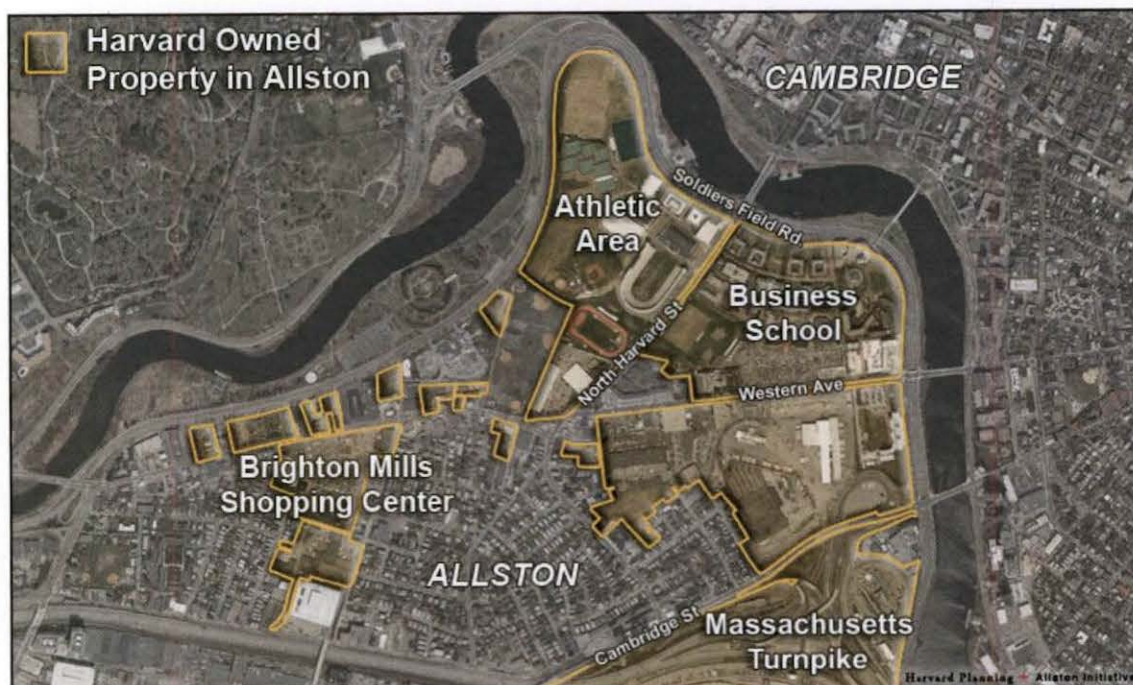


Figure 4
Use of GIS for Master
Planning Activities at
Harvard University

vide preliminary feasibility evaluations of proposed building locations. GIS was utilized to provide a cost-effective evaluation of subsurface soil and groundwater conditions; existing elevation contours; and proximity to college roadways, utilities, and residential buildings. The GIS helped to identify an area that suited the needs of the college; however, GIS data showed that the selected site included areas of known contamination that would add significant costs to the construction project.

After careful analysis of the costs and benefits of the site, this location was selected; however, the early identification of costs associated with soil remediation allowed for accurate budgets to be established for the project. GIS was then used to develop a design at the chosen site that evaluated excavation and reuse scenarios to minimize costs associated with off-site disposal of soil. The portion of the projects associated with management of environmental contamination came in below budget, due largely to the GIS planning undertaken prior to construction.

Master Planning Allston Campus—Harvard University

Another example of the use of GIS for master planning is the growth and extension of Harvard University into the Allston, Massachusetts area. The Harvard Planning and Allston Initiative (HPAI) was formed to create the framework for the new development in a way that best supports Harvard's academic mission and growth needs while ensuring that the new campus is an integral part of the broader urban community (www.allston.harvard.edu/ai.htm). Figure 4 illustrates the use of GIS as one of the many tools that HPAI uses to aid in the planning and development of the 344-acre parcel of land.

Tools for Facility Management and Operations

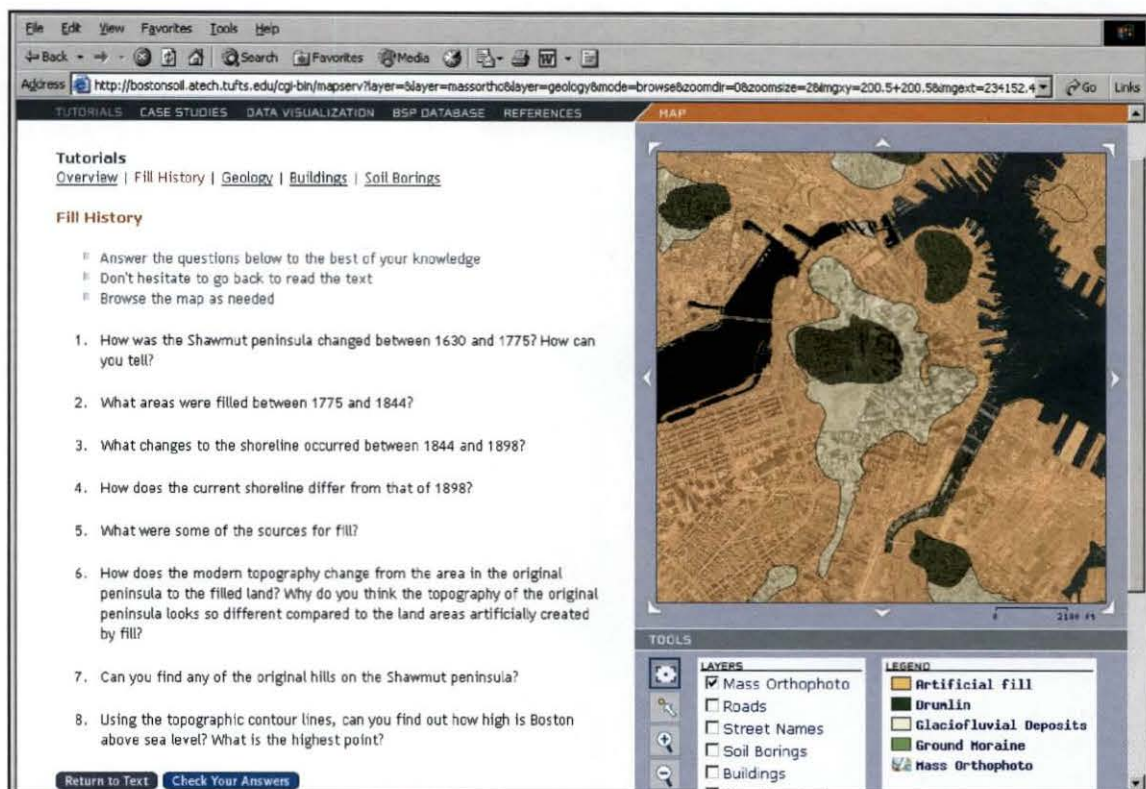
Since GIS can be used to store and display data spatially, GIS is well-suited for management of campus facility operations. GIS tools for facility management can be used to efficiently schedule maintenance activities for buildings, utilities, roadways, and landscaping features by evaluating areas spatially. In addition, creating GIS layers for landscaping features can be used for master planning landscape improvements. For example, a layer showing oak trees on campus could display the location, current dimensions, age, and date of last pruning. There are tools in GIS that could be used to simulate what the mature landscaping will look like or how the site will change seasonally.

Other GIS applications include management of underground storage tanks and permits, and the evaluation of potential nearby impacts of leaking tanks. Environmental health and safety management operations such as indexing locations of hazardous waste storage and generation, areas designated for recycling operations, emergency vehicle access routes, and evacuation plans are ideally tracked using GIS tools.

GIS as an Educational Tool

GIS can be used as an educational tool to teach students about mapping, interpolation techniques, and geology. Under the direction of Professor Laurie Baise at Tufts University, an interactive GIS website has been established to aid students in exploring geologic conditions in Boston. The database was developed using available subsurface information such as data from the Central/Artery Tunnel project. Tutorials included on the website (Figure 5) teach students about the filling history of Boston, geologic sampling techniques, and foundation con-

Figure 5
Use of GIS in the
classroom as an
educational tool,
Tufts University



siderations for buildings based on varying subsurface conditions. The website was developed in 2004 and is being implemented in graduate and undergraduate courses within the Civil Engineering and Geology Departments. (Boston Subsurface Project Website: <http://bostonsoil.atech.tufts.edu/index.html>)

Tools for Communication and Marketing

Applications for communication and collaboration using GIS are just emerging at universities and colleges. GIS is being used for a wide variety of other functions important to educational institutions, including:

- Mapping space utilization for research grants and federal funding applications;
- Communicating campus activities and facility schedules with the university public (faculty/staff, students, community) using GIS to display information at campus buildings via the Internet;
- Providing interactive campus maps, accessible through the Internet, showing parking areas, walking paths, bus routes, class locations, and faculty offices. For example, students at MIT developed a GIS system that tracks campus bus movements and provides up-to-date locations via the Internet, so that minimal time is spent waiting for the bus (<http://shuttletrack.mit.edu>);
- Using GIS Web interfaces as a differentiator to help attract faculty and students;
- Communicating information on campus improvements and ongoing construction projects; and
- Increasing communication and effectiveness between facility managers and consultants during planning, design, and construction.

Conclusions—The Future of GIS

Technology has greatly improved so that GIS and other related tools can be readily used by facility managers, planners, faculty, and students at educational institutions. Since new data will be electronic, incorporating existing hard copy data into an electronic platform will allow increasingly more efficient planning, operations, and communication at educational institutions. GIS is an economical, beneficial tool that can be effectively used for planning by colleges and universities, regardless of the size of their endowment. As the technology continues to advance, the usefulness of GIS will continue to expand and improve. 🏛️

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THE HIDDEN ECONOMICS OF CAMPUS SUSTAINABILITY

by John P. Morris

As the manager of facilities operations at Colorado State University (CSU) I had the opportunity to lead a variety of work units including Utility Services, Energy Management and Water Conservation, Trades Services, Custodial Services, Trash and Recycling, Outdoor Services (Grounds), and Transportation Services. Each of these work units has actively implemented numerous sustainability programs. However, the purpose of this article is to discuss some of the less obvious benefits of campus sustainability efforts that are often overlooked.

John Morris was until recently the manager of facilities operations at Colorado State University, and is now physical plant director at the University of Colorado, Boulder. He can be reached at john.morris@colorado.edu. This is his first feature for Facilities Manager.

Most of us are familiar with the obvious economic and environmental benefits associated with utility cost avoidance programs. For example, Colorado State University has actively encouraged energy management and water conservation efforts since the early 1970s. Since the mid 1980s, CSU has had a utility cost avoidance of over \$35 million. Associated with these programs is an estimated emissions avoidance of over 1 billion pounds of carbon dioxide (CO₂), over 6 million pounds of sulfur dioxide (SO₂) and over 3 million pounds of nitrous oxide (NOX). However, some of the less obvious benefits of these efforts include the avoidance of expensive utility plant investment fees; emission equipment installations or upgrades, utility infrastructure upgrades; maintenance savings; improvement in the quality of the indoor environment; free publicity; and a recruiting tool.

Utility Plant Investment Fees

CSU's conservation efforts have delayed and deferred the need to purchase expensive plant investment fees from the local utility supplier. For example, since 1990, the student population has increased by 5,000 students (a 25 percent increase) and building square footage has increased nearly 1.4-million gross square feet (a 19 percent increase), while potable water use has decreased over 108-million gallons (a 22 percent decrease). The equivalent cost of water and wastewater plant investment fees is in excess of \$2 million.

Emission Equipment Installations or Upgrades

The university is required to have air emission permits under Title V of the *Clean Air Act*, which imposes limits on the quantity of specific emissions. Growth due to campus expansion could potentially require the university to incur the capital cost of implementing best management practices to control emission levels. Reducing the current emission levels through conservation efforts defers or potentially eliminates the need to invest the capital required to implement additional emission reduction best management practices.

Utility Infrastructure Upgrades

Conservation efforts have also deferred for decades the need to increase the capacity of expensive utility infrastructures. During the late 1980s, a major sanitary wastewater line experienced surcharge problems. As can be expected, a sanitary line that raises a manhole cover and overflows onto the campus is not a desirable situation. The cost to increase the capacity of this sanitary system is well over \$2 million. The reduction in campus water consumption has not only eliminated the surcharge problem, it has also deferred the need to invest the capital required to increase the size of this system, even with the addition of several new buildings.

CSU also has a steam district heating system with three main boilers. Again, in the late 1980s, the university steam demand was quickly approaching the firm capacity of the boilers. Energy conservation measures have delayed the need to upsize the plant capacity for nearly 20 years, even with the

addition of over 800,000-gross square feet (GSF) of building space. The deferred cost to increase the smallest boiler is well over \$2 million.

Maintenance Savings

In the early 1980s, Colorado State University investigated the use of an energy service company (ESCO). It was determined that the best option was to issue certificates of participation or bonds, in the order of \$12 million and to use internal resources to implement a similar program without the assistance of an ESCO. After a decade of implementing conservation programs, the bonds were completely paid off using the cost avoidance to the utility budget, leaving the university with nearly \$2 million annually available for other opportunities. Nearly \$1 million per year was reinvested into facilities needs such as building system renovations. Another million dollars was available for such things as faculty salary increases and other academic or administrative needs.

Other benefits related to conservation efforts included a reduction in lighting system maintenance costs. For example, replacing a 40-watt exit light with a life of about 1,000 hours with a 2-watt exit light with a 10,000-hour life significantly improved the maintenance staff's ability to ensure properly functioning exit lighting systems. Similar benefits were experienced with main building lighting systems.

Improvement in the Quality of the Indoor Environment

Lighting system improvements not only reduced maintenance costs but also improved the quality of the work environment with the advantage of increased worker productivity. It is difficult to put an exact number on the economic benefit of improving the quality of the indoor environment but these numbers do exist. It is well known that the cost of an employee per square foot is at least one order of magnitude greater than the cost of the utilities for that same space.

For example, if an employee making \$30,000 per year occupies an office of 100-square feet, the unit cost of that employee is about \$300 per square foot. The cost of utilities for that same space is less than \$3 per square foot. Improving the productivity of that employee by only 1 percent is worth \$3 per square foot. A conservation project that reduces the utility expenses by 10 percent, or \$.30 cents per square foot, could result in an

improvement in worker productivity by \$3 per square foot if the savings is reinvested into the facility. At Colorado State University, reinvestment of the utility savings into the older campus buildings helped to revitalize numerous facilities that were quickly exceeding their functional purposes.

Similar studies have shown that the classroom environment can impact the learning ability of students. In cooperation with academic departments such as the department of Construction Management, various classrooms were renovated using sustainable concepts, not only teaching sustainable concepts to the students, but also making these spaces less institutionalized and more conducive to a positive learning experience.

In July 1997, Fort Collins, Colorado experienced a 500-year rainfall that caused nearly \$100 million worth of damage on campus. Nearly 40 buildings experienced water damage, including several lower levels that were completely inundated with water. One outcome of this rainfall was an increased awareness and sensitivity to the effects of mold and other indoor air quality concerns. The loss of worker productivity related to the indoor environment of these buildings could be costly. Incorporating sustainable or green products into building construction and campus operations can reduce or eliminate the negative impacts of indoor air quality-induced illnesses.

Software for the INFORMED Professional

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¹Software developed in consultation with Jack Dudley, P.E., Editor and Co-Author of the First Edition of the *Custodial Staffing Guidelines* and Co-Author of the Second Edition. Mention of APPA does not imply endorsement of the product.

²ISSA Cleaning Times used by permission of ISSA, Lincolnwood, IL., www.issa.com

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Free Publicity

CSU spends a significant amount of money on marketing to attract new students. Energy conservation programs can assist with this marketing effort at no additional expense. When the university offered students in the residence halls the opportunity to purchase 100 percent of their electrical needs from wind power, the news was reported in more than 25 newspapers nationwide, including the *New York Times*. Colorado State University has also been listed in several trade journals relating to partnerships in programs such as the EPA Green Lights program and Climate Wise. Publicity of this type is

priceless and requires minimal effort beyond implementing conservation measures.

Recruiting Tool

Many institutions are vying for national and international recognition. To do this, they compete for students, faculty, and research funding. As the next generation becomes more focused on reducing their environmental footprint, having a sustainable mindset can be a significant recruiting tool. More than ever before, university building designs are viewed as enhancing and preserving our institutional heritage while creating an attractive environment in which to learn, discover, and live.

We do not just build or renovate structures; we create a 'sense of place.' It is important that the university actively demonstrates this concept within its mission and values. Active support for energy management and water conservation is one way to demonstrate this commitment.

Conclusion

Energy management and water conservation have the direct benefit of utility cost avoidance and reduction in emissions. They also have some less obvious and often overlooked significant cost benefits such as the avoidance of expensive utility plant investment fees, reduction in expensive emission upgrades, avoided, or deferred utility infrastructure upgrades, maintenance savings, improvement in the quality of the indoor environment, free publicity, and a powerful recruiting tool. I encourage facilities managers to consider and take credit for these less than obvious benefits. 🏢



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Are...

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organizational occupancy and
recovering indirect costs asso-
ciated with funded research?

When...

...was the last PM performed
on this equipment?

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...is our inventory,
and do we have the right
materials on hand?

How...

...much are we spending on
utilities each month?



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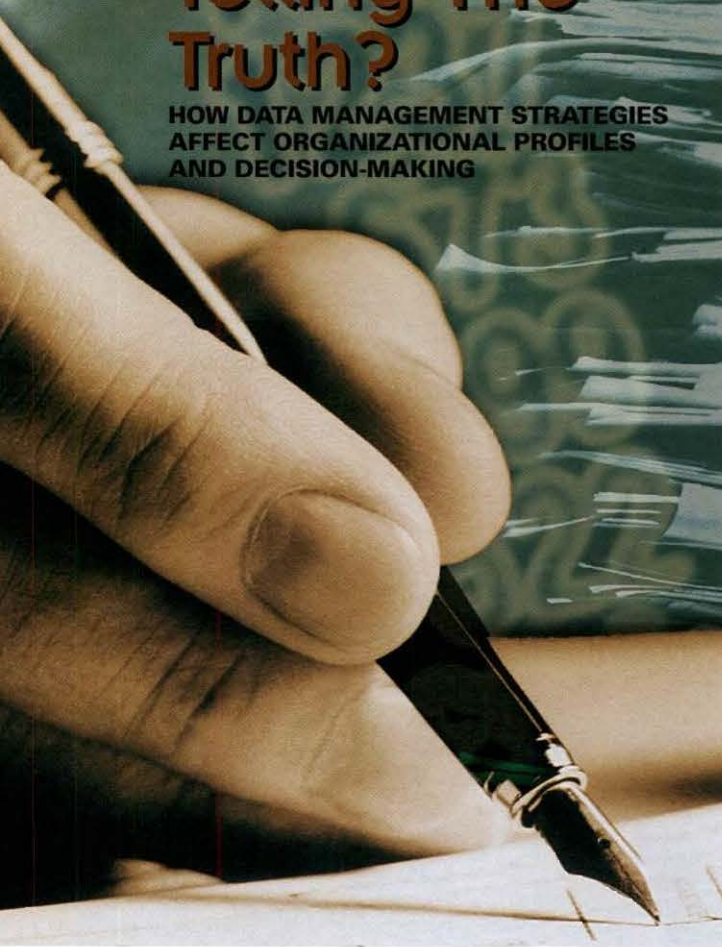
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Is Your Work Order Data Telling The Truth?

HOW DATA MANAGEMENT STRATEGIES AFFECT ORGANIZATIONAL PROFILES AND DECISION-MAKING



by Frank Lucas

Maintenance management has come a long way over the last 30 years. Once regarded as strictly a reactive, resource-intensive cost center, managers now run maintenance organizations like businesses, collecting and analyzing data to assess, plan, and make important decisions aimed at preserving facilities and assets in the most efficient manner possible. Work orders serve as the primary source of this information due to their role as the essential instrument used for recording maintenance activities.

But how do you know that the key facts and figures being extracted from these documents are accurate and credible? What if the data on which you have been basing important strategies and decisions is not portraying a true profile of the

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organization? While computerized maintenance management systems (CMMS) have become an invaluable tool in the maintenance professional's arsenal, they will only produce what has been put into them. The axiom "garbage in equals garbage out" still applies. Just as important is how data is identified for future recall, for this is the dynamic component that can make even good, factual information tell an inaccurate story.

Everyone agrees that the heart of a maintenance organization lies in what happens out in the field—what my mentors referred to as "where the rubber meets the road." But this distinction is lost when an organization doesn't take the necessary steps to ensure their data management strategies are accurately describing these activities. This key process must be well thought out and executed if decisions are to be based on valid, reliable information. Despite all the advancements made on the business side of facilities management, it still takes human beings to develop and execute procedures, conduct training, and perform review functions that regulate the data collection effort in a dependable manner that produces legitimate results.

Forecast vs. Historic Data

Maintenance data can be broken down into two main categories, *forecast* and *historic*. A newly created work order is actually a rough draft that documents a maintenance concern or customer need. This information can be used to predict or *forecast* future events and activities. Anyone who monitors maintenance backlogs or plans work schedules uses forecast data to accomplish these tasks. Conversely, a completed work order is the final report of exactly what was done to address the issue. This information becomes the actual or historic account of actions taken. Those who report on expended work hours or accumulated costs use historic data to generate these statistics.

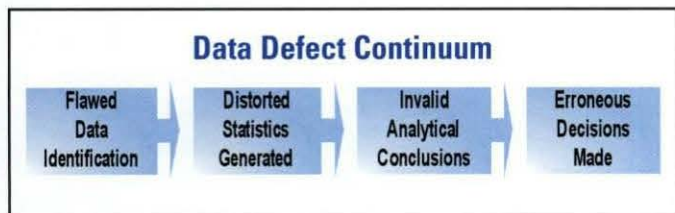
In some cases, forecast and historic data are preserved on the same document. An example of this is estimated cost (forecast data) and actual cost (historic data). In other cases, forecast data must be changed to become accurate historic data. If a work order to answer a "too hot" complaint is initially classified as routine maintenance (forecast data) and the technician corrects the problem by making a repair (historic data), the work classification should be modified to match that action. This is the part of data management that many maintenance professionals fail to address in procedural documents and execute as part of their daily operational routines. Hence, many reports and statistical compilations generated from the CMMS will likely present inaccurate representations of what is truly taking place in the organization.

While items such as work order types, priority codes, work hours, cost, and equipment tag numbers play an important role, it would be hard to argue against the technician's field comments as being the most important component of a work order. As demonstrated above, it is these field comments that communicate to the organization what was done to complete

the requested work. The field comments turn the work order rough draft into the final report, transforming forecasted data into historical data. This is the information most often used to statistically profile the maintenance organization. It is also the same data technicians use to review previous actions taken, find trends, and determine root causes of problems. This makes the technician's field comments more than just a historical record of how work orders were resolved; it now becomes the principal source from which statistical information is collected, identified, and managed for future recall.

In some instances we already know what the expected resolution will be, and work orders can initially be coded to meet that expectation. A work order created to have a key made, for example, has very little probability of being fulfilled in any way other than a locksmith cutting the key. The chances are very good that no changes to the work order classification will be necessary if it was coded correctly to begin with.

But what about a work order to address a "too hot" complaint? Expected technician activities can range from simple adjustments, to moderate repairs, to replacing a capital piece of equipment. Each of these actions describes a vastly different scenario for resolving this common service call. Thus, the codes used when creating the work order must be reviewed at close-out and modified to appropriately reflect the nature of the work that was performed. Failing to do this triggers a data defect continuum (see below) of sorts, a chain reaction of events that could profoundly affect statistical profiles and eventual decision making.



Developing Data Management Controls

To be run like a successful business, maintenance organizations must have process and procedure documents at the core of their operations that govern all aspects of work order data entry. These documents should include definitions for each of the classifications and codes that management has determined are appropriate for their needs. Along with the definitions, some common examples of each should be included to help employees understand how the corrective actions taken dictate their use.

For instance, a work order type called *repair* must include an explanation of what a repair means to the organization, and should include some examples of repairs that routinely occur at the plant. Replacing worn components, patching leaking pipes, and re-wiring faulty circuits are all examples of traditional repair activities.

During the life of an active work order, at least two classification and coding opportunities will occur, once during initial

To be run like a successful business, maintenance organizations must have process and procedure documents at the core of their operations that govern all aspects of work order data entry.

creation and again at close-out. The initial creation of a work order offers the first opportunity based on known facts, which are usually minimal or general in nature. In the case of the "too hot" complaint, the actual "fix" will not be known until the technician has had a chance to assess the situation, take necessary corrective action, and verify that desired results were achieved. An organization should decide on the use of default codes when defining factors are not initially known, with the understanding they will be reviewed at least one more time at work order close-out. The "too hot" example above may be classified as *routine* or *recurring* work at first, but then changed upon final review of the documented corrective actions. Depending on the processes outlined in an organization's control procedures, additional classification and coding opportunities are possible.

Some organizations make interim changes to work orders as they pass through various stages of the work process. These can entail updating status codes, modifying job scopes, or routing line item tasks to other shops and trades. Such updates help manage backlogs and schedules by making work order data as real-time as possible. Once the work order has been turned in for completion and all postings and documentation have been entered, a final code review can take place. This step includes looking at the technician's comments, ensuring they adequately describe what was done, and changing classifications and codes that more appropriately match the actions taken.

Classifications and codes are then used to quantify data into various statistical categories that management has determined will provide a representative snapshot of the business. The results can be analyzed and appropriate decisions made. This process assumes classifying and coding was done correctly and is reviewed for accuracy prior to the data becoming part of the historical record. The identifiers a maintenance manager decides upon can be based on a combination of past experience or preferences, industry standards and best practices, or those that fulfill site-specific requirements. Once they are decided upon, it is important that everyone is made aware of them and understands the circumstances and situations that determine their use.

Examples of more common classifications and codes include request and work order types, priority codes, building and room designators, statuses, trades and shops, equipment or asset tags, and condition-cause-action codes. Other identifiers may stem from operational features built into the CMMS design or requirements of other business systems that share data with the CMMS. These can include repair or cost center

labels, account number formats, task or job numbers, warehouse and part IDs, employee designators, timekeeping codes, and other site-specific references.

Employee Responsibilities

Some organizations have the resources of an extensive work control operation to perform data entry and review functions while others may need to rely on a limited clerical staff or the technicians themselves. Whatever the situation, these employees play a major role in how the organization is statistically portrayed. It is absolutely vital that technicians write good comments, not only for management's purposes, but also to serve as a viable maintenance tool for learning, diagnosis, and prevention.

There is often debate over what constitutes a good comment, and clear answers are hard to define. While they shouldn't be novels, they should at least contain enough information so appropriate qualifiers can be determined based upon the definitions established by the organization. If a work order was created to "cut a key," a comment of "done" or "complete" might be good enough. But a work order created to address a "too hot" complaint will require more elaboration to describe how the problem was resolved. In addition to this requirement, organizations may stipulate additional information such as the operating condition a piece of equipment was left in, fill-in-the-blank answers to task questions, and follow-up activities that may need to occur in the future.

While good comments are vital, it is equally important that employees interpret, classify, and code them in a manner that truly represents the work performed. Statistical reports are not generated directly from field comment text but rather from identifiers that represent field comment text, so it is important that they are categorized in accordance with organizational guidelines. If field comments do not allow for accurate determinations to be made, the work order must be sent back to the technician for additional information. Work orders may also include ancillary materials in the form of check sheets, logs, and other attached documents.

Data management procedures must address the handling of this information as well.

The need for a manager to include reviews of closed work orders cannot be underscored enough. It is the only way with any certainty to verify employee performance and ensure that statistics being generated from the CMMS are portraying the organization with a high degree of accuracy. This can be accomplished by creating reports that show all appropriate disposition criteria and field comments for work orders that were closed in a given time period, usually the previous day or week. This information is then reviewed for accuracy, with items requiring modification highlighted and returned to data entry personnel for correction. This becomes a good training tool that fosters an atmosphere of continuous improvement and demonstrates the organization's commitment to data reliability. In addition, error rates can be benchmarked, recurring mistakes highlighted, and follow-up training performed so improvements can be made where needed.

Understanding Data Dynamics

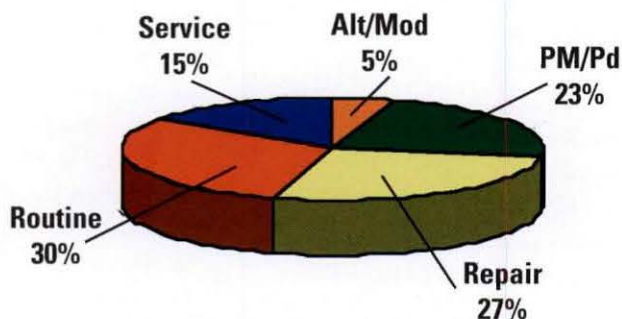
The accuracy of collected information ultimately lies with management. It is their responsibility to write procedures, perform training, enforce data identification requirements, and review employee performance to ensure success. It is also important for employees to understand how these activities affect the organization. Showing them how data is used and the potential impacts of non-conformance is a great learning tool. It helps instill a sense of awareness, promotes ownership of the process, and illustrates their role in the success of the organization.

Figures 1 and 2 represent a work year of activities for a 20-person maintenance shop. They demonstrate how changes in the way work order data is categorized can lead to dramatically different statistical results, which in turn can affect a manager's perception of the organization.

Figure 1 shows a work hour collection broken down by work order type for a maintenance organization. Figure 2 shows the same data classified differently. Because both fig-

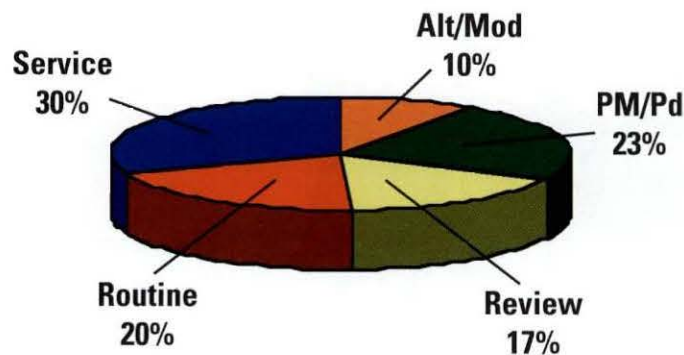
Work Hour Distribution by Work Type

FIGURE 1



Work Hour Distribution by Work Type

FIGURE 2



ures present a different set of circumstances, conclusions about the data will be different. Quite often budgets are earmarked for specific activities, such as the maintenance of real property and installed equipment. Note the percentage difference in non-maintenance service hours, with Figure 2 indicating less time being spent performing core maintenance functions.

If the annual budget submittal was based on Figure 1 data, this increase could violate guidelines describing how maintenance-funded work hours are to be used, which could lead to reduced funding from this source in the coming budget cycle. Some organizations charge back requesters for performing non-maintenance services. Assuming this is the case here, a manager reacting to Figure 2 data could assume 15 percent more of his FTEs, or three more technicians, would be paid for by customer accounts ($20 \times .15 = 3$ in Fig. 1 versus $20 \times .30 = 6$ in Fig. 2).

Figure 2 shows a smaller repair percentage than Figure 1 with both having a consistent PM/Pd share. Because Figure 2 data indicates fewer things are breaking down, a manager using this data could assume the PM program is working much more effectively than originally anticipated. By extracting the PM and Repair percentages from each chart, a classic PM to Repair comparison can be done. When adjusted to a 100 percent scale, dramatically different PM to Repair ratios and vastly opposed organizational profiles become evident (57.5% PM to 42.5% Repair in Fig. 2; 46% PM to 54% Repair in Fig. 1).

In many organizations, alterations and modifications represent resources spent on modernizing facilities and equipment. A manager operating under these assumptions could conclude the drop in repair rates in Figure 2 is due to its 5 percent increase in modernization work. If such work is traditionally performed by outside contractors using capital funds instead of the operations budget, the manager might incorrectly expect a labor surplus that can either be re-assigned to new activities or serve as justification for a reduction in force.

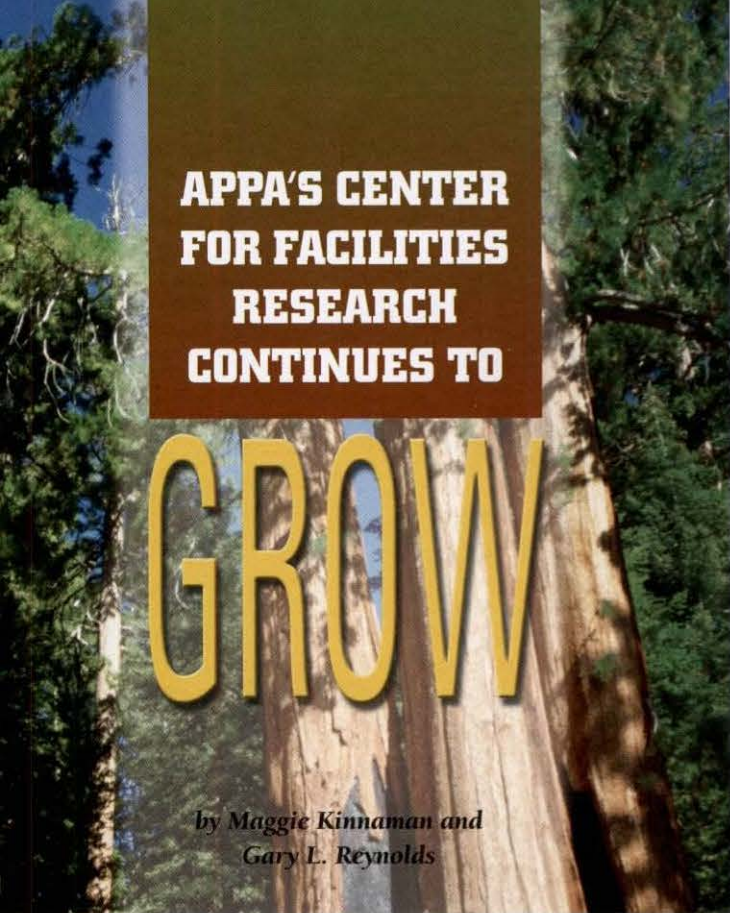
A Foundation for Success

The above examples are an oversimplification of how differing statistical profiles can affect decision making. But while historical work order data should accurately reflect the activities taking place in the field, relying on it alone violates the intent of making a fully informed decision. Analyzing budget reports, reviewing commodity usages, and conducting meetings with supervisors and technicians are examples of steps that can be taken to corroborate findings prior to making important choices.

A work backlog forecast that disputes statistical indications of shrinking maintenance requests or a budget report that lacks the evidence of expected surpluses from an increase in chargeable services would refute the statistical analyses above. Clearly, a well-rounded approach should be employed to verify what the data is telling you and create a higher degree of viability. But regardless of whether or not all the indicators agree, a story about the organization is being told just the same. The reasons why they do not corroborate are just as important as the reasons why they do.

The process of good decision making is built upon a foundation of accurate data collection and identification. Understanding its origins, developing management controls, training responsible employees, and performing reviews to verify its authenticity are essential functions for operating a maintenance organization in a business-like manner. Asking important questions about the intent of such a process and setting expectations for what the end results should be are a good way to start.

What statistical categories are going to be analyzed? How will the results be used or interpreted? Who or what will influence contributing data sources? How will the data be formatted, generated, and presented? What procedures, training, and follow-up activities will be necessary to ensure success? The answers to these questions will vary among organizations but the ultimate goal is the same—a sound data management strategy that should never leave you wondering if your work order data is telling the truth. 🏠



APPA'S CENTER FOR FACILITIES RESEARCH CONTINUES TO

GROW

by Maggie Kinnaman and
Gary L. Reynolds

It has been two years since the launch of an exciting new APPA initiative, the Center for Facilities Research (CFaR). The past two years have yielded many accomplishments that we'd like to share with you. First, though, let's review the basic concepts of CFaR.

Purpose of CFaR

The Center for Facilities Research was established to organize and consolidate research on facilities management issues concerning educational facilities within the APPA association. Research is broadly defined as the "deliberate search for knowledge."

CFaR is intended to function as an instigator of research, a repository of information, a resource center for members, a means for information distribution, and as a means of recognition of APPA members for their research work and contribution. CFaR supports APPA's desired outcomes of competence, credibility, and collaborative relationships by connecting our members to evolving research that will help to raise levels of competence and enhance institutional credibility.

Maggie Kinnaman is director of business administration for facilities management at the University of Maryland, Baltimore; she can be reached at mkinnama@fm.umaryland.edu. Gary Reynolds is director of facilities services at The Colorado College, Colorado Springs, Colorado; he can be reached at greynolds@coloradocollege.edu. Both are co-directors of APPA's Center for Facilities Research Advisory Council.

ity. In addition, the initiative connects our members to others who have conducted research and have a story to tell.

Center for Facilities Research desired outcomes:

- Identify needed research areas
- Expand and strengthen the facilities body of knowledge
- Engage more constituents/stakeholders in research
- Ensure stability and continuity of the research initiative
- Consolidate existing and future facilities-related research
- Improve access to facilities research information

CFaR's—Vision and Mission

The Vision is: "An internationally recognized resource supporting learning environments."

The Mission is: "Advancing the body of knowledge of facilities management through research, discovery, and innovation."

History of CFaR

In February of 2002 the APPA Board of Directors approved the creation of CFaR and the renaming of APPA's Standing Committee to Information and Research. This alignment created a new reporting line integrating CFaR permanently into APPA's governance structure. With this approval, and preliminary funding, a CFaR management and advisory structure consisting of two co-directors and four assistant directors and an Advisory Council were developed. The preliminary funding for CFaR came from significant and ongoing sponsorship provided by founding contributor Applied Management Engineering, Inc. of Virginia Beach, Virginia.

CFaR Advisory Council

Directors

Maggie Kinnaman
University of Maryland,
Baltimore

Gary L. Reynolds
The Colorado College

Assistant Directors

David A. Cain
CARTER & BURGESS, INC.

Harvey D. Chace
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The work completed in the interim two years includes the development of the basic structure including a vision and mission statement, organizational alignment, policies, management and research procedures, an in-depth Researcher's Guide and the creation and enlistment of a peer research review group. In addition, several research projects have been completed and published, website development has started, marketing materials have been developed for members and external constituencies, and research has been sponsored, such as the Stewardship Investment Model (SIM) and the Impact of Facilities on Student Recruitment and Retention.

We are in the second year of a five-year startup of CFaR. The initial activities, as outlined above, have been supported by donations to CFaR by interested Business Partners and for this support we are extremely grateful. In addition to the tremendous sponsorship we have received from Applied Management Engineering, we are also grateful to Facility Asset Consulting and Sodexho for their generous support of CFaR. These activities have permanently integrated CFaR into APPA's governance structure, created an awareness of CFaR amongst our members and external constituencies and created the underlying support structure to conduct peer-reviewed research.

The development of information includes seed funding for research such as the SIM project and the Impact of Facilities on Student Recruitment and Retention research. The completion of these projects, along with several others that were completed and published under the auspices of CFaR, help to set a standard of high quality research and credibility for CFaR.

The delivery of information is an important part of CFaR's mission. A key component in that delivery process is the development of a dynamic, Web-based library and search engine that allows CFaR to gather, classify, store, and deliver information on-demand. Also, other delivery mechanisms need to be developed including a peer reviewed journal, APPA Annual Forum delivery support, and delivery at other APPA educational venues.

Completed CFaR Projects

The following research projects have been completed under the CFaR umbrella.

• Workplace Violence in Higher Education

Principal Investigator: Edward L. Rice, Kansas State University
Executive summary published in March/April 2003 *Facilities Manager*

"Workplace violence is more complex than an employee suddenly appearing at his or her workplace heavily armed with the intention of killing supervisors or other employees. In understanding workplace violence, administrators must be aware that violence can strike a college or university campus at any time. Administrators must also understand that the

only effective defense against workplace violence is their campus employees. For the employees to be effective requires that the campus have a workplace violence prevention program and workplace violence training to support the program."

• Implementing the Capital Plan

Principal Investigators: William A. Daigneau, University of Texas M.D. Anderson Cancer Center, and Jack Hug, APPA Past President

Published as chapter in the APPA-NACUBO book, *Planning and Managing the Campus Facilities Portfolio*, 2003

"Developing a comprehensive long-term capital plan to manage the facilities portfolio is a major challenge. Implementing that plan is yet another. Not all projects in the capital plan carry the same priority. Generally, most projects fall into one of two categories: 1) projects necessary to maintain the operational integrity of the institution; or 2) projects that have a strategic importance to the institution and those that further its mission and goals. Some projects may have elements of both categories; for example, the renovation of an older building to support a new program may also include a number of repair projects, such as a new roof and upgrades to the building façade, as well as necessary code compliance improvements."

• Where Do You Lead From?

Principal Investigator: Frederic J. Gratto, University of Florida
Executive summary published in May/June 2004 *Facilities Manager*

"In a profession as technical as facilities management, all the hardware in the world can be a mighty force. Nonetheless, the software of management skill matters more than ever before. Leaders have the biggest impact on any organization; employees tend to take on the characteristics of their leader. People do follow the leader. In fact, employees ascend or tumble to the level of the leader. Therefore, it is important for leaders in facilities management to consider how their behavior, attitude, and level of job satisfaction impacts the work environment and the performance of the people in it, including themselves."

• Traversing the Culture Continuum

Principal Investigator: Glenn Smith, Bryn Mawr College
Executive summary published in May/June 2005 *Facilities Manager*

"Change is essential to any improvement effort, and yet our institutions of higher education are, by their very nature, highly resistant to internal change. So where do we start? Perhaps at the very place where that resistance resides—the institution's culture. The important point is to understand that the effectiveness of any efforts to change the output, product, or service of any organization is dependent upon the organizational culture—the interrelationships, interactions, and interdependencies of people, and the written and unwritten rules that govern them. Performance and success, however measured, is directly linked to organizational culture."

Active CFaR Projects

- **Building the Learning Environment Through Strategic Investment**

Principal Investigators: Douglas K. Christensen, Brigham Young University, and Rod Rose, Stratus/The JCM Group

This project will provide a set of stewardship guidelines to help campus administrators understand the total cost of investing in and maintaining campus facilities over their full life from inception, construction, renovation or modernization, through decommissioning.

- **The Effect of Educational Facilities on Recruitment and Retention of Students**

Principal Investigators: Gary L. Reynolds, The Colorado College, and David A. Cain, Carter & Burgess, Inc.

This project will update and more fully explore the impact of the type and quality of educational facilities on student recruitment first seen in a 1980s report by the Carnegie Foundation for the Advancement of Teaching. At press time nearly 16,000 undergraduate students have completed the researchers' Web-based survey.

- **Structuring In-House Construction Rates in Colleges and Universities**

Principal Investigators: Donald J. Guckert and Jeri Ripley King, University of Iowa

Phase I of this study has been completed and was summarized in the July/August 2004 *Facilities Manager* as "The Charge of the Rate Brigade: A Rate Template for In-House Construction Labor." Phase II is underway and will determine the current ratio of recharge rates to direct wages, as well as the factors that influence the ratio.

- **The Facility Condition Index as a Measure of the Conditions of Public Universities in the United States as Perceived by the End Users**

Principal Investigator: Robert J. Quirk, California State University, Long Beach

This study will question the null hypothesis that there is no relationship between the FCI and the perspective of the end users, and the researcher also expects that these findings will provide additional credence to the FCI measurement and reveal an association between customer satisfaction and the condition of our public universities.

- **Facilities Reinvestment**

Principal Investigator: Harvey H. Kaiser, Harvey H. Kaiser Associates, Inc.

Support for facilities reinvestment is enhanced by linking an institutional strategic plan with the development of a facilities strategic plan and long-range capital plan, applying an array of assessment and analytical tools. The researcher



Energy Solutions Guaranteed Energy Savings

"The actual savings we realized during the construction period were greater than Tour Andover Controls had estimated. My impression is that this project has been approached as a team effort by my staff and their staff. The working relationships have been excellent."

— Raymond E. McFarlane
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presented initial findings at most of the annual meetings of APPA regions in 2004.

- **The Effect of Facility Condition Index on National Science Foundation-Funded Research Grants in Higher Education**

Principal Investigator: Theodore J. Weidner, University of Nebraska-Lincoln

Federal research expenditures for science and engineering have increased over 92 percent between 1991 and 2001. This study will create an outcomes-based metric that may be used in future discussions with higher education administrators to address accumulated deferred maintenance issues.

- **Negotiating Win-Win A/E Professional Services Agreements**

Principal Investigator: Donald Chrusciel, assisted by Christopher K. Ahoy, Kelly McCool, and Dean Morton, all of Iowa State University

When combining the interest of being a good steward of the institution's physical assets, along with the interest to obtain design services better, cheaper, and faster, these paradigms come together at a focal point when an institution goes into the negotiations with an external architect/engineer vendor. This study will serve to discover the factors most influential in this negotiating process.

Future Initiatives

- Creation of an APPA Award for Principle Investigators of Level 3 Synthesis and Level 4 Creation research
- Completion of a dynamic website to ensure that our members have access to a repository and resource center capturing and making available the results of evolving research

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Traversing the Culture Continuum—Executive Summary

by Glenn Smith



One could make the case that at the core of APPA's mission lies the term "improvement." APPA, in its pursuit of facilities management excellence, is constantly striving to find knowledge, tools, and educational opportunities that will allow each of us to do our jobs better. But with any pursuit of excellence—any desire to improve—comes the need for change. There's a familiar saying, "If you always do what you always did, you'll always get what you always got." Improvement, by definition, requires change.

This all sounds easy enough, but as Adam Wolfe stated so succinctly in the December 4, 1998 issue of the *Chronicle of Higher Education*, "No institution in America is more resistant to change than the university." And thus, the dilemma starts to take shape. Change is essential to any improvement effort, and yet our institutions of higher education are, by their very

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nature, highly resistant to internal change. So where do we start? Perhaps at the very place where that resistance resides—the institution's culture.

Organizational culture—We've heard and used the term, but do we fully appreciate what it means or the power that exists within it? Many of the references listed at the end of this article describe the concept of "culture" in great detail, but in essence, it is the way things routinely operate and the way people interact. It can be defined by the unwritten rules, the answer to the question "How does it really work around here?" and the "if—then" cause and effect beliefs of the employee population. According to Marshall Sashkin and Kenneth Kiser in *Putting Total Quality Management To Work*, "Culture is the cumulative perception of how the organization treats people and how people expect to treat one another."

The important point is to understand that the effectiveness of any efforts to change the output, product, or service of any organization is dependent upon the organizational culture—the interrelationships, interactions, and interdependencies of people, and the written and unwritten rules that govern them. Performance and success, however measured, is directly linked to organizational culture. The change required by an improvement effort almost always requires a change or shift in organizational culture.

My independent study, observation, and experience dealing with this phenomena of organizational culture has led me to develop a chart I refer to as the "Culture Continuum" (see page 39). By evaluating an institution's culture in terms of five different, but interrelated components, one can better understand the forces that are either encouraging or resisting change. The Culture Continuum represents two extremes, which I refer to as "traditional" and "stewardship." In truth, no culture functions totally at one extreme or the other, but somewhere in between. The issue becomes, in which direction does our culture need to shift in order to encourage the kind of meaningful change and improvement we desire? Or, what should be our culture vision?

The first component, **Leadership Style**, is where any institutional culture finds its roots. Culture, as a force that has become deeply entrenched over time, is a product influenced more by the legacies of the institution's leaders and their individual styles than any other factor. The Culture Continuum contrasts a command and control leadership style with what we have come to refer to as servant leadership. Despite the presence of many different leadership styles within any institution, the culture of the institution will inevitably be a reflection of the leadership philosophy practiced at the highest levels—in our case, by the president and senior administrators.

What leadership styles do you see being practiced at your institution? The top-down autocratic approach of a George Patton or a Bobby Knight, or do they model Max DePree's belief that "A leader is one who serves. Leadership is a concept of owing certain things to the institution. Leadership should

CULTURE CONTINUUM

	Traditional	Stewardship
LEADERSHIP STYLE	command & control →	participatory or servant
ASSUMPTIONS ABOUT PEOPLE	negative →	positive
MOTIVATION	punishment/reward →	pride/joy of work
RELATIONSHIPS	parent/child →	partnership
SUSTAINING FORCES	fear →	trust
LEADS TO	favoritism (perceived or otherwise) → compliance rules/policies/regulations win/lose or lose/lose decisions competition frustrated/angry employees dependent employees leveraged power blame bureaucracy short term/reactive results	fairness commitment common sense/sound judgment win/win decisions cooperation satisfied employees empowered employees balanced power organizational and personal accountability entrepreneurial spirit long term success
INSTITUTION IS	stagnant →	vibrant, learning, improving

be about stewardship rather than ownership.” Larry Wilson of the Pecos River Learning Center puts it this way:

The whole idea of leadership has turned upside down. Today’s leaders are there to serve rather than be served. They are there to empower people; they don’t come to work having the answers. The objective of today’s leaders is to help people bring 100 percent of their creativity and courage to bear on the problems of the organization.

The kind of meaningful change required to bring about a better performing facilities department is dramatically influenced by the leadership style that exists in the institution’s highest levels. And don’t mistake collegiality for servant leadership.

Another component of organizational culture deals with the **Assumptions About People** that exist. Generally, these assumptions are expressed in terms of the policies, rules, and procedures that exist. In Douglas McGregor’s 1960 book, *The Human Side of Enterprise*, he lays out his Theory X and Theory Y assumptions about workers. Theory X assumes that people inherently dislike work, need to be coerced into putting forth work, have little natural ambition, and wish to avoid responsibility. As a result, strong direction and control

is required from management, mirroring the traditional leadership style. Theory Y, on the other hand, assumes that physical and mental effort is satisfying and natural; people will exercise self-direction and self-control in the service of objectives to which they are committed; and the average person learns, under proper conditions, not only to accept but to seek responsibility.

Frequently management agrees with the Theory Y assumptions, but the policies and rules in place tend to send the message that employees cannot be trusted; they must be closely monitored; and they respond best to external forms of motivational prodding or inducement. In an educational setting, this trend just builds hypocrisy. Every institution of higher learning harbors Theory Y assumptions about its students. Students have unrealized potential to grow, to discover, to create, to lead productive lives. Many schools have adopted honor codes, implying that students are inherently honest and trustworthy and capable of holding one another accountable to the code. What a contrast this can be to the way college and university administrators tend to view their employees.

The assumptions that management makes about employees lead very naturally to the **Motivational Techniques** used

to obtain desired results or behavior. Most of us have experienced the use of “carrot and stick” extrinsic motivators. Do something good and we will give you something desirable. Do something bad and you will be punished. Typical performance appraisal systems, merit pay systems, bonus, and reward policies all resort to dangled rewards and threatened punishments in an attempt to get certain performance results from employees. But the culture continuum suggests an opposite extreme to typical carrot and stick motivational techniques—creating an environment and a culture where people are intrinsically motivated. Stephen Covey contends that:

The highest level of human motivation is a sense of personal contribution . . . People [are] the most valuable organizational assets—as stewards of certain resources—and stewardship [is] the key to discovering, developing, and managing all other assets. Each person recognized as a free agent, capable of immense achievement, not as a victim or pawn limited by conditions or conditioning.

William Damon, in an article in the *Chronicle of Higher Education*, puts it this way:

As a half-century of research in cognitive and social psychology has shown, ideas are a far more reliable source of motivation for higher human behavior and civic value than are sticks, carrots, or social controls. . . . Even ordinary moral behavior—habits of honesty, consideration for oth-

The kind of meaningful change required to bring about a better performing facilities department is dramatically influenced by the leadership style that exists in the institution's highest levels. And don't mistake collegiality for servant leadership.

ers, respect for social mores—is sustained in the long run more by understanding and belief than by reward or punishment. People who have faith in the purpose of a law follow it more than those who simply know what will happen to them if they get caught breaking it.

Next, let's take a look at the true nature of the **Relationships**, especially those between manager and subordinate, which exist within an institution's culture. Traditionally, bosses have provided direction and control over subordinates. In Peter Senge's words from *The Dance of Change*:

Traditional authoritarian hierarchies foster dependence by placing concentrated decision-making power in the hands of a few and demanding compliance from the majority.

A parent-child relationship tends to develop where employees become dependent upon management to tell them what to do, when to do it, and how to do it. Employees even find

themselves dependent upon their employer for their own happiness—something most employers are unable to provide, even though they try. Employees begin to lose their sense of self-awareness and the proactive muscles that allow them to make choices and exercise judgment start to atrophy. As James Champy describes in his book, *Reengineering Management*, organizations that encourage command and control leadership and dependency relationships “tend to suppress all possibility of human imagination, initiative, decisiveness, dissent, individual responsibility, or real teamwork.” In the end, if managers insist on treating employees like children, they will behave like children and will resort to child-like responses, such as whining, complaining, rebelling, or doing anything to get attention, even if they know it is wrong.

Relationships based on partnering, or partnerships, offer a stewardship alternative to parent-child dependencies. In a partnership, all members of the community respect each other and

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treat each other as mature, empowered, interdependent adults, with unique, mission-critical roles to perform. All are team members and must rely upon and trust one another for their collective success. In the words of Max DePree:

We have to become competent in our relationships. Almost no one is going to have the luxury of working alone. All of us are going to be working in ways in which we're interdependent with other people. And the only way we can do that effectively is to build competence in relationships.

I refer to the final element of the Culture Continuum as **Sustaining Forces**. In any culture, certain forces emerge to ensure that the conditions that created the existing culture continue. In a sense, organizational culture takes on a life of its own and tries to guarantee its own survival. Most cultures have survived for generations, as many different leaders have come and gone. The inertia that must be overcome by leaders in their attempt to make meaningful change in their organization's culture can be tremendous, and if the change effort is not sustained, the culture will try to spring back to its former form.

In a traditional culture, fear is the sustaining force. Fear can manifest itself in many subtle ways, such as fear of making mistakes and being punished for them; fear of repercussions; fear caused by inconsistent leadership; fear of government or legal intervention; fear driven by lack of knowledge, information, communication, or understanding; fear driven by the lack of a vision, fear of being vulnerable, and, perhaps the most powerful of all, fear of change. But in any of its forms, fear tends to cause leadership styles, our assumptions about people, underlying motivational techniques, and basic relationships to follow a "traditional" pattern.

The force that counteracts fear—that lies opposite to fear on the continuum, and is an absolutely necessary ingredient to any stewardship-based culture—is trust. Therein lies the challenge to meaningful and lasting culture change—for trust is considerably harder to generate than fear, harder to hold on to, and in many ways harder to define. Complicating the matter fur-

ther, when we make building trust a goal, it often leads to higher levels of suspicion—where employees fear that trust-building programs are just a ruse for getting them to buy into whatever management wants. Trust, in its purest form, is the naturally occurring result of a culture that embraces the conditions found on the stewardship side of the culture continuum. And when trust exists in this form, it becomes a powerful sustaining force for the culture that gave it birth.

These five elements—leadership style, assumptions about people, motivating techniques, relationships, and the sustain-

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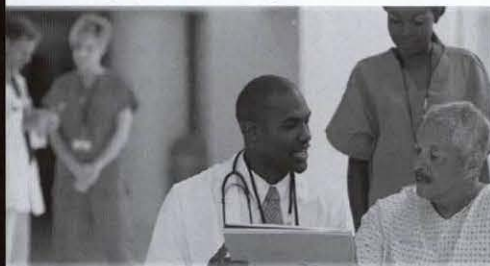
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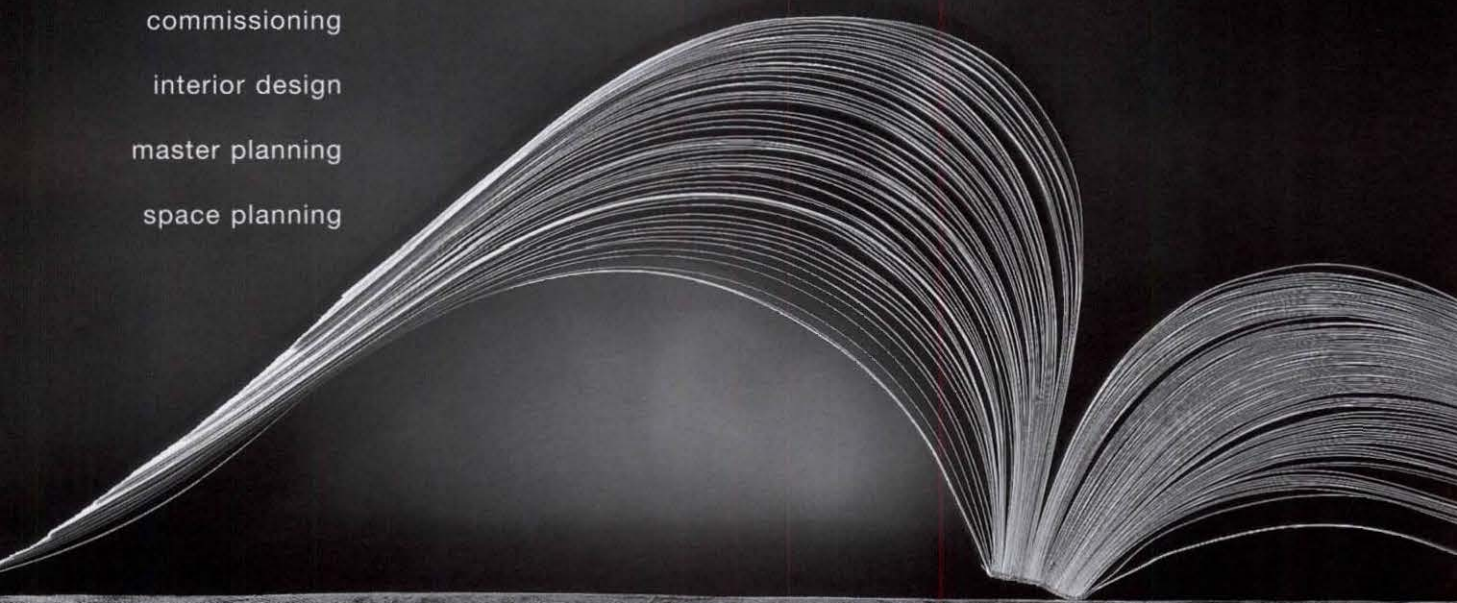
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ing forces that they generate define an organization's culture. As these elements interact, overlap, and intersect, certain characteristics of the culture they have defined start to emerge. When contrasting the characteristics of traditional cultures with those that embrace a stewardship approach, we find evidence of favoritism versus fairness; compliance rather than commitment; rules, policies, and regulations are relied upon more heavily than sound judgment and common sense; win/lose or lose/win outcomes prevail over win/win results; frustrated, angry employees seem to outnumber content, satisfied employees; employees are dependent upon others for direction, rather than empowered to make their own decisions; power is leveraged instead of being kept in careful balance; blame and finger-pointing is more prevalent than organizational and personal accountability; and the organization is focused on short-term, quick-fix results rather than long-term success. Institutions that cling to the traditional culture model become stagnant and many do not survive. Those which have made the shift toward stewardship are vibrant, constantly learning, and continually improving. They also recognize the need for and, in fact, welcome and embrace change.

So, how does an institution, particularly a change-resistant institution like a college or university, go about shifting its culture from the traditional model to a more stewardship approach? Bryn Mawr College has been going through such a transition for over five years now. There are times when it feels like all we have to show for our efforts is a greater appreciation for the change-resistant nature of our traditional culture. Fear continues to exist for various reasons and that fear tends to pull us back to a culture we are trying to leave behind, but we are also seeing rays of hope. Decision making across the board has become a far more collaborative process, especially in the area of facility project planning and design. Nancy Vickers, president of Bryn Mawr college since 1997, is leading this shift toward a more participative leadership style by encouraging the formation of trust-based teams. As part of this

effort, the college developed and published a set of workplace principles, which articulates how the staff desires to relate to one another—a huge step toward building effective relationships. Within the facilities services department, the focus has been on developing a compelling vision, a process that has done much to generate a true spirit of cooperative teamwork and move away from the more traditional hierarchical model.

There has also been a steady review of HR policies, seeking better alignment with our stewardship model. Peter Block contends, "Human Resources practices do not impact the culture of an institution, they are the culture." With that in

Continued on page 45

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mind, we have revamped our sick leave policy to one that assumes that employees are basically honest in contrast to the former policy that focused on how to identify and punish sick leave offenders. A task force is now meeting regularly to review the college's approach to performance appraisals. Within facilities, we have taken all members of the department through Stephen Covey's 7 Habits of Highly Effective People training, believing that all change starts with the individual.

We are also actively engaged in making sure our daily actions are in close alignment with the college's mission and goals. The shift to a new culture has started and there is strong commitment to sustaining the momentum necessary to see us successfully traverse the "Culture Continuum."

In closing, let me leave you with this thought from Edgar Schein, author of *The Corporate Culture Survival Guide*:

... you cannot create a new culture. . . [you can only] set the stage for the culture to evolve . . . It can be evolved—if you think clearly about it and understand its dynamics. 🏢

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Change is Difficult

by Carl A. Rabenaldt

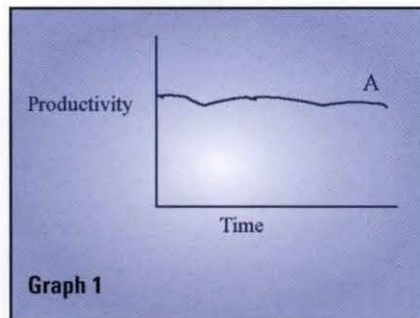
A famous author once wrote "change is not made without inconvenience, even from worse to better."¹

This is all too true. We are all uncomfortable with change. Change is difficult on an individual basis and especially hard on an organizational basis. What we have found over the years is that understanding the basics of change helps individuals and organizations more readily accept change.

So why is change so hard? Imagine a graph of your actual productivity. The X axis is time and the Y axis is a measurement of your actual production. Let's graph long-run production as opposed to short-run production. The reason we differentiate between the two is because short-run production tends to have large swings. You have good days and you have bad days. One day you feel you have accomplished a lot, and the next you feel the whole day was wasted. On the other hand, long-run production is somewhat even. You probably have about the same productivity curve this year that you did last year (identified as "A" in Graph 1). As you can see in the graph, these production curves tend to level out over time. You learn to do your job and you do it. Systems and procedures are in

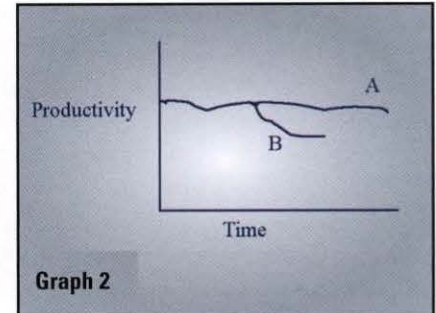


place and by following those procedures you get your job done. That is until someone wants change.



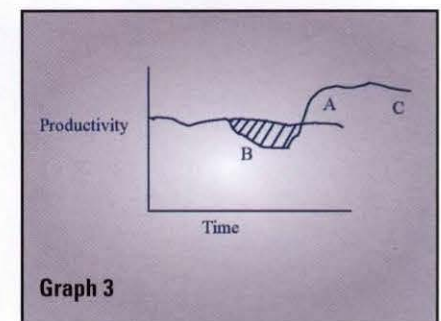
Let's say someone comes in and decides we are going to automate the process for work orders. Instead of tracking work requests on 3 by 5 cards, the tracking will be done on the computer.

Learning the new system will take some time. People will have to change some of their habits. This new learning will slow production down. What used to take people five minutes, now takes them 20 minutes because they have not had time to develop good work habits and are still learning the new system. In other words, production will fall (identified as "B" in Graph 2) from your normal production curve "A."



This drop in production will cause some people to lose interest. Others will voice their concerns saying the old system was better or more efficient. In the short run, these nay-sayers may be correct. Support of the change is most difficult during this period.

But, in the long run, the loss in production is soon gained back when new habits are learned. Once people start to understand the new systems and procedures, all the loss in production should be gained back plus a little more.



After the change is in place and new habits are formed, people will start to see an increase in their long-run production (identified as "C" in Graph 3). Once this new production is achieved, it will not go away. You now have a new productivity curve.

Unfortunately, short run inefficiency is what causes many good changes to fail. People will complain

Carl Rabenaldt is a senior vice president with 3D/I. He sits on their Board of Directors and is responsible for the implementation of new IT systems and procedures. He can be reached at rabenaldt@3di.com. This is his first article for Facilities Manager.

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Change is difficult on an individual basis and especially hard on an organizational basis. What we have found over the years is that understanding the basics of change helps individuals and organizations more readily accept change.

Continued from page 46

about the new system and will point to legitimate problems in an effort to go back to the old method. They do not recognize the inherent production problem associated with change and think the temporary production loss is permanent.

Another problem exists because people claim to be too busy to change. In essence they are saying, I am too busy to become more productive. These people will always be too busy because they are not looking for better ways to do their work.

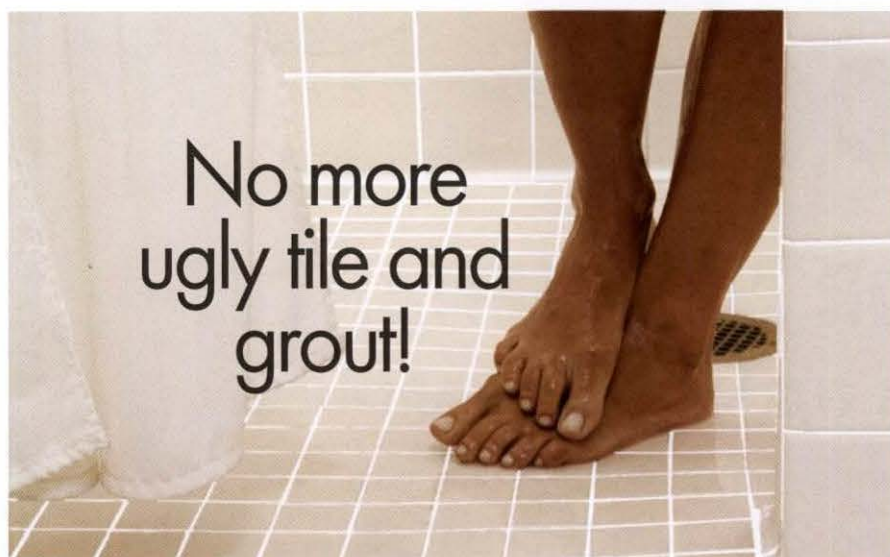
There are inherent problems associated with change. People are resistant. But, understanding the problems and taking a few measures can minimize change resistance:

1. Make sure top management is aware of the possibility of short-term inefficiencies (production drops) and will support the change in the long run.
2. Develop a detailed implementation plan when changing operations and procedures.
3. Include production drops and extended hours of involvement in your change implementation plan
4. Inform people that being too busy to change is a very short sighted view with regard to the big picture.

The best advice is to communicate this concept to others. By letting stakeholders in the process know about the resistance to change and why this resistance happens is the first step to successful change. 🏰

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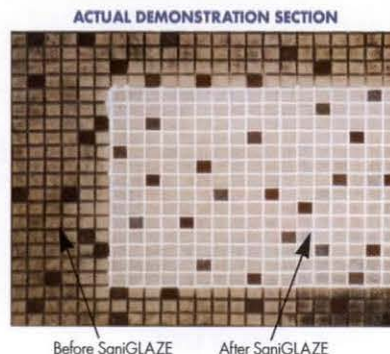
1. Booker, Richard Booker (1554-1600). In *Samuel Johnson, preface to A Dictionary of the English Language*, 1755



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The Bookshelf

Book Review Editor: Theodore J. Weidner, Ph.D., P.E., AIA

Technical manuals are sometimes difficult to read but very valuable in use. This issue presents two such manuals. The first presents the new, and sometimes controversial, Construction Specifications Institute format for construction specifications. The second provides some valuable data to support and justify maintenance expenditures.

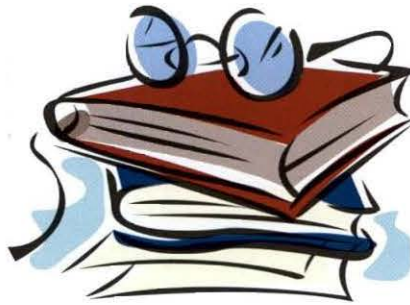
* * *

The Project Resource Manual: CSI Manual of Practice, fifth edition, Alexandria, Virginia: Construction Specifications Institute, 2004 (www.csinet.org), 657 pages, hardcover.

The Construction

Specification Institute's fifth edition of *The Project Resource Manual: CSI Manual of Practice* is an excellent construction project resource for all members of the building team. In this new edition, CSI demonstrates an expanded focus on teamwork and partnering by including owners and contractors and formally recognizing them as important team members in the creation of successful facilities.

The manual is organized by modules, describing the facility life cycle in varying levels of detail from project conception through demolition. Module topics include: project con-



The manual is organized by modules, describing the facility life cycle in varying levels of detail from project conception through demolition.

ception; project delivery; design; construction documentation; bidding, negotiating, and purchasing; construction; and facilities management. The design, construction documentation, bidding, and construction modules are appropriately detailed while the remaining modules provide general overview information, including how the topics relate to the design and specification process. For example, the module on project conception discusses the importance of determining project priorities in the planning phase to avoid poor design decisions later on. Another planning section emphasizes documenting owner wants versus needs and obtaining owner approvals, noting that no assumptions should be made.

The detailed portions of the manual discuss specification methods and contract administration, including explanations, interpretations, and

expectations helpful in understanding common industry standards. Quality control processes, such as stating information once in the correct location and processes for researching and assembling contract document information, are explained well, and include the implications of producing incorrect or poorly assembled construction documents.

The module on construction documents also contains an interesting overview of the specification methods of various governmental agencies and the use of master guide specifications. A more detailed discussion of the advantages and disadvantages of using an owner-provided master guide specification would be a welcome addition to the manual. I found that some information is repeated in several sections throughout the manual, seemingly in error; however the repetition may enhance use of the manual as a topical reference.

Overall, *The Project Resource Manual* is an important educational tool in training those involved in developing, reviewing, and implementing construction documents. A concise discussion of the responsibilities and expectations of team members through the partnering concept, with an emphasis on successful contract administration, creates the potential for this manual to improve the construction delivery process.

Reviewed by
Tracy Aksamit
Manager, Design and Construction
University of Nebraska-Lincoln

Ted Weidner is assistant vice chancellor of facilities management & planning, University of Nebraska-Lincoln, Nebraska and president of Facility Asset Consulting. He can be reached at tweidner2@unlnotes.unl.edu.

The Whitestone Building Maintenance and Repair Cost Reference 2004-2005, ninth Annual Edition, Peter S. Lufkin, Chad Turner, and Jon Miller, Santa Barbara, California: Whitestone Research, 2004 (www.whitestonersearch.com), 289 pages, softcover.

The Whitestone

Building Maintenance and Repair Cost Reference documents 50 different building types. There are several that are of particular interest to education facility officers—both higher education and K-12.

This ninth edition provides updated cost information for the 50 modeled building types which include elementary schools, college classrooms, college student unions, dormitories, gymnasiums, hockey rinks along with 44 other building types. The cost information is based on models developed by Whitestone Research and

using cost data from R.S. Means. The models are each comprised of the many building components that are required: doors, windows, plumbing fixtures, and connecting infrastructures such as copper piping. Each model identifies the building type, size (area), height (stories), general description, replacement cost, and other components. Costs, annual preventive maintenance, scheduled maintenance, and capital renewal are provided including a 50-year cost profile for maintenance which includes a breakdown by building system.

While the reader may be tempted to find a direct correlation between the building area and components, the authors caution that the models are not scalable. The raw data (unit costs and life-cycle for over 300 components) are provided so that a sophisticated user can develop maintenance costs for a building that does not match one of the models. Adjust-

ment data for different metropolitan areas are also provided so error can be minimized. Added details of life-cycle variations in HVAC equipment area are also provided.

Whitestone Research has compiled a more expensive, user-friendly software package—MARS cost forecasting system—that is based on the same data presented in this reference. It remains possible, with effort, to develop a detailed cost model at a lower cost for a specific building based on the data provided in this publication.

The Whitestone Cost Reference provides a great deal of data which can be used to develop a fact-based record of building maintenance costs. When someone at your campus asks why maintenance costs so much, you can show them through this reference. 🏛️

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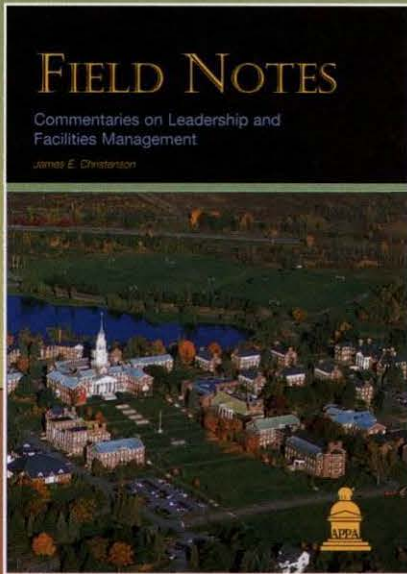


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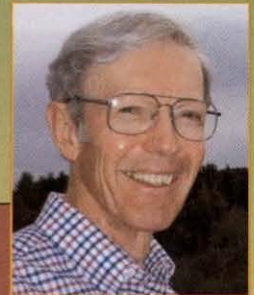


FIELD NOTES



"The title of this book comes from my early experience as a surveying instructor and civil engineer. Field notes represent what has been observed and measured on the site. Field notes are not theoretical calculations of what might be or what we wish would be the case. They are intended to represent reality as closely as reality can be depicted on paper."

—The author

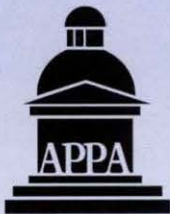


About the Author

James Christenson, a past recipient of APPA's Meritorious Service Award and Rex Dillow Award for Outstanding Article, has worked as a facilities professional for more than 40 years in 17 different facilities management positions. *Field Notes* provides an interesting read and plenty of useful ideas for the facilities professional or anyone involved in leading an organization to success.

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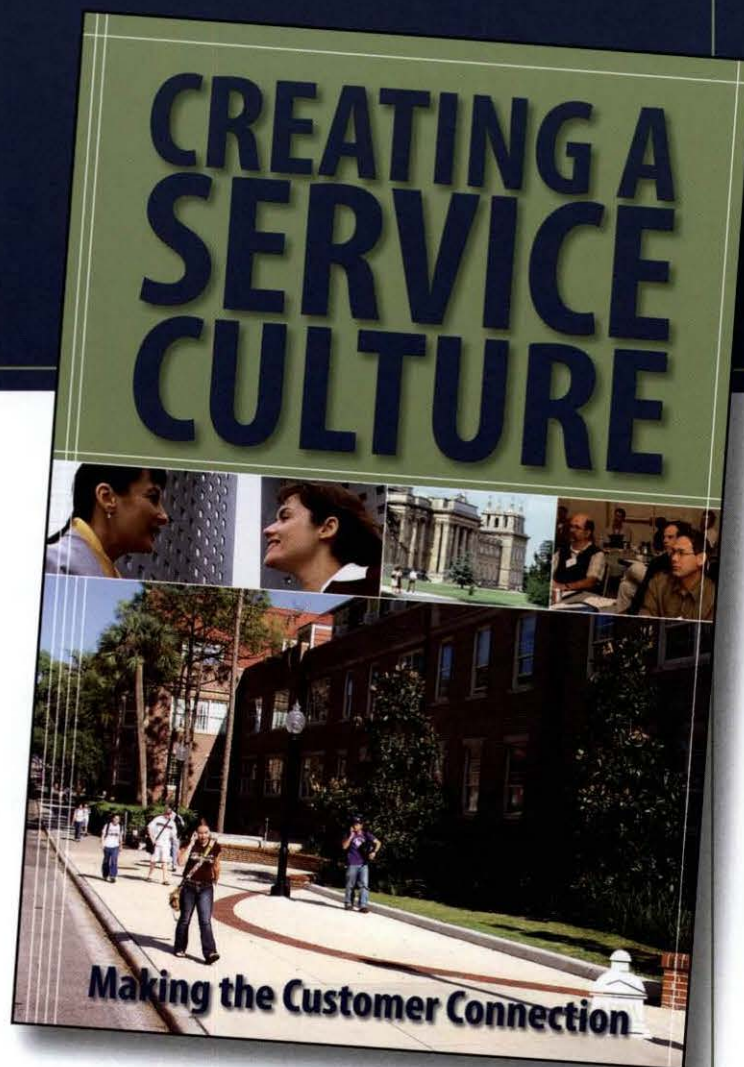
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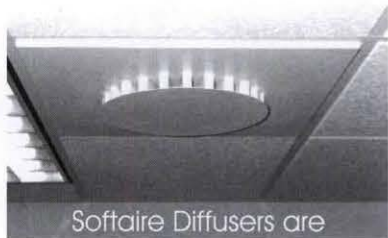
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Continued from page 56

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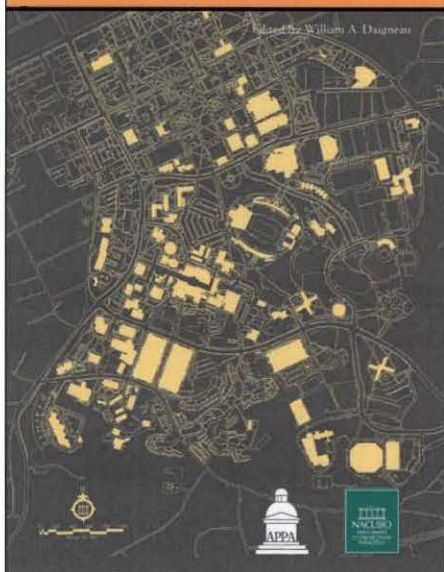
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