May/June 2000
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NUMBER 3

Facilities Manager

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

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FEATURES

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Facilities Manager

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Global Partner in Learning

From the Editor

Steve Glazner

Roger Staubach Leads a Powerful Lineup of Speakers at Fort Worth Educational Conference!

We are pleased to announce a wonderful lineup of special speakers for "Spurring Change," APPA's 2000 Educational Conference and 87th Annual Meeting. The conference will be held July 16-18 in Fort Worth, Texas, and while it may be hot outside, we think it will be even hotter *inside* with the mix of educational sessions and special speakers that we have put together for you.

First, we are very proud that **Roger T. Staubach,** Super Bowl-winning quarterback for the Dallas Cowboys for years and icon for many a sports fan, will be our banquet speaker Tuesday night. He will help us bring the conference to a close with an exciting message, and he has also donated several autographed footballs that will be given away to some lucky members in attendance. After years of success in college and professional football, Staubach is now chairman of the board and chief executive officer of The Staubach Company, a full-service real estate strategy and services firm that provides innovative solutions for companies and organizations seeking office, retail, and industrial space.

Roger Staubach

On Sunday, the conference will be kick-started with a dynamic keynote address presented by **Michael Hawley,** a professor of media technology at the MIT Media Lab. At the lab, Hawley is leading a groundbreaking research program called "Things That Think," which explores the limitless ways that digital media will infuse everyday objects. He will share the fascinating results of this research, explaining that we are entering a pivotal era in which technology is poised to become a staple ingredient in commonplace items.

Baxter Black

On Monday the 17th, you'll begin your day with an entertaining Breakfast with **Baxter Black,** the cowboy poet. Black has been rhyming his way into the national spotlight and now stands as the best-selling cowboy poet in the world. He has written 12 books and achieved notoriety as a syndicated columnist and radio commentator on National Public Radio.

And for our convergence session on the afternoon of Tuesday the 18th, speaker, writer, and consultant **Tom Hinton** will speak on "Leadership Lessons I Learned on the Links: Nine Ways to Master the Changing Course of Physical Plant Administration." His focus will be on the "Five Ps" that will help the facilities professional manage change: Purpose, Principles, People, Processes, and Performance.

We know you'll come away from this annual meeting revitalized and ready to meet the challenges that you face at your institutions. If you have not already done so, register today for the educational conference at www.appa.org. You'll have a great time in Texas!

2000 Election Results Are In

The Tally Committee has tabulated all the votes in this year's election, and the results are in. Gary Reynolds, director for facilities services at The Colorado College, has been elected APPA's President-Elect. This is a three-year sequence that comprises the offices of President-Elect, President, and Immediate Past President.

James O. Roberts, director of physical plant operations at Campbell University, was elected Vice President for Educational Programs. Vickie DeWitt, director of facilities resources at Kansas State University, was elected to the office of Vice President for Information Services. The new officers begin their new positions at the July annual meeting.

In other news, the proposed Bylaws change was adopted and became effective immediately. The 2000 Tally Committee was chaired by Al Stearns, member emeritus. The other members were Al Guggolz, member emeritus, and David Petersen of Fairfax County Public Schools.

Comparative Costs and Staffing Report Now Available

For nearly 30 years, APPA has provided the most comprehensive data available for facilities management costs and staffing information. Now back in printed format, the 1997-98 CCAS Report also reinstates the cost-per-square-foot measures that were requested by our members for their planning and budgeting needs. This report focuses on total costs in the key functional areas of facilities management: administrative, custodial, grounds, maintenance, utilities, safety, environmental, waste, and others. Operating costs per GSF are broken out by funding source, Carnegie classification, APPA region, and student FTE. The report also includes extensive personnel data and costs, utility costs and consumption, and more. Member price is $85 for this 296 page, softcover book. The CD-ROM version includes the full database in Access format, all reports found in the print version, and a peer-to-peer comparison feature. The CD

costs $115 for APPA members. The book-CD set can be purchased at $180, a 10 percent discount. Now available online by visiting www.appa.org/resources/ and clicking on the Publications link.

Construction Challenges in California

Voters in California defeated a proposed constitutional amendment that would have made it easier for community colleges to issue bonds for construction needs, which campus officials say total $8 billion. The constitutional amendment, Proposition 26, would have reduced the margin of local-voter approval that California's 72 community-college districts need to issue bonds for construction. Currently, two-thirds of voters in a district are needed to float education bonds. The amendment would have changed the requirement to a simple majority.

In 1998, California voters had approved a $9.2-billion bond for education, including about $2.3-billion for public-college facilities. California has approximately 106 community colleges serving a total of 1.4 million students.

PGMS & NJAPPA Hold Joint Seminar

On Tuesday March 28, 2000 a seminar in partnership with the North East Branch of the Professional Grounds Management Society (PGMS) and the New Jersey chapter of APPA (NJAPPA) was held at Dwight-Englewood School, Englewood, New Jersey. The main theme for the day's session included sessions on Proper Tree Pruning, Ornamental Gasses, Plant Growth Regulators, Turf Disease and Insect Damage. Also included was a session on Risk Management, as well as the PGMS Certification Programs. Wilfred MacDonald Inc., a local turf equipment dealer, held an equipment demo showing the latest in grounds care equipment. The annual business meeting for NJAPPA was also held during the day.

As with the partnership between APPA and PGMS on the national level, the seminar represented that same spirit on a local level. Special thanks to those who made it possible include:

- Kevin ODonnell, PGMS President
- Tom Stepnowski, ERAPPA President
- Dan Drost, NJAPPA President
- George Van Haasteren CGM, Dwight-Englewood School and 1st VP for PGMS
- Kevin Herron, Dwight-Englewood School and Secretary for NJAPPA
- Eilleen DiBari, Dwight-Englewood School
- Todd Cochran CGM, PGMS
- Mike Mongon, CGM, PGMS

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Assessing the Effectiveness of Your Organization

by E. Lander Medlin

"How are we doing? Compared to what?" These are two questions we hear over and over again in our facilities management organizations. So, what are you using to gauge the effectiveness of your operation today? How do you measure success? Again, compared to what?

These two questions have great value for us today given the context of change and the continued importance of focusing on leading and effecting change. Not only do you need to know where you are going—that is, where vision, mission, purpose, and direction are essential—but you need to understand where you have been. To do so, it is important to gain a clear picture of where you are right now; a baseline of your organization's efficiency and effectiveness especially in light of the rapid and dramatic pace of change today. Otherwise, pinning down you organization's effectiveness during such rapid change can be like trying to nail Jell-o to the wall!

Today and well into the future, the old saying "the only thing constant is change," will still apply. Change is inevitable but, unfortunately, change and the complexity of change today is even more fragmented, chaotic, and unsettling than ever before. As a matter of fact: "You think you understand the situation, but what you don't understand is that the situation just changed."

That is where APPA's Facilities Management Evaluation Program (FMEP) can help. The FMEP represents a good evaluation tool you can use to get a handle on where your organization is right now. And with the right amount of participation and involvement by the staff of your organization, you can gain immense buy-in to make long-lasting change happen and more comprehensively.

Although the FMEP was originally established ten years ago by APPA's Professional Affairs Committee, most recently this same committee has spent a great deal of time reviewing and substantially updating the program to give you that baseline snapshot of where you are today. This helps you focus the assessment process as a launch point for further continuous improvement. The FMEP provides a comprehensive set of well-defined and recognized professional guidelines the facilities management organization can use to objectively measure its performance levels and quality of effectiveness of its services. These criteria help to make any evaluation a much more objective process than it would be if each evaluator or institution were working against his or her own subjective criteria.

The objective of the evaluation program is to provide an institution with a concise picture or profile of the quality of the processes used and the results achieved by the facilities management department. This profile stems from the examination of the organization in seven key areas or categories: Leadership, Strategic and Operational Planning, Customer Satisfaction, Information Analysis, Human Resource Focus, Process Management, and Performance Results.

Responses to these criteria are outlined in a complete self-evaluation prepared by the organization in advance of a team's site visit. In each case, an external review team determines the degree each key area has been established, the extent fulfilled, and the effectiveness of the processes used to pursue their stated goals.

Although we can all agree it is important to step back and periodically evaluate ourselves and our organization's from time to time, it still takes a great deal of mental and emotional courage to do it comprehensively and successfully. As Bill Daigneau succinctly illustrated about the process of evaluation a few years ago, undergoing a formal facilities evaluation is much like going for your annual physical examination. While you intellectually know that it will be good for you in the long run, most of us still have some fears that the doctor may discover something unpleasant. So, if you are going to do this, you want to be assured that your doctor is competent, thorough, and professional. Likewise, knowing that those entrusted to conduct an evaluation of your facilities operation are respected and knowledgeable facilities professionals, helps ease the uncertainty of this process.

Therefore, great care has been given to develop a comprehensive set of evaluation criteria, and the evaluation itself is conducted by

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people who understand the practice of facilities management within the education environment. By using practicing professionals we can:

1) offer a pre-evaluation site visit (to lock down the institution's objectives and ensure that key issues or conditions are identified);
2) advance review pertinent documentation regarding the organization and the management of its facilities to gain an accurate baseline picture;
3) focus on the real issues—quality and effectiveness—in a fairly short period of time (usually between three to five days);
4) tailor the makeup of the team to align respected and successful facilities professionals with the features and circumstances comparable to the requiring institution;
5) provide conclusions based on factual data with recommendations that are realistic and "do-able."

Another important key to a successful evaluation is the attitude of the organization being evaluated. This is not a program one should begin without a firm commitment to do a good job. Much effort is required to prepare the self-evaluation and institutional profile. Every person in the organization should know the purpose of the evaluation and be encouraged to be active supporters of the process.

What comes with the process is a final report based on the site visit interviews and the external evaluation team's review of both the institutional profile and the self-evaluation. The report highlights the organization's strengths and weaknesses and makes recommendations that are practical and can be implemented at one-third to one-tenth the cost normally attributed to such a service. Information that ultimately serves as the basis for a continuing program of improvement in quality, productivity, and effectiveness for the institution and produces pride in recognizing this achievement.

But let me caution you that institutions do not request an APPA evaluation to learn that they have no problems in their facilities management area. The fundamental benefits come not from the identification of these problems, wherever or whatever they may be, but rather in the search for them. This is where the give and take, the sharing, occurs. So, whether you are just trying to get a baseline assessment of where you are, or measuring the results of a well-established continuous improvement program, or undergoing an administrative review (maybe as the result of an institutional accreditation), the FMEP may be just right for your needs.

If quality facilities management services are important—if you are striving to achieve continuous improvement to meet customer needs, to develop a planning tool for strategic and long-range purposes, to improve the understanding of facilities management issues in your department and throughout the institution—then you should take a good look at the FMEP as a tool to help achieve this.

As a famous naval officer once said, "We cannot change the wind, but we can surely adjust the sails." And adjust we must if we are going to keep pace with the changing world around us. Although the evaluation effort is not an end in itself, it is a means to an end, that of being an improved and more productive facilities operation. Call APPA today or visit our website (http://www.appa.org/fmep) for more information on how you can begin the assessment of your organization through the use of APPA's Facilities Management Evaluation Program.

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Vital Assets

by H. Val Peterson

Within an institution of higher education the only permanent and lasting assets (excluding its renown and reputation) are its physical assets—the buildings and grounds. And except for those institutions known as "universities without walls," this applies to all colleges and universities.

Campus facilities should be viewed as a valued asset that contribute in numerous ways to the university's mission. Facilities are the single largest asset on the institution's budget balance sheet. Facilities provide a location for instruction, lectures, forums, and workshops. Facilities house laboratories and scientific equipment necessary to conduct research and experimentation. Facilities offer spaces to conduct business and perform workday tasks. Facilities are where meetings are held and planning is accomplished. Facilities accommodate rehearsals and practice sessions as well as performances, recitals, and concerts. Facilities afford food and lodging, recreation and entertainment.

Facilities generate first impressions. Facilities can offer a diversity or continuity of design, construction, and usage. Facilities are used to advance teaching and learning. Facilities accommodate the discovery of knowledge and the creation of new products. Facilities are instrumental in attracting new staff, faculty, researchers, and students. Facilities accommodate a wide variety of programs and disciplines. Facilities promote and enhance the quality of life. Facilities provide a place to gather and make new friends. Facilities offer sustenance for the body, mind, and spirit. Facilities create a sense of place and bring to pass memories.

College and university campuses are both functionally and physically unique. In the communities where they are located, campuses emphasize high and noble endeavors while at the same time serving as a showplace for the most successful of built environments. The campus has the potential to be a direct reflection of an institution's history, mission, and accomplishments, as well as its aspirations and vision for the future. The various elements of the campus—its green spaces and gathering spots, its individual buildings and groupings of buildings, its malls and pathways, its landscaping and common areas—unite together to reveal the institution's past, present, and future.

Even as the physical assets of the campus reveal the purpose and objectives toward which an institution aspires, the appearance and condition of its buildings and grounds can also be a reflection on its reputation. If an institution is judged by its outward appearance, certainly the condition and appearance of its facilities can determine the relative competitiveness of one institution as compared to another. For an institution that wants to be known as one of quality, one that cares about its faculty, staff, and students, it makes good financial sense that its physical assets be maintained with an eye to both the present and to the future.

Even though the organization that plans, constructs, operates, and maintains the buildings and grounds is known by different names at colleges and universities, within the wide-ranging facilities industry the term "facilities management" is commonly used. Facilities management is a distinct management function and, as such, it involves a well-defined and consistent set of responsibilities. Simply stated, it is the management of a vital asset—the organization's physical facilities or its physical plant.

Within the field of facilities management the organization is expected to combine proven management practices with the most current technical knowledge to provide comfortable, functional, and effective working environments. Within higher education this must also include the provision of an appropriate teaching and learning environment. The central threads of "quality of life" and "cost effectiveness" run strongly through the technical components of the profession. Usually, facilities managers are the "generalists" who manage a variety of "specialists." The "specialists" are either in-house staff or outsourced service providers who perform the day-to-day tasks of facilities management.

Facilities management as a profession has evolved over time. When buildings were relatively simple, most facilities-related tasks could be accomplished by individuals possessing limited skills and training. Their tool kit consisted of an oil can, a screwdriver, and an adjustable wrench. As buildings and their operating systems became more complex, so did the technical expertise needed to operate and maintain their systems and components.

I recall an article that appeared in the local newspaper several years ago that caught my attention. The story

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line read, "*Job of the 90s: Facility Manager,*" and the subtitle added "*Coordinator of the Workplace.*" I thought to myself that finally our profession was getting its deserved recognition. But as I read the article my initial enthusiasm was somewhat blunted as it went on to say, "For years, it was the job that had no name. Janitors did it. So did building supervisors, secretaries, and human resource directors. Sometimes real estate agents, architects, interior designers, and even financial officers handled the myriad of responsibilities of the job." Obviously, times have changed.

To the average person, the existence of a facilities management operation is relatively unknown. As long as things are operating in a "normal" condition no one seems to notice those who come and go on a daily basis; they are typically not conscious of the full range of efforts required to maintain a trouble-free environment day-in and day-out. To a great degree, the work categorized as facilities management happens without a great degree of visibility. Much of the effort takes place behind the scenes—in an equipment room, above the ceiling, on the roof, or otherwise out of sight. Some tasks are even accomplished "off-shift" via a computer.

When Lee A. Iacocca was chairman of Chrysler Corporation, he made the following observation:

> It (facilities management) already is a useful tool for strategic planning because planning today involves the expenditure of billions and billions of dollars. You don't spend that kind of money unless you're confident that the facilities you're building with it can be managed efficiently, provide a return on your investment over time and do the competitive job you intend them to do. (*Facility Design and Management* magazine, October 1989).

While the magnitude and types of facilities found within institutions of higher education may be different from those mentioned by Iacocca, parallel impacts can certainly be measured.

Employees within our own facilities management organizations can be justifiably proud of the part they play in helping their college or university achieve its goals and accomplish its mission. And just as facilities are vital assets to our institution, each employee within the facilities management organization is a vital asset to the department as well as to the institution.

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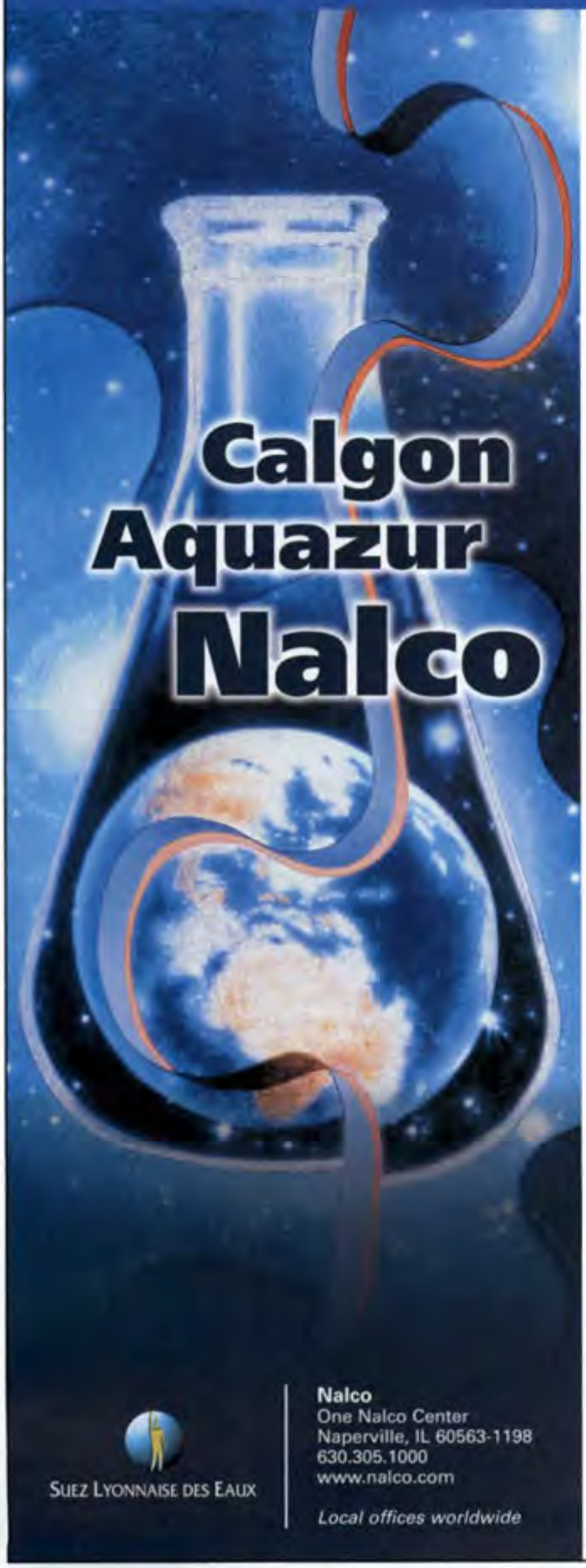

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Maintaining Your Balance in the New Millennium

by John P. Harrod Jr.

It was once said that "the mind is wonderful thing—it starts working at birth and never stops until you get up in front of an audience!"

That statement is quite fitting for most of us. The challenges we often face when before a group, either speaking or writing, are:

- Managing the size of the audience
- Focusing on topics of interest to the audience
- Recognizing when it is time stop
- Placement on the agenda; immediately after lunch or the last presentation of the day or conference.

A wise speaker/writer is one who can keep all of these issues balanced while leaving a positive impression and having everyone end at the same time.

Have you ever thought about that word *balance*? The *American Heritage Dictionary*, Second College Edition, defines balance as:

n. 1. A weighing device. 2. A state of equilibrium or parity. 3. A power or means to decide. 4. A state of bodily equilibrium. 5. A stable mental or psychological state. 6. A harmonious or satisfying arrangement of proportion of parts or elements, as in a design. 7. An influence of force tending to produce equilibrium. *Accounting*. a. Equality of totals in the debit and credit side of an account b. The difference between such totals.

v. 1. To weigh in or as if in a balance. 2. To compare by or as if by weighing in the mind. 3. To bring into or maintain in a state of equilibrium. 4. To act as an equalizing weight or force: to counterbalance. *Accounting*. a. To compute the difference between the debts and the credits? b. To reconcile or equalize?

While scanning my trusty thesaurus I found myself focusing on the word "balanced" and the references that followed:

Balanced: composed, harmonious, just, poised, sane, sensible, stable, symmetric, uniform.

And, in exploring a bit further, I had to chuckle at words like: sanity, rational, and like-minded. These terms all seemed a bit contrary to the "reality" of actions and activities that often occur in our organizations.

Not Always Are We *Balanced!*

Did you know that there are at least seven divisions or "service providers" within our institutions that when not functioning properly can act like a "poison" and kill our institution? Can you name those "7-Ps," providers or poisons? The easy one, before we were "facilities," we were: 1) Physical Plant. The other "Ps" are: 2) Purchasing (materials management), 3) Personnel (human resources), 4) Payroll, 5) Parking, 6) Programming, and 7) Police. If these groups are not working properly or if they are not working cooperatively, if there is not a *balance* in their support of one another, our institutions can and will be "poisoned." They will be very sick. Some may even die. We as the business managers, as the facility managers, as the "service providers," cannot let the "poisons" infect our organizations.

How do we avoid the poison? We attain and stay in balance!

- *We work with one another.* We use cross-functional teams to address the issues. We invite other "experts" to share in our business.
- *We communicate.* We tell one another what is going on now. We talk about what is planned for the future. We share our problems and our solutions. We listen.
- *We cooperate.* We make ourselves available to others when asked. We offer assistance when we can help.
- *We educate.* We stay current with the thinking of the day. We encourage our staff to expand their abilities. We foster and reward enhanced skills and abilities.
- *We motivate.* We encourage our staff to take risks. We reward them for their success and we assist them when they are challenged.
- *We never ever underestimate* the importance of the smallest contribution made by any division or individual. We recognize and promote the value of working together.

The demands of our industry require us to be professionally and personally fit. It means that we must be prepared! It means we must stay in touch with and a bit ahead of the ever-changing technologies and techniques in our industry today. It means knowing where you want to go as an individual, it means knowing where your institution is going. It means *balancing* the challenges of work with the challenges of home.

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Will Rogers, the American humorist, once said: "Even if you are on the right track, if you just sit there you'll get run over."

To be *balanced* does not suggest that we are motionless. In fact, with all that is changing, we need to stay in motion to maintain a sense of equilibrium.

Jack Welch, CEO of General Electric Company, paraphrased the Will Rogers statement as: "Change is a steamroller moving at 5 miles per hour. You can easily walk ahead of it, but if you stop you will get run over."

Like others, the education business is constantly changing. It is "our" business to stay ahead of and help lead the change. Our institutions and our colleagues look to us to be the stewards, to be the pioneers, to be the pacesetters, to be on the cutting edge and to be an unimpeachable body of knowledge. On occasion, we as the pioneer will lose our way, as the pacesetter will lose our wind and as the blade will lose our edge. However, by staying balanced—physically, mentally and morally—we can and we will quickly recover.

Unfortunately, some folks have not embraced the challenge of balance in their lives. They have adopted this simple three-step daily plan:

1. Get up. 2. Survive. 3. Go to bed.

And others suggest that "if you don't know where you are going, any way will get you there." So why worry?

Neither of these approaches sends a very reassuring message to our staff, our institutions, or our customers. They all expect and demand much more.

Do you know who your customers are? Do you know what they want?

First let's assume that your "customer" is anyone to whom you provide service: students, faculty, staff, politicians, parents, and "the" institution!

Research has found that most customers have four basic needs. Needs that every one of us can relate to. Needs that when addressed will most often satisfy the most critical customer.

Customers Want:

- Quality product
- Reasonable price
- Timely response
- To be kept informed

Pretty simple criteria when you think about it. Extremely hard to do! How do we satisfy those needs? We finetune our leadership, management, and operations skills by attending the regional and international conferences, the APPA Institute and the Leadership Academy. We take the opportunity to meet and visit with some of the brightest minds in our business. We exchange business cards today so we can exchange ideas tomorrow. We replenish our toolbox with time-tested techniques and new experiences that we can use now, tomorrow, and into the future.

At the 1999 Education Conference in Cincinnati, speaker Les Brown reminded the attendees that:

"It's better to be prepared for an opportunity than to have and opportunity and not be prepared."

It is much easier to stay *balanced* when you have an expanded base, a broad foundation. Look at the stability given to the canoe and to the mobile crane when the outriggers are extended. Consider the Chinese bamboo plant that grows below ground for four years establishing a root system, a foundation that will support its huge growth spurt of 68 feet in just 58 days. Do yourself a favor and stretch/expand your base. Look outside of your current environment to set your outriggers.

APPA is here to help you establish your base. Use the resources that are available to you. For the longest time our communication was challenged by distance. Now, with the Internet, we have become a "connected" society. We can communicate with just about anyone, anywhere, anytime, about almost anything. Utilize the technology of the Internet and connect with APPA. It is as simple as: www.appa.org.

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Evaluating the Planning, Design, and Construction Department:

The Capital Programs Management Audit

By Harvey H. Kaiser, Ph.D., & Dennis M. Kirkwood, FHFI

In the life of an institution of higher learning, change is constant and inevitable. This is true in the case of its central teaching and research programs; in organizational, human resources, and other administrative matters; and, not least, in the institution's built environment. Planning, directing, and implementing change in the physical plant and campus environment (which we refer to as Capital Programs Management) is a complex undertaking for most institutions that is assigned, typically, to a Facilities Planning, Design, and Construction (FPD&C) unit. To accomplish this work effectively and efficiently requires a well-organized and ably led staff that is adequate in numbers, capabilities, and funding, and has a clear and consistent approach to its work.

While the FPD&C unit often provides a variety of technical and other advisory services to an institution, including support to operations and maintenance, environmental health and safety, and information technology, Capital Programs Management is a substantial component of the unit's efforts. The following discussion presents a diagnostic model for assessing the state of an institution's capital programs management by delineating "work processes" which comprise that function.

What is Capital Programs Management?

The APPA *Facilities Management* manual for plant administration[1] provides the following definition of the Facility Planning, Design, and Construction function:

> A major grouping of functions normally included within a facilities management department, but sometimes organized separately from facilities operations and maintenance services, is facilities planning and programming for the institution, architectural and engineering planning of new construction, and construction project management. The principal functions include the following:
> - Facilities planning and administration
> - Facilities master planning
> - Space management and utilization

[1] APPA: The Association for Higher Education Facilities Officers. *Facilities Management: A Manual for Plant Administration*, third edition. Alexandria, Virginia, 1997. P. 51.

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- Capital program planning
- Real estate management
- Architectural and engineering services
- Design by staff or through architectural and engineering contracts
- Architectural and engineering consulting services
- Construction contract administration

While all of these functions are performed at all institutions of higher learning, organizational structures can vary by institutional size and cycle of capital programs development. Models can include in-house staffing with outsourcing of some responsibilities. On the very smallest campuses this work may be handled by one person or a small group. There the "work processes" often are simply embodied in the working patterns of these individuals, with little in the way of formal documentation. Once institutions reach a threshold volume of capital programs activity a larger, more formal organization becomes necessary. With a sizable staff comes the requirement for more formal, better-documented work processes.

The goal of an institution's capital programs is to maintain, over time, a proper alignment between its mission and programs and its built environment. This is done by periodically identifying the institution's physical plant requirements, and then adjusting the facilities portfolio to meet those requirements through an ongoing program of new construction, renovation, renewal of facility components and systems, decommissioning, and demolition. Proper management of capital programs by an FPD&C unit is critically important, first, to assure that suitable facilities of high quality are developed and, second, to accomplish this task with a high degree of efficiency and effectiveness.

Resources for Capital Programs Management

We can think of Capital Programs Management in terms of applying the following five categories of resources to the functions included in the APPA definition:

- Policy — the institutional directives that drive planning, capital allocation, programming, and design decisions;
- Process — the way in which management actions—planning and control—are clarified, routinized, and documented;
- Tools — the software and other job aids which organize information and serve as a record of decisions;
- Standards — the rules and other adopted criteria that assure repeatability of processes and conformity with industry norms; and
- People — the professional abilities, experience, and organizational authority invested in the institution's staff driving the Capital Programs Management process.

A Work Process Model for Capital Programs Management

Well directed, competent, and dedicated people are essential to a successful Capital Programs Management function, but the other four resource categories listed above are also necessary to give focus and consistency to the efforts of the FPD&C department. We have developed a *Work Process Model* for Capital Programs Management by an FPD&C function that portrays the interaction of the major functional elements of capital programs management (per the APPA definition) with these resource categories.

The *Work Process Model* is depicted in Figure 1 in matrix form. The functions of Capital Programs Management managed by an FPD&C department are listed in the leftmost column and are organized into three major phases. These correspond with the logical and temporal sequence of actions involved in projects, from capital requirements definition to the activation of completed projects. The next columns correspond to the first four resource categories listed above. The personnel resource category is treated separately in Figure 2.

Figure 1: Capital Programs Management Processes

FPD&C Phase Work Process	Institutional Policy Inputs to FPD&C	FPD&C Core Processes	Support Processes & Info. Systems	Quality Systems & Standards
Strategic Facility Planning Phase				
Space Planning & Management	• Strategic (Business) Plan • Space Allocation Policy	• Annual Space Inventory • Space Needs Assessment & Periodic Updates • Space Management Process	• Space Inventory Database	• Space Measurement Standards • Space Planning Guidelines / Standards / Benchmarks
Capital Requirements Planning for Infrastructure / Renewal	• Target Facility Condition Index (FCI) to be Achieved *in conjunction with* • Capital Allocation Policy for Renewal / Refurbishment	• Periodic Facility Audits: • Condition / life cycle replacement • Code compliance • Program Functionality • Energy consumption	• Facility Audit - Condition / Quality Assessment Database • Capital Plan / Budget Database	• Facility Audit Standards, Procedures, Inspection Cycle, etc. • Adopted Industry References for Cost Estimating
Campus (Facility) Master Planning	• Physical Development Policy	• Campus Master Planning & Periodic Updates	• FM Drawings in CAD	• Informal
Design Standards Program	• Scope & Applicability of Standards Program	• Design Standards Development & Periodic Updates		• Informal
Management of Facility Documentation & Project Archives		• Archiving of Project Documents & Records • Maintenance & Update of Drawings in CAD	• FM Drawings in CAD • (Project) Record Drawings in CAD • File Indexing System for Project Records (Paper & Electronic Formats)	• CAD Standards
Capital Deployment Phase				
Planning Investigations & Feasibility / Programming Studies	• Study Authorization & Funding Mechanisms	• Planning Investigation Request / Authorization Process • Project Management Processes for Investigations / Feasibility / Programming Studies	• Project Management & Accounting Database • Capital Plan / Budget Database	• Review / Screening Criteria (e.g., Institutional Policy, ROI) • Project Budget & Schedule Templates (Concept-Stage) • Space Planning Guidelines / Standards / Benchmarks
Annual Capital Budgeting Process & Ongoing Capital Plan Management	• Capital Allocation Policy • Program-based New Construction & Renovation • Infrastructure / Capital Renewal • Capital Contingency Allocations	• Annual Budget Development Process • Budget Amendment Process • Budget Management & Reporting	• Capital Plan / Budget Database	• Capital Budget Calendar, Forms, & Instructions • Chart of Capital Accounts / C-I-P Accounts • Status Reporting Formats & Schedules
Capital Project Implementation Planning / Initiation	• Institutional Priority-Setting	• Capital Project Implementation Planning • Assignment of Project Manager • Scheduling & Prioritization • Project Delivery Mechanism	• Capital Plan / Budget Database • Project Management & Accounting Database	• Guidelines on Project Delivery Mechanism: • Design Resources & Compensation • A/E Service Contract Types • Construction Contract Type • Bidding / Negotiation Guidelines • Detailed Project Budget & Schedule Templates

Figure 1 (continued): Capital Programs Management Processes

FPD&C Phase Work Process	Institutional Policy Inputs to FPD&C	FPD&C Core Processes	Support Processes & Info. Systems	Quality Systems & Standards
Project Execution Phase				
Vendor Pre-Qualification / Preferred Vendor Arrangements		• Vendor Pre-Qualification Process		• Vendor Pre-Qualification Standards
Project Team Selection		• Vendor Selection Process • Institutional Assignments / User Representatives		• Standard Professional Services Agreements, T&Cs
Project Management:		• Detailed Project Schedule Management (throughout) • Project Documentation Processes (throughout) • Regulatory Interface (throughout) • User Interface (throughout) • Design Clarification / Request for Information Process (throughout) • Change Management Process (throughout) • Quality Assurance Processes	• Project Management & Accounting Database (throughout) • Project Records / Documentation Archiving System (throughout)	• Project Documentation Standards • Budget Performance Tracking & Accounting Standards • Schedule Performance Tracking • Project Correspondence • Meetings / Issue / Decision Tracking • Invoicing & Payment • File Indexing
• Pre-Design Services		• Planning & Programming Management Process	• Record Drawings of Existing Conditions (from Archive) • Existing Space Inventory Data	• Space Planning Guidelines / Standards / Benchmarks
• Design		• Design Management Process • Equipment Planning Management Process	• Record Drawings of Existing Conditions (from Archives)	• Design Standards • Design Review Process & Quality Standards
• Bidding / Negotiation	• Institutional Purchasing Policies	• Bidding / Negotiation Management Process		• Standard Contracts / Terms & Conditions / Scopes of Work
• Construction		• Construction Management Process		• Construction Observation Process & Quality Standards
• FF&E Procurement & Owner-Direct Contracts	• Institutional Purchasing Policies	• FF&E Procurement Management Process • Utilities Coordination • Procurement Logistics		• Standard Contracts / Terms & Conditions / Scopes of Work
• Close-out & Commissioning		• Project Close-out Process • Process for Turnover of Project Deliverables • To Project Archives • To O&M Staff • Commissioning Process		• Commissioning Plan / Guidelines

Phases & Work Processes

The initial phase, **Facility Strategic Planning**, relates overall institutional strategic and academic planning to the campus physical environment by formulating a physical development policy. Here the role of the Capital Programs Management (CPM) Office is to provide staff support to the institution's senior management and governing body, which are responsible for policy formation. The workload associated with this phase is rather predictable and independent of the level of current capital project activity. It is much more dependent on the size of the institution's physical plant and on its overall programmatic maturity—in an institution with growing enrollments or rapidly changing academic programs these facility strategic planning workloads will be correspondingly large. The major work processes of this phase are:

Space Planning & Management

Physical plant and space requirements of the institution are matched, over time, to the available facilities portfolio through a formal process of space allocation. Space requirements in excess of the available portfolio will generate programs for new construction. Space requirements that are substantially less than the available portfolio imply decommissioning/adaptive re-use/demolition programs. The FPD&C office provides staff support to this process.

Capital Requirements Planning

The FPD&C office identifies requirements for future capital outlays to renew and refurbish the institution's buildings and campus infrastructure. This should be done in a formal way through an ongoing facility audit process that examines each facility every three to five years.

Figure 2: Facility Planning, Design, and Construction Human Resources Processes

Category	Sub-Category
Organization & Staffing	
	• Table of Organization
	• Position Descriptions
	• Workload Management
Performance Planning & Evaluation	
	• Annual (institutional) Process Staff Performance Review
	• Post-Project Evaluations
Staff Training Program	
	• New Employee Orientation
	• CPM Policy & Procedures
	• Project Management Skills & Techniques
	• Technical Training
	• Skills Assessment
Timekeeping / Chargeback Policy & Process	

Campus Master Planning

The following campus elements are addressed for a five-to-ten-year planning horizon: 1) land use and site planning, 2) design guidelines, 3) vehicular/pedestrian circulation and parking, and 4) infrastructure. Together, these elements set clear directions for the future development of facilities. Periodically, and preferably annually, the campus master plan should be updated to reflect current conditions.

Design Standards Program

Formal guidance in the form of design standards, policies, and practices given to architects and engineers on materials, equipment, furnishings, etc., to be used in new construction and renovation projects. Factors influencing the specification of "campus standard" specifications may include preferred vendors or special pricing arrangements, life cycle cost, standardization of equipment to reduce maintenance costs, energy consumption guidelines, operational considerations, and campus aesthetics.

Facility Documentation/Archives

Plans, specifications, and other reference materials relating to the physical plant are organized, indexed, and managed for use by future designers of campus improvements as well as by staff involved in ongoing maintenance and operations. The norm today is that drawings are maintained in the form of CAD files.

Next, the **Investigation & Capital Deployment phase** involves the identification, prioritizing, authorization, funding, and implementation planning of discrete capital projects, working from the framework of the institution's strategic or business plan and its campus master plan. In the early part of this phase the FPD&C office continues in its role as a staff to the institution's top management and governing body, facilitating their decision-making on capital allocations. At the end of this phase, after capital has been allocated to specific projects, the FPD&C office organizes its own internal resources for implementation. This is done through the following major work processes:

Investigations/Feasibility Studies

In the course of identifying potential capital projects, often the first step is to perform analyses or feasibility studies that help to define the problem to be solved via capital expenditure and contain recommendations for alternative operational solutions, project scope, preliminary cost estimates, and preliminary schedule projections. Typically this occurs before a proponent organizational unit decides to pursue funding of a specific capital project. A funding source should be identified for the investigation process.

Capital Plan/Budget Management

A capital plan/budget should be prepared and approved on an annual basis. In addition to newly proposed projects, the plan should include all active projects that are authorized and

not yet completed. It should include information on project proponent/user, scope, budget, and schedule at a level of detail appropriate to the stage of the capital project. Newly proposed projects should appear in the capital plan/budget as soon as they are sufficiently identified, even though they may not be required or funded for development for several years.

During a project's life it may be necessary to revise its scope, budget, or schedule. Also, from time to time, projects will be added to the capital plan/budget outside of the annual cycle. Such amendments should be handled in a standard way. An emergent need for a capital project can arise due to unforeseen plant conditions or programmatic requirements. A pool of funds subject to the discretion of the chief facilities officer may be available for such undesignated projects. Authorization for expenditure is provided by the chief financial officer and is included in regular monthly and quarterly status reports along with other approved capital projects.

The FPD&C office should manage the capital budgeting process, including such details as budget calendar, budget forms, etc., and should provide staff screening/review of all submitted projects.

Capital Project Implementation

An annual schedule that assigns project managers to specific projects and sets forth key milestones should be published soon after the annual capital budget is approved. At this initiation stage the contractual mechanism for delivering the project should also be decided upon, as it will influence the designer's scope of work and the level of detail required in construction documents. Criteria relating to the project's complexity, urgency, required quality level, and other factors should be used to determine project delivery method.

The third phase, **Project Execution,** covers the accomplishment of specific projects from start (an approved, scheduled, assigned project) to finish (a completed, occupied, operating project) and includes the following work elements:

Vendor Pre-Qualification Program

An important tool for managing project quality is the pre-qualification of design and construction firms based on objective criteria measuring firm capabilities, financial stability, and relevant past experience. The pre-qualification process may often be combined with or precede negotiation of vendor fees based upon guaranteed volumes of work for the vendor. Such preferred vendor arrangements often specify performance measurements and/or incentives to assure that quality is maintained.

Project Team Selection

The first step in project execution is the selection of the most appropriate team of vendors—planners, architects, engineers, and other design professionals, as well as construction managers and key materials/equipment/systems suppliers in some cases—for the project being initiated, in accordance with a FPD&C policy on vendor assignments. Policy will dictate that team members be drawn from pre-qualified vendors under normal circumstances. The goals of such policy should be to balance workloads with vendor resources, to capitalize on vendor familiarity with the nature of the project or highly relevant past vendor experience, etc.

Equally important at this stage is the formal assignment of "user representatives" for each project team. Again, overall project management policy should clearly define the roles and responsibilities of user representatives in such matters as pre-design and design quality reviews, management of change-orders and project contingency budgets, project close-out and acceptance, etc.

Project Management Processes

Throughout the complete lifecycle of a project—from pre-design and programming through design, bidding, construction, FF&E procurement, close-out, and commissioning— the assigned project manager is the central player responsible for the success of the project. Success is measured both in process measures (schedule and budget) and

in outcome measures (project suitability and quality). The key project management processes are:

- project schedule management;
- project budget management;
- change management and decision documentation;
- regulatory interface;
- user interface; and
- quality assurance.

Reasonably detailed project management policies and processes should be documented in a project management manual.

Resource Categories

Institutional Policy Inputs to Capital Programs Management (CPM) are applicable only during the Strategic Planning and Capital Deployment phases. During the Project Execution phase there is normally no need for policy input at an institutional level although good practice would dictate a routine flow of information upwards on the status and progress of projects.

CPM **Core Processes** are the planning and control actions taken by the FPD&C staff to further the accomplishment of its work. These should be clearly documented in reasonable detail in a CPM manual. We have found that process flowcharting is a particularly effective documentation method.

Information Systems & Support Processes are the documentation and decision support systems that support CPM core planning and control processes. FPD&C offices handling a significant volume of capital programs activity should consider a suite of software applications. These include: 1) a space management/space inventory application; 2) a condition assessment database (which could be a module within a computerized maintenance management system); 3) a capital plan/budget database; 4) a CAD application for indexing and management of drawings and facility records; 5) a project management and accounting workflow application. Staff productivity and communications among team members can be greatly enhanced through the use of workflow software, and particularly web-based products.

Quality Systems & Standards include a variety of reference materials, industry standards, and job aids such as forms and software templates. Such references contribute clarity and consistency to the CPM core processes and support processes, and this, in turn, helps to assure quality of outcomes.

Human Resources Processes in Facility Planning, Design, and Construction

Management of human resources within the FPD&C office involves many of the same policies and practices as are applied throughout the rest of the institution. These are outlined in Figure 2. Although institutional policy governs in each of these areas, it is important for the FPD&C office to incorporate its own special requirements while conforming to institutional norms.

One special area, impacting on both FPD&C personnel and budget policy, involves staff timekeeping and the proper allocation of time to projects. For capital projects, the institution may elect to charge project management services against project (capital) accounts, or it may elect to fund such project management out of the operating budget in order to extend scarce capital funds. By and large, Strategic Planning and Capital Deployment phase activities must be funded out of the operating budget. Regardless of the funding strategy, good practice dictates capturing a detailed record of staff activity against specific work assignments, whether they be related to strategic planning, capital deployment, or project execution. Over time this data will be useful for estimating workloads and productivity, and thus to forecast the staffing requirements of the FPD&C office.

The Facility Planning, Design, and Construction Department Audit

In auditing the FPD&C function, the CPM Work Process Model and Personnel Process Model have proven quite useful to assist an audit team in the following ways:

- At the FPD&C audit planning stage, the models help to define the objectives and scope of the FPD&C audit when discussing the proposed engagement with the prospective client. Often there are nuances in the organization of the prospect's capital programs activity which require that the assessor interact with several additional departments having minor or supporting roles in the overall CPM work process.
- In the initial stage of the audit, the models provide a framework for identifying the policy and process documentation that the assessor must review. By reviewing the Work Process Model in detail the assessor and client can jointly develop a list of documents to be reviewed by the assessor in advance of the site visit.
- During the interview stage, the Work Process Model is useful to match key personnel with functions so that all relevant FPD&C staff is interviewed. Previewing the Work Process Model in a general orientation at the start of the assessment, or with each interviewee individually, helps to set the agenda for the interview and focus the topics for discussion. This tends to streamline the interview process and eliminate redundant discussions.

- At the analysis stage, we have found it useful to develop an assessment checklist from the Work Process Model, and to apply a simple point award scheme as a way to measure how well the FPD&C organization under study conforms to the Work Process Model. We have used the following four-point rating scale to rate individual Work Process Model components:
  1. Excellent. All requirements met. No further review required.
  2. Good. Most requirements met. Future attention required for performance improvement.
  3. Fair. Partial meeting of requirements. Attention necessary for performance improvement.
  4. Poor. Requirements not met. Immediate attention required to achieve baseline performance.

By examining the pattern of scores awarded, it is possible to isolate the specific areas where attention is needed. We have observed patterns where a specific functional area (e.g., campus master planning) was deficient in an otherwise satisfactory FPD&C organization. We have observed other instances where a specific resource category (e.g., quality systems and standards) tends to be deficient across several functional areas.

Applying the CPM Process Model to Assess an FPD&C Office

The Work Process Model has been used as an assessment tool at several institutions, three of which are summarized here:

CASE 1: Academic Health System

This large, urban academic health system with two hospital facilities and a network of ambulatory care sites sought an assessment of its Planning, Design, and Construction office in advance of a major capital project. The system, which had been placing approximately $20 million to $25 million in capital construction projects annually, was about to take on a $105 million phased campus redevelopment program. The objective of the assessment was to identify what adjustments should be made to the PD&C office in order to "scale up" for the larger program.

Using the Work Process Model, we found that the Strategic Facility Planning Phase suffered from deficiencies in documentation, so that the framework for evaluating potential capital projects was not clear to project proponents. This led to a resource-intensive, "ad-hoc" approach to capital project planning and budgeting. On the other hand, the Project Execution Phase was grounded in clear and consistent procedures with good documentation. Among the resource categories, we noted a serious lack of information systems support for all phases. We recommended the acquisition and implementation of commercial project management and accounting software to improve the productivity of the project management staff and to improve financial reporting and controls.

CASE 2: Public Research University

This comprehensive public research university, with a physical plant approaching 4.5 million GSF on a 350-acre campus and an enrollment of nearly 15,000, sought a "management efficiency review" of its campus development office together with its physical plant operations & maintenance Office. This was one of a series of reviews of administrative and support functions within the university. The university sought recommendations on improvements in departmental operations and comparative external data on resource utilization, particularly human resource utilization.

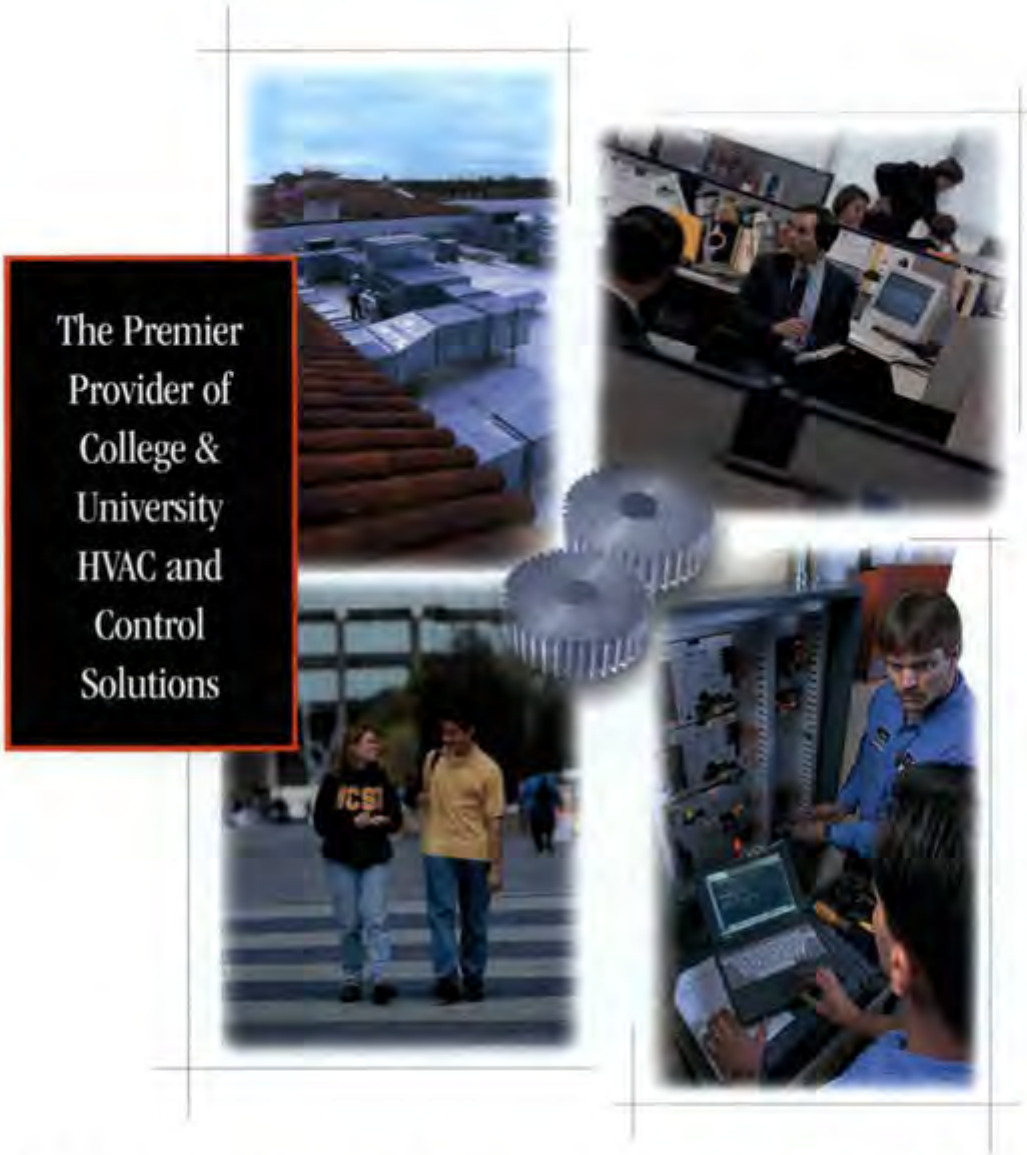
Using the Work Process Model a set of recommendations was developed. It outlined changes in the overall conduct of the FPD&C unit to relinquish most design activities to consultants and to concentrate on capital program management, feasibility studies, and technical support to Physical Plant. An improvement in the interaction between the two departments was necessary to clarify roles and reduce customer concerns about sources of service.

CASE 3: Private College

A private residential Master's Comprehensive college with a physical plant of 2.8 million gross square feet and an enrollment of 4,600 FTE students was concerned with the capabilities of its FPD&C and Physical Plant staff to handle current requirements and an expected 15 percent enrollment growth. In addition, there were senior management concerns about relations with the campus community and between the departments. A complication in the organizational structure was that the two departments reported to different vice presidents. The Work Process Model identified the need for a realignment of reporting lines to one vice president and the appointment of a chief facilities officer to improve coordination between the two units. A major problem area in the processing of feasibility study requests and capital budget development was addressed with recommendations to modify institutional policies for identification of priority project requests. Other major recommendations were the reduction of construction work performed by in-house staff and introduction of capital project "chargebacks" to recover FPD&C costs directly from project budgets.

Summary

The Work Process Model and Human Resource Model provide diagnostic tools to audit the effectiveness and efficiency of an institution's overall Capital Programs Management activities. The focus here on the Facilities Planning, Design, and Construction unit is designed to enable an audit team to look at the "big picture" and to identify problem areas that are suitable for improvement. Use of the models should incorporate the full participation of the unit under review to encourage adoption of recommendations for improvements and to incorporate elements of the models in routine work processes.



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Intelligent Campus Buildings for the Information Age

By Jack Caloz

Three "Information Age" trends have colleges and universities scrambling to take a hard look at the flexibility of their campus infrastructure systems: rapid-fire changes in technology, particularly information technology; increased demand for flexible, technology-focused teaching spaces; and increased systems' interconnectivity.

Today's campuses are becoming heavily reliant on infrastructure technology and systems. Student and faculty require access to campus information systems, computerized databases, and research tools from almost anywhere on campus—dormitory, lecture hall, cafeteria, lab bench, the commons, or library—and from remote, off-campus locations. Today's wired generation and the future wireless generation will make demands on campus infrastructure, particularly information technology infrastructure, that are unprecedented.

Rapid-Fire Technology Change

To maximize today's significant investment in telecommunications technology and infrastructure support, colleges and universities must focus campus-wide, rather than cobble together a building-by-building or school-by-school system.

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Campus facility managers and information services (IS) department heads must also develop an intelligent campus infrastructure that will accommodate today's Information Age systems as well as new, rapidly emerging technologies. Yet, how can colleges and universities avoid investing millions in infrastructure systems that become obsolete almost as quickly as they are installed?

The crucial factor is to develop a flexible, expandable, and adaptable campus backbone—one maintained and expanded to accommodate growing institutional aspirations, while supporting the legacy systems needs of ongoing operations. Today, technology initiatives are woven throughout the goals of almost every institution, from campus networking plans to distance learning hubs, multi-modal presentations, teleconferencing centers, and computer-assisted experimentation, to name a few. Without a solid, flexible backbone, these initiatives will fail.

We need to pave today's electronic highways for tomorrow's development. The adage "Build it and they will come" is as true today as it was in the days of the ARPANET. The Internet has shown the previously unimaginable leverage achievable on an information highway on a global scale. Entire industries have emerged that are dwarfing our traditional ones. We cannot afford to choke the lifeblood of our educational institutions. The backbone infrastructure is the information highway to future opportunities for the students, faculty, and the institution.

Technology Master Planning

Picking the right backbone involves a technology master planning effort that focuses on an iterative solution as

opposed to an ultimate solution. With the speed of technological change accelerating, your plan needs to be reviewed annually in context of the institution's goals and objectives and the technology that supports those goals and objectives. With goals and objectives defined, the foundation of your technology infrastructure—the backbone—then can be accurately assessed.

With microprocessor speed doubling every 18 months since the mid-1970s, a healthy diet of fiber is recommended. Insight into where the backbone is going is based on working with the next generation of IP (Internet protocol) service providers and Web hosting /co-location firms. While single-mode fiber is still king of the long-haul, high-bandwidth market, there is significant shift in the intermediate range. Distance and bandwidth continue to be the drivers in this market. Gigabit Ethernet is stretching the bandwidth and distance limitations of the standard 62.5-micron fiber. We have seen a material shift in the market from 62.5-micron to 50-micron fiber for those applications where gigabit Ethernet is required or expected.

Mike Gallitelli

Hudson Valley Community College

Copper is still king of the last 90 meters, although specialty requirements are still prevalent and wireless is growing rapidly. While not in the volumes of the past, copper is a backbone dietary must, if not for the building systems and legacy systems, at least enough for dial tone to call the service provider when the fiber lights go dim.

Wiring is a Key

Making a wrong choice in wiring will have far-reaching implications for future expansion and adaptation. The days of ad-hoc cabling systems are numbered. The increasing demands that high-speed telecommunications systems place on cabling require a highly structured system. The proper design of physical telecommunications infrastructure elements—today's critical "fourth utility"—is a key in assuring optimal network system performance.

In contrast, when various brands of layer-upon-layer of wiring is pulled, connected, disconnected, and reconnected in response to changing technology, it doesn't take long for wiring to become a tangled and confusing mess.

Cabling systems have traditionally been deployed in such a way that the system is not a system at all. The infrastructure becomes a conglomeration of vendor-specific components with little or no interconnectivity. Just as other building utilities must provide high quality service, telecommunications systems must be capable of providing performance, interoperability of systems, and efficiency of administration. Consistent standards-based solutions and careful attention to the associated support systems are essential in assuring many years of information exchange.

Existing and new buildings must give careful consideration to cabling performance, pathways and spaces, power provisions, and the infrastructure's relationship to system performance. Network downtime is often attributable to problems with the cabling media, either at termination points or along the cable length. Add to that the associated administrative time required to track down the problem and costs rapidly rise.

Problems can occur anywhere along the cabling system. Poorly sited or cramped closets, inadequate installation, pathways that do not provide needed support and protection, equipment and termination spaces not properly planned, or power provisions that cannot support the loads incurred, all can lead to system breakdowns.

One reason for a structured cabling system is technology is rapidly catching up to cable performance. Until recently, performance issues were not as important in many networks because cabling systems were typically designed for transmission speeds beyond the information exchange capabilities of electronic equipment. This is changing rapidly as more aggressive standards emerge and the price of associated high-speed network technology improves. Thus the capabilities of cabling infrastructure will be fully realized.

Standards-Based Systems

Manufacturers have also recognized the advantage of allowing universal interface with recognized structured cabling systems. Thus a standards-based structured cabling system will provide connectivity for voice, data, video, fire alarm, security, and building management systems.

With the best available cabling media in place, attention must be given to interconnecting hardware. This component is as critical as the cable when serving high-performance networks. Universal connecting hardware provides a common interface for building systems and allows efficient management of moves, changes, and additions. Connecting hardware is a very hot industry topic, with a focus on assuring cable segments and connections achieve the same signal performance.

Durstan Saylor

SUNY Geneseo

A common misconception is that the infrastructure is temporary and does not warrant the expense required to be "standards compliant." The reality is that the infrastructure often is in place for 15 years or more and congested closet spaces invariably lead to administrative problems due to difficulty in cable termination and identification. Twisted-pair telephone infrastructures, for example, have been in place in many facilities for half a century and are still supported. If technicians do not have adequate working space to terminate, the physical connection may be compromised. The shear magnitude of cable routed to an undersized closet results in a situation were locating a problem becomes impossible.

Peter Treiber

Lafayette College, Kirby Hall

Pedagogical Changes

The second trend affects how teaching spaces are designed. Learning environments must be flexible, able to accommodate multi-modal presentations and group learning, as well as the traditional pedagogical system of text-based lectures and testing—all within a single space. As a result, barriers that in the past typically separated lecture halls, classrooms, seminar rooms, and student gathering and study areas are quickly coming down. The goal of the Information Age campus design is to provide more intimate surroundings suitable for a variety of teaching methods for increasingly smaller groups of students.

These multiple-use spaces will require a creative and collaborative application of a media mix consisting of copper fiber and, yes, wireless. As means, methods, and approaches change to meet the future challenges of today's teachers, the support infrastructure needs to be there to facilitate the process. Significant interaction between the end users and the designers needs to occur to assure that the tools of the future are not precluded. Audiovisual support for teachers and state-of-the-art connectivity for students is a must. Today's students need to be prepared for the technological work environment they will enter. They will need to be adept at the use of today's tools and the school has to provide that experience. These challenges are economically achievable or at least not precluded when the collaborative efforts of the designer and users are combined to support the aspirations of the institution and the needs of its students and faculty.

Various room shapes and teaching styles notwithstanding, technology is fast becoming the central element in equipping classrooms and student gathering areas. Yet, since a space's design will far exceed the technology's useful life it is essential that good planning principles be applied to the infrastructure used within the space. For instance, a supporting system we have looked at many times but that has always fallen short of the viability mark was wireless LANs (local area networks).

Until recently the price/performance functionality was just not there. They were too expensive per point and performance was less than adequate for anything but the least demanding of applications. It has always been less expensive to cable than to go wireless. While that is still true for most applications, the latest 10+mps product offerings appear robust enough for prime time. The applications in non-traditional spaces such as student gathering areas, historical renovations, and exterior areas, are making wireless LANs a part of the viable solution mix for today's campus. They are not ready for the engineering or graphical arts labs yet, but will be providing an additional tool for the right media mix formula to facilitate the intelligent campus for the Information Age.

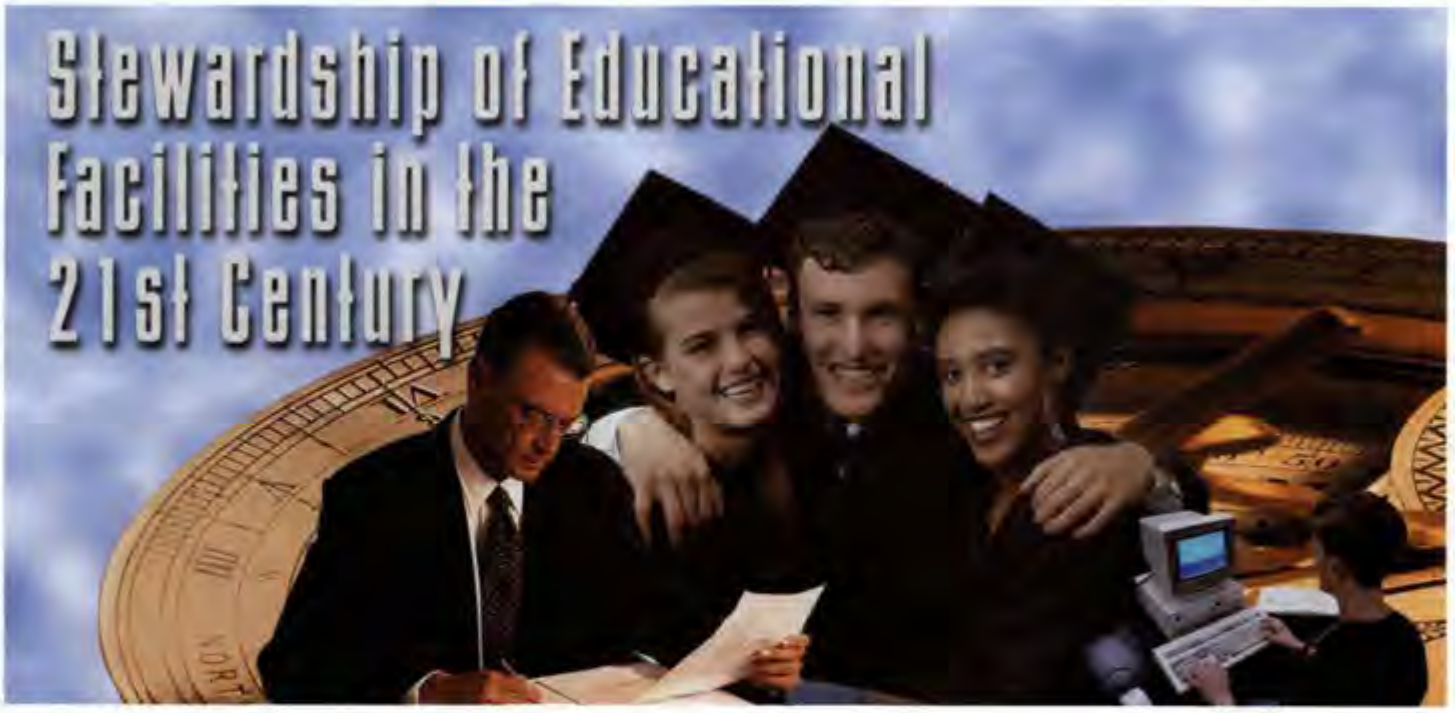
Systems Interconnectivity

The third trend is the increased interconnectivity of systems. This means that in the future flexibility is enhanced as building automation systems (temperature control, lighting control, closed-circuit TV, intrusion detection, and access control) and educational automation systems (voice, data, video distribution, Internet access) all migrate to a common platform. This migration, with the right infrastructure system, ultimately will allow the plug-and-play approach to all educational systems in the future. Incorporating wireless, personal communications devices, which increasingly will enter the educational universe, will also be a major consideration.

This is an area where we can see some cost relief instead of more capital expense just to keep pace. The improving economics of electronic infrastructure, with its potential exponential increases in productivity, is only now becoming a reality. We see it in the stock markets as Wall Street rewards the "dot-coms," and on the campuses as we begin to leverage the migration to a common platform and the true sharing of infrastructure and data among systems.

A well-designed electronic infrastructure will provide the educational and operational requirements over the same wires and fibers. They will share data and combine the data from diverse systems to generate information. The information gathered from the campus systems will provide a new, more effective, and less costly educational experience, enriching students, faculty, and the institution simultaneously. New amenities for students will produce additional revenue sources for the institution and expanded opportunities for the faculty. A new paradigm is being created where the pie increases for all at the same time that your campus is Information Age-ready.

Stewardship of Educational Facilities in the 21st Century



By Mike Crosson

Keeping the buildings of a school system or university in good condition is an enormous responsibility, and one that can run out of control without a comprehensive system of capital planning and assessment. Before the Massachusetts Institute of Technology adopted a technology-based strategy for facilities renewal and management, university officials relied on the memory of its physical plant personnel to document the conditions of the 119 buildings on campus and used spreadsheets to track its most urgent needs. Today, the school has established a strategic facilities investment policy, and the campus' condition plays a pivotal role of MIT's overall mission to remain one of world's top technical universities.

Fundamental change, in both business methods and decision support tools, is needed in order for higher education institutions to optimize capital reinvestment across large, diverse building portfolios. Meeting the facilities needs of a campus is an important step toward building an environment conducive to learning and educational innovation. Ultimately, an integral methodology for strategic and comprehensive facilities life cycle planning cannot be overstated. Traditional approaches must break from one-time building assessments and repair budgets and progress toward an ongoing life cycle-based facilities management approach. Facilities issues are continuous and dynamic, yet classic "master plans" and "project-based" approaches are still employed, despite the fact that they are generally static in nature and flawed by design. Evolving to a life cycle approach of facilities management requires enterprise-wide communication and consensus building regarding building conditions, needs, and planning guidelines across all departments and constituencies. Information flows between facility managers, department heads, budget writers, and executives, enabling all parties to adjust their priorities according to pressing needs. The process defines, refines, and solidifies core missions and goals, providing "buy-in" from key constituencies both in terms of financial and process support.

Benchmarks/Metrics

Accurate baseline information on the condition of the facilities, including both physical conditions and functional ability to meet program requirements, is the foundation of long-term planning initiatives. Improved policy and financial decisions can only be attained through analysis of accurate baseline facilities information, projections based upon proven models and established benchmarks. Popular benchmarks such as the facilities condition index can be supplemented with educational adequacy indices, as well as systems conditions ratios, etc.

The facilities condition audit is a proven method for gaining accurate baseline information. Audits can be performed in various levels of detail and are conducted by in-house staff, independent-third parities, or a combination of both.

To define targets and create benchmarks, a common industry standard is used—the Facility Condition Index (FCI). The FCI is the repair cost over the replacement cost of the build-

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ing. As a description of the building, FCI transcends the traditionally used descriptions of "good" and "poor" and provides a quantitative benchmark. A building with an estimated replacement value of $25 million with an FCI of 0.1 would mean that $2.5 million is needed to repair the building. This now becomes a defensible figure that lends more credibility to budget requests and provides a better understanding of the building's condition. The FCI can also be rolled up to any grouping of facilities within an organization, allowing for quantitative and qualitative comparisons.

Automated Decision Support Tools

A technology-based decision support tool can be a powerful aid in the construction-versus-renovation decision-making process. Using the methodology, a building slated for demolition might be deemed worthy of renovation after a thorough condition analysis—saving a university potentially millions of dollars while ensuring facility quality.

In this approach, the Internet is utilized as an integral part of the system's widespread gathering and distribution of facilities data across complex, multi-site, and multi-structure university systems. For example, remote sites can input requirements and view progress versus tactical and strategic goals in a cooperative environment.

Such Web-based capital planning and management solutions provide long-range, multi-year "what-if" scenario analyses and project planning tools for prioritizing and optimizing corrective actions. The system also links organizational program needs and functional requirements to facilities. Most importantly, the system enables the creation of funding strategies and further utilizes the facilities conditions data to develop polished, concise reports that provide valid justification for facilities capital needs.

Higher education institution, especially public institutions, fare better at attaining the necessary funding for carrying out deferred maintenance, renewal, and replacement initiatives when they approach funding sources with a comprehensive outline for facilities capital planning.

UMass and UNC—Showcases for Success

The successful expansion of the UMass-Amherst campus during the past 70 years took its toll on some of the campus' aging buildings. The campus has grown considerably since the 1930s and experienced its biggest growth spurt during the 1960s when 57 buildings were erected. With 190 buildings and a total of 9 million square feet, the university has further plans for expansion. However, tracking and scheduling the maintenance and repair of existing facilities became a serious priority as the university found that many of its buildings require immediate attention.

"We were concerned with protecting the current value of the university's assets over the long term and investing in those assets to increase their value," said Jim Cahill, UMass director of facilities planning. "The university realized that deferring problems with its facilities would only require a greater investment at a later time."

UMass formed a comprehensive team to begin the process of assessing facilities conditions and creating a plan for the management of the university's physical infrastructure. During the initial facilities condition assessment, the UMass team determined that its goals should include benchmarking the current condition of the university's facilities portfolio, predicting future capital renewal needs, developing financial models, and providing tools for continued planning and management. The scope and degree of deficiencies was also assessed by identifying existing deficient conditions, prioritizing and categorizing the conditions, developing solutions, and estimating corrective costs.

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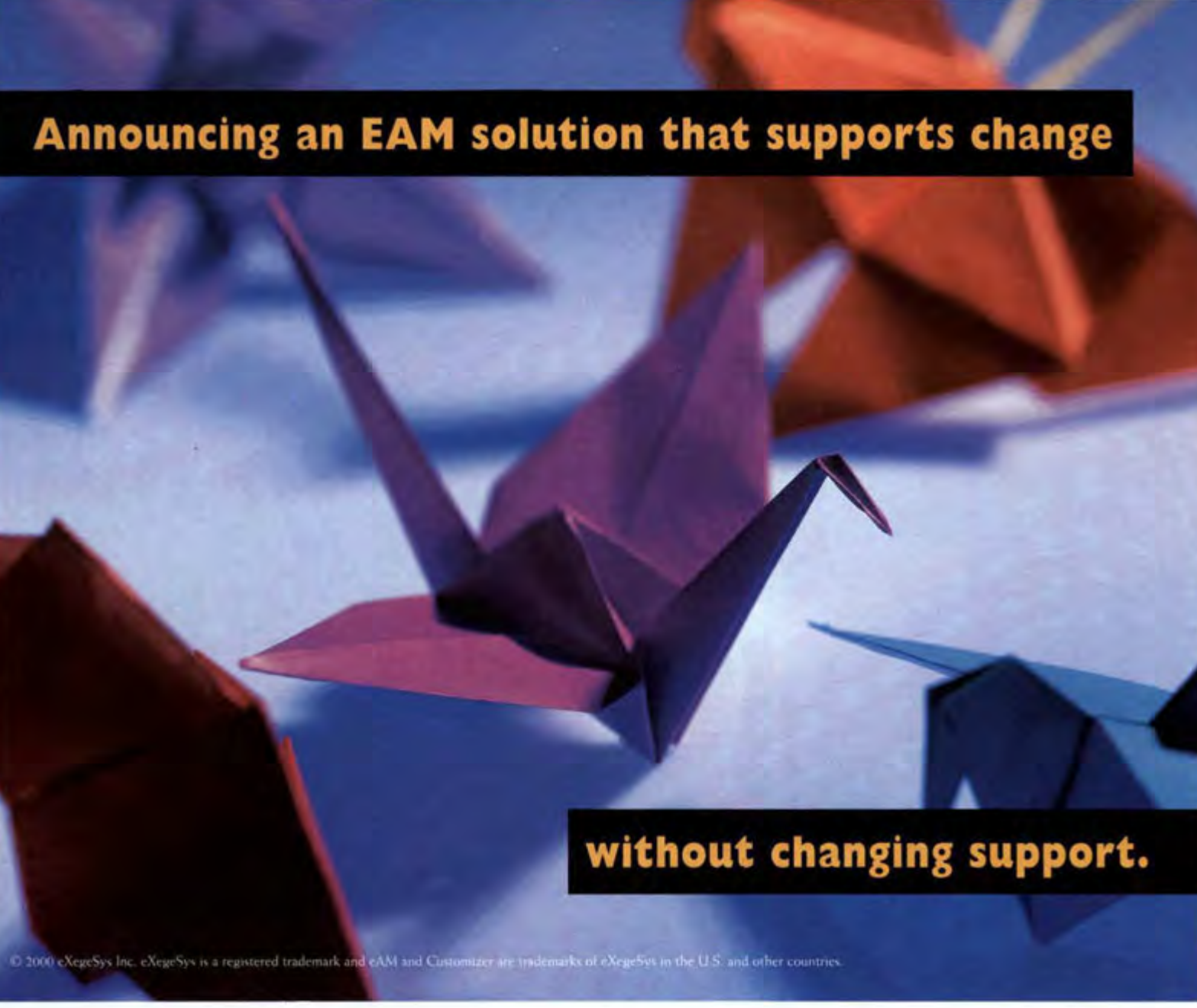

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Continued from page 30

UMass created a comprehensive planning approach and funding strategy for facilities management and developed a framework for action that included plans for deferred maintenance backlog reduction, renewal, modernization, new construction, and facilities operations. The comprehensive planning approach also addressed new construction projects in order to meet the university's evolving needs, provided for state-of-the-art technology, accommodated growing space needs, and replaced obsolete and badly deteriorated facilities.

Twenty-five buildings were identified as candidates for potential future demolition, representing a current estimated replacement value of $49 million. The comprehensive planning approach emphasized dedicating the facilities operating budget to preventive and ongoing maintenance and repair and linking operational funding to increases in facility assets.

Increasing enrollments also made facilities a priority concern in the University of North Carolina system, which is spread over 16 different campuses that are hundreds of miles apart. Within a six-week timeframe, the university needed to cost-effectively determine if enough space was available and if the current facilities' conditions could accommodate an increase. Without accurate, up-to-date facilities' condition data available, the necessity and costs of new projects could not be appropriately calculated.

"We needed a detailed account of the facilities' conditions at each campus," said Kevin MacNaughton, UNC's associate vice president for finance and university property officer. "The state's condition assessment program only dealt with deferred maintenance, and university-developed facility evaluation merely categorized renovation as A-, B-, C-, and D-priority level. The quality of information also varied from campus to campus, depending on resources available to conduct each assessment, and lacked overall consistency of information."

UNC established a uniform method of compiling accurate facilities conditions data using a Web-enabled capital planning and management solutions system. By responding to the system's online questionnaire about various aspects of each campus building, such as structural condition, accessibility, maintainability and climate control, UNC was able to compile data on campus facilities conditions and calculate each building's cost of repair or renewal.

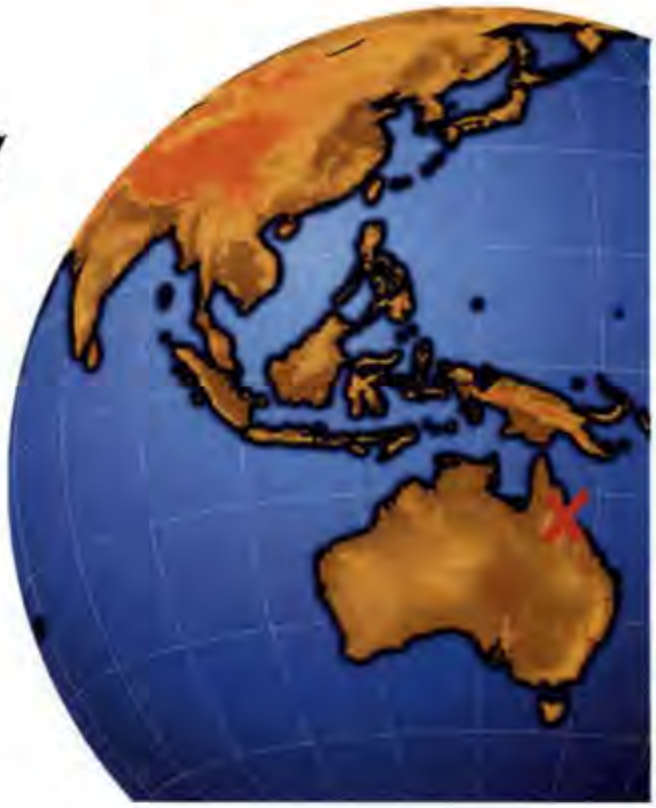
Using the system, UNC ensured the collection of valid data and enabled collaboration across the 16 distributed campuses. The system subsequently created facilities' conditions reports that have aided in developing UNC's capital plan. A ten-year proposal for campus expansion projects, the capital plan includes the development of general academic and student support space, science and engineering labs, and an extended campus infrastructure. The University Board of Governors and the North Carolina General Assembly will review the capital plan in order to determine the amount of facilities funding allocations.

The APPA/VFA Capital Renewal Survey

APPA and VFA have joined forces to establish a Web-based survey of facility condition audit practices, as well as associated information regarding existing levels of deferred maintenance and capital renewal. This survey can be found at both the APPA and VFA websites, www.appa.org or www.vfa.com.

Information from the survey will be used to promote awareness of the increasing deterioration rate among the nation's educational facilities. It will be published by APPA to provide a better understanding of current status and trends, and to yield high-level facilities information. Please note that only aggregate-level data will be published, and all individual institution information will be kept confidential. We urge you to participate in this important ongoing data collection effort.

Delivering a New Library Building at James Cook University



By Ted Dews and Judith Clark

James Cook University has just occupied a new library building on its campus at Cairns, in North Queensland, Australia. Cairns is a regional coastal city 350km north of the parent campus and located at latitude 17 degrees south of the equator. It has a wet tropical environment, and the campus is surrounded on two sides by virgin tropical rainforest. The Cairns campus opened in 1996 and now has a student population of 3,000, with steady increases expected. The new building replaces a temporary library installation in one of the first buildings. At 6,600 square metres (70,600 square feet) it is the largest building on the campus and, because of its central importance, extra attention was given to the architecture. The whole project cost A$12.7 million, of which the building and associated consultants fees cost A$10 million.

The region served by JCU has the lowest tertiary participation rate in the state of Queensland. The catchment area covers many isolated rural settlements and small remote and island communities. To address the special needs of an exceptionally diverse student population presents specific challenges in facilities management. To fulfill its central role on campus, the building has to more than stand out, it must provide a welcoming environment that is in every way explicit about its function and purpose. It has to be a place that students want to use and like to come to. The building also has to serve the changing roles of librarians. Increasingly they are partners in the academic process, and as electronic technologies make it possible for those processes to take place "any time, anywhere," information services extend beyond the walls of the library building. Choices made in library facilities design and fit out are fundamental to how well the university achieves its goals in teaching, learning, and research.

In the last few years it has become ever more difficult to plan a library building that will continue to remain relevant in the university for years to come. The days are gone of planning a library building on the basis of projections for collection growth and student population. The challenge now is to build for an unknown future. At Cairns, we recognized a need for a different type of library building, one that addresses the changes resulting from technology-driven innovation in teaching. We also recognized that libraries to a greater or lesser extent play an important social role. In the context of the Cairns campus, this new building had to make a strong

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contribution toward building a sense of academic community and establishing a culture of learning.

The new library is designed on a learning center model. A learning center is commonly understood to be a dedicated facility for self-paced study and learning, providing state-of-the-art technology and a place where people can study together without interruption. The new building in Cairns combines the learning center approach with more traditional aspects of the university library. It houses resource collections, help desk and reference services, general computing facilities, the central network communications hub for the campus, training rooms, assistive technologies for students with disabilities, and an Internet café. Study skills staff, student equity, information technology, and audiovisual functions for the campus are provided from this building.

The building comprises three stories, is fully airconditioned, and is supported from a central campus plant room with ice storage for electrical load shifting and hygroscopic heat wheels for heat (cold) recovery from expelled air. Refrigerant heat pump systems are used to provide heating for the purposes of dehumidifying the incoming ventilation air. With carefully designed shading of external walls and roof insulation and double-skin construction where appropriate, the whole facility is very "energy efficient." Glazing is green tinted. A number of other features mentioned below add to this efficiency.

The primary structure is concrete, cast in-situ, with post-tensioned floor slabs specified to a load-level suitable for compact shelving. The post-tension design solution was offered by the builder, and saved both cost and time in construction.

Because of the tropical climate no heating (other than for humidity control) is required. Cooling is required year round with set points at 23°C during the day and 26° at night. Air conditioning ducting has external insulation to minimize condensation. Occupancy sensing adjusts set points when spaces are unoccupied. In appropriate areas lighting is similarly controlled, and there are also programmable controllers to take account of natural light available at various times of the day. Acoustic control is achieved through careful selection of surface materials and window seals.

The building is entered via a striking foyer atrium, but the scale of this space is tempered by a sense of order. The reception counter is clearly visible, despite the combined services desk being set well back so as not to intimidate the first-time visitor. Strong, bright colors (tangerine and royal

blue) complemented by track lighting draw attention to the services counter and are in keeping with its purpose. Cream and mint walls are interposed throughout the rest of the building to give a light, calm, and fresh feeling to what could easily have been overly homogenous and rectangular expanses. On each floor, ceiling-mounted monitors serve as an electronic billboard, presenting details of new s services and promoting events and activities on campus.

The new JCU Cairns library.

Behind the service counters are open-plan staff workrooms with modular office furniture, and multi-task work tables at varying heights. There is plenty of additional room so that trolleys of books or equipment can be moved about easily. Staff enjoy a high level of natural light and stunning views of the rainforest—in some aspects this is a canopy view that is quite unusual and conducive to viewing the wildlife.

An important workplace design goal was to break down functional barriers and bring diverse parts of the organization into closer contact. Work groups in this building are not strictly functional but are "mixed neighborhoods," co-locating people with different professional backgrounds. This was a deliberate arrangement chosen in the expectation that better integration of services would result.

The library entrance shows Queensland sandstone facing. Café shown at left.

Workplace health and safety consultants reviewed routine work flow associated with the library services, and their recommendations were followed in the document services workroom fit out. Capital project funding was used to purchase the latest materials flow equipment and a self-checkout unit to supplement the borrowing services provided over the counter.

The library staff provide instruction about multimedia information resources—their use and management, their integration into teaching programs, and their evaluation. This new building has a number of well-equipped training rooms for this purpose. There is growing demand for a full-service environment where new resources can be assembled, produced, and created. The IT infrastructure for this building was designed to cater for an increase in use of all types of multimedia. The training labs are equipped with videoconferencing systems and furnished so that they can be adapted to a variety of teaching and learning activities.

In assessing the performance of a building a key factor, important for both comfort and productivity, is spatial and work station design. In the higher education sector, library users are required to spend ever more of their time using computers and other electronic equipment. It is more important than ever that study and learning areas are comfortable and that there are appropriate spaces for collaboration and for relaxation. In the computer areas we allowed space for interaction between students and extra chairs. It is common to see two or three chairs pulled up at the one screen.

On each level of this building there are clusters of computer workstations, areas with tables in varying configurations, library carrels, and lounge areas. Phone, power, and data connections can be provided almost anywhere, via skirting ducting, specially designed floor penetrations, or power columns. The same style of modular office furniture was used in both public and staff-only areas. Depending on the configuration, this furniture can be either soft- or hard-wired. As information technology further affects the way people work and learn, this furniture can be easily reconfigured for different tasks and functions.

The book stacks are laid out to frame views of the surrounding hills and are used to create different types of work zones. Separate group study areas help to isolate noise, but glass internal walls were selected for these rooms to help to integrate activities. The great strength of a multi-use facility, and the success of this building, is that with good design, an atmosphere of vitality and enterprise develops naturally.

Library services desk.

The IT infrastructure was an integral part of building design

from the start of the project. The communications network was planned to scale easily as demand grows and to cater for a variety of uses. The IT solution developed in partnership with a selected Large Account Reseller (LAR) was based on a Storage Area Network (SAN) that can be added to in the foreseeable future. The initial investment in IT cost just under 10 percent of the total capital project costs. It leaves the campus well placed to move to wireless communication, digital multimedia broadcasting, client-server architecture, or personal portable computing over the next few years. What we can never plan for is just how IT will change educational processes and the impact this will have on libraries, learning, and support services.

A bridge connects a lecture theatre and the library, which is adjacent to a rainforest.

On this project, the marriage between architectural design concepts and the librarian's need for functionality was the key to its success. The original design brief prepared by the campus librarian described a building that was to be more a workshop than a warehouse, with the emphasis on service delivery rather than the collection of books and other materials. All libraries seek to maximize access to their local collections, but more important in this case was the provision of spaces and facilities to accommodate a wide range of activities involving interaction with ideas and information. It is perhaps natural that a remote branch library with a small collection would have developed a strong service ethic aimed at widening access to information resources.

The project was completed to time and to budget, with the construction phase being 44 weeks. The contractor had targeted a significantly shorter period for building and probably would have achieved it had not two key subcontractors failed to perform as expected. The contractor was disappointed although we were happy that our timetable had been met.

How Did We Go About It?

When it was clear that our top priority project, the library, would be funded, it was decided it would be designed to facilitate the use of the best contemporary technologies for teaching and learning. Following the APPA annual meeting at Salt Lake City in 1996, the writers toured a number of major North American institutions reputed to have facilities of the kind that we were envisaging. This trip proved to be extremely valuable and enabled the later planning decisions to be made with much more confidence than would otherwise have been the case.

With this basic vision, we established the broad program for the project. A key element of the programming was that once started the process should be continuous and under some pressure. There would be no time to continually revisit issues or for major changes of philosophy once decided. Since one of the key components of a successful project is a clear and comprehensive brief for the designing consultants, its preparation and adoption was the first major task. This was undertaken in house, using the university's standard model brief for major buildings as the starting point.

Queensland State law requires that its state universities, of which we are one,

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engage in a competitive process for the selection and appointment of consultants and contractors. We had already decided that we would use a conventional delivery process, that is full design and documentation before proceeding to seek bids for construction. We have our own selection criteria for both consultants and builders, and in the case of the former as well as relevant experience and a good track record, we require a high level of local input through demonstrated permanent establishment of substance in the city. We also have our own conditions of engagement that require the consultant to agree to meet our budget, to our standards and to provide as a minimum the amount of space identified in the brief, which also includes some efficiency targets. This requirement tends to focus the minds of the consultants as if the tendered prices exceed the budget, redesign is at their cost, unless of course we have imposed a significant variation. While a high degree of liaison with all user groups is required of the consultants, all instructions that might involve any variation from the brief must be through the director of central services. Variations undertaken outside of this policy are likely to be at the cost of the consultant. We require also that the architect be the principal consultant and hire all secondary consultants to our approval. They were also required to meet our nominated program.

A view from the library.

The selection criteria and the conditions of engagement, plus the designer's brief, were provided to all consultants who expressed interest in the project. They were required to address them all in their bid submissions.

A small selection committee with local community technical expertise as well as business representation worked with university property staff to interview a short list of bidders and assess the candidates according to the established criteria. A local Cairns firm was appointed. This process, from advertisement to appointment took about six weeks.

The design process was monitored fortnightly by a project planning committee comprising user representatives, property section representatives and the consultants as appropriate to the stage of the work. This committee was chaired by the director of central services. It reported in formal terms at predetermined points along the way to the University Buildings and Grounds Committee. At each key point in the process the users were required to confirm that they were satisfied with the design and with the inevitable compromises that were necessary. The budget was also closely monitored at all times. Changes were made if budgets were being exceeded. This process continued until documentation was completed.

The University Council, the governing body, approved the plans at developed sketch plan stage (the only time they go before the council unless material changes are made). This was carefully timed so that work was not delayed. With a track record of no changes ever having been made at the council, the author took the risk and proceeded with the documentation work while this approval was being obtained.

As soon as the preparatory site works and foundation details were finalised a contract was awarded for construction of this part of the work. This gave the main building contractor a clean start with all underground main services in place.

As the documentation approached its conclusion the process of preparing to obtain

bids for construction was started through publicly advertised invitations to apply for registration as a bidder. Once accepted through this process, the lowest conforming bidder should be awarded the job. As soon as the documents were completed they were distributed to the registered bidders and they were invited to submit a bid.

The eight bids received were very competitive. Some adjustments of a relatively minor nature were needed to ensure compliance with the budget. These were negotiated and the contract was awarded.

Contract progress was monitored by the project control group on a monthly basis. This received reports from consultants and contractors and identified any issues that might delay the work with a view to expediting their resolution. Although named a control group it was essentially a liaison group. All job instructions to the contractor followed the procedure nominated in the building contract. The director of central services visited Cairns and met the architects on a bi-weekly basis for detailed progress reports. Site supervision was by the consultants and reinforced by a full-time clerk of works employed by the university.

Overall, project progression was smooth and harmonious. A good performance indicator is the duration and frequency of control group meetings. There were no extra meetings scheduled and few exceeded 30 minutes duration. In our process, commissioning of the building services forms part of the construction contract and is supervised by the consultants as part of their commission. This was included in the 44 weeks.

During the final months of the contract university staff prepared loose furniture and equipment schedules and arranged the necessary purchases. From appointment of the first consultants to building occupation was 23 months.

This was in fact a fairly routine process and one that is frequently but not exclusively used in this part of the world. Its success in our case rests on the agreements with the consultants, the adequacy of the brief, and on being good clients with a good team that made prompt decisions and stood by them. We handled all internal processing expeditiously.

Facilities management issues such as building location, servicing, layout, security, and access can have a fundamental effect on the quality of services delivered and can also act as a catalyst to change. The way that buildings and environments are designed can enhance or inhibit workplace learning through influencing the morale, values and relationships within the organization. This project gave us the opportunity to reconsider the role of the library and other support services on campus in the context of detail planning for the new facility. There is no doubt that involving employees and building users in parts of the process has lead to greater integration of people, technology and support services. Running this process in parallel with a well- controlled building program has resulted in a facility that is a success from all perspectives.

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DEVELOPING A BIG-PICTURE VIEW FOR PARKING

By Chris Luz, P.E., AICP, and John Burgan, P.E.

Students, faculty, staff, and visitors may have widely divergent views when it comes to college and university facilities. But if there is common ground, it probably centers on parking—there's likely never enough or it's never as convenient as it could be.

The higher education construction market is booming. Conservative estimates project that well over $10 billion will be spent upgrading or replacing outdated collegiate facilities in the next ten years, and parking facilities are a major part of the mix.

Providing efficient parking and related transportation services is a continual challenge for higher education facility personnel. The key to successful parking operations is to carefully analyze current and future parking requirements in light of other institutional building plans, including the integration of parking requirements with the institution's master plan. This thorough analysis, coupled with innovative design and management solutions, can ease the parking burden on many campuses.

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Setting the Stage

College and university facility professionals understand the importance of the institution's master plan. This living document provides the strategic direction that is vital to making wise facility investment decisions. The plan provides the details and anticipated schedules for the construction of new facilities or the renovation of existing structures.

Parking and related transportation components are obviously an integral part of the master plan. The expansion of a building, for example, may require the demolition of an adjacent parking lot—and those spaces must go somewhere or be accommodated by using alternative parking solutions. The integration of surface and covered parking facilities into the fabric of the campus must be balanced with both building and green space requirements.

Accurately defining current parking operations and management issues establishes the foundation for the parking plan, and involves four major components:

- Travel and parking characteristics of faculty, staff, students, and visitors
- Inventorying the number and type of campus parking spaces and quantifying the information
- Understanding the culture of the campus and user expectations
- Gathering public input through the use of surveys, open-campus meetings, focus groups, or other mediums

The completed analysis enables facility personnel to evaluate the existing parking inventory verses estimated demand. Conducted concurrently, a cost analysis provides valuable information that defines the cost associated with campus

parking. Components to be analyzed during the cost analysis include the revenue stream and costs associated with operations and maintenance, administration, roadway improvements, land acquisition, new construction and debt service, and the support of transit and alternative modes of transportation.

By thoroughly evaluating current and anticipated parking conditions, and by developing detailed goals and objectives, facility personnel can set priorities and develop strategies that relate to a big picture, rather than a band-aid approach, to parking.

Parking for the 17,000-seat Kohl Center at UW-Madison was provided through the use of existing public and private parking facilities.

The University of Wisconsin-Madison (UW-Madison) has taken a comprehensive approach to parking. The university's 900-acre, 200-building campus is home to more than 51,000 students, faculty, and staff. An aggressive capital improvement program currently underway will dramatically impact the entire campus, and parking is a major program issue.

The number of parking spaces serving the campus is currently lower than at any other Big 10 school. To meet current and future parking requirements, the university developed a comprehensive parking program. The first step was the completion of a Transportation and Parking Master Plan. The plan analyzed the physical organization of the campus, identified future expansion opportunities and thresholds, and balanced transportation and transit needs, parking, building development, open space, and pedestrian patterns. Recommendations for the construction of new spaces were also provided. The master plan indicated that the university's building development plan would be constrained based on the capacity of the roadway system to accommodate new campus parking. To compound the situation, much of the projected new building space will be located on current surface parking lots, requiring the replacement of that portion of the parking inventory as well as new parking to meet new demand associated with the building program.

University staff realized that building new parking alone was not the answer. To meet numerous requirements, the university turned to an innovative approach to parking management—a Transportation Demand Management (TDM) plan. TDM involves modifying travel behavior in order to reduce traffic congestion and parking demand while also meeting other requirements. The plan enables the university to make the best use of available parking resources by looking at other transportation and parking options including ride-share programs, shuttle service, and alternative work schedules for both faculty and staff.

Implementation of the initial TDM Plan was completed in 1996, and is continually evolving. The plan, coupled with other efforts, begins to meet the university's parking requirements in ways that would not have been considered feasible ten years ago.

Parking for Today and Tomorrow

While it may seem like old news, there are a number of challenges to developing successful parking projects. Limited open space, cost, the integration of parking with other building components and the interface with the surrounding community can all have an impact on the development of any parking project. All projects must relate to the master plan on and consensus must be built among all users prior to the development of any project. By carefully evaluating new construction verses renovation options, joint development projects and other scenarios, parking facilities constructed today will successfully meet parking requirements well into the future.

New Construction versus Facility Renovations

When it comes to adding parking spaces only two options exist, build new or expand an existing structure. While a renovation to existing structure may seem more feasible to many, facility professionals know that renovation projects can often be more costly than building a new parking structure.

A thorough analysis of the existing facility must first be completed. Information gathered will include an assessment of the facility's physical condition and an evaluation of its security, way finding, access, and aesthetics. The original

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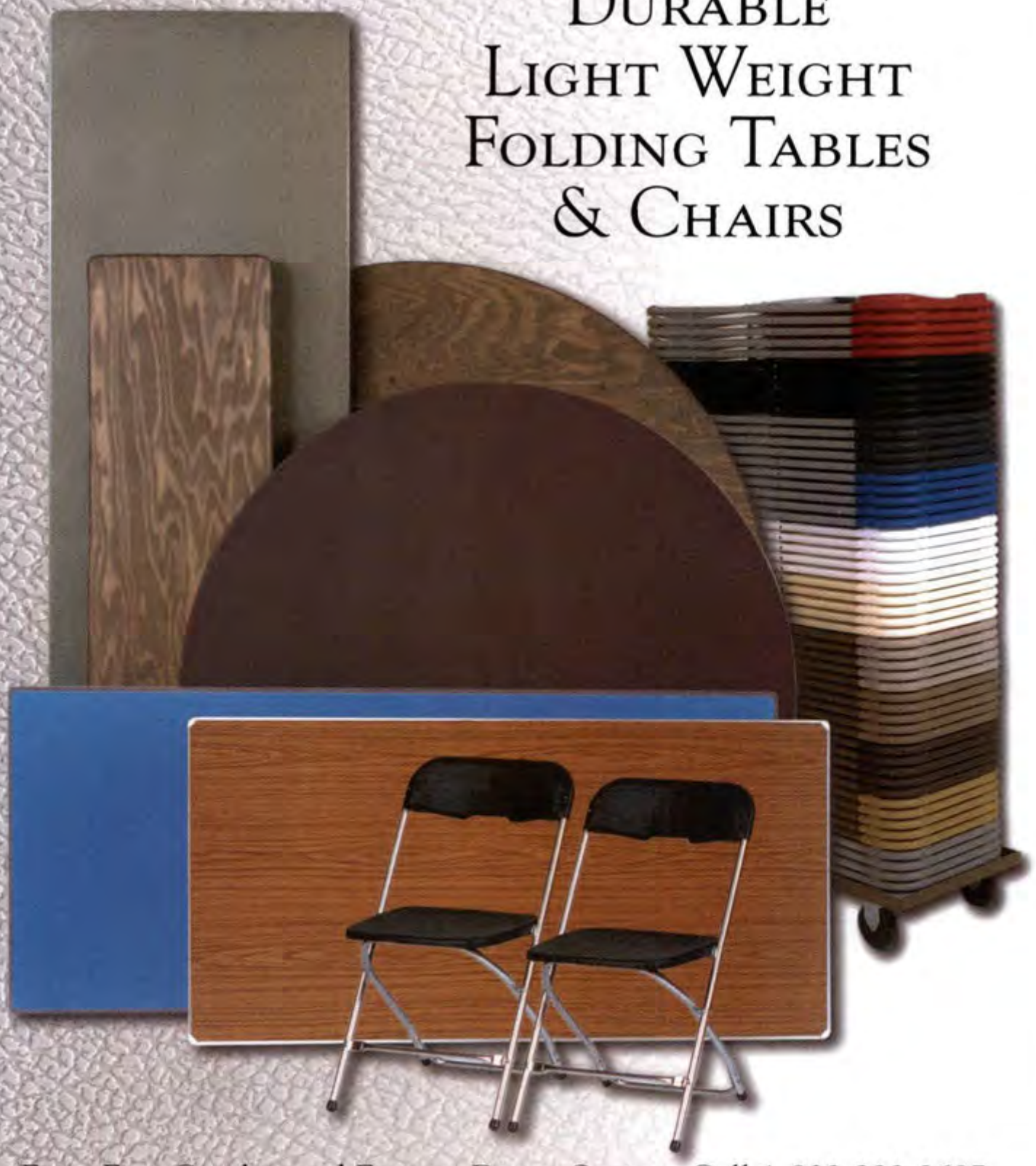

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construction documents must be reviewed to confirm whether or not the existing structural system will support an expansion or a major renovation. Finally, the site and adjacent properties must be evaluated to determine if a horizontal expansion is feasible or if a vertical expansion is the best option. The resulting report provides a detailed analysis of the existing structure and the estimated costs for its expansion or renovation. This data can then be compared to the estimated cost for constructing a new facility, enabling the institution to select the most efficient and economical construction alternative. A life cycle analysis over an extended period of time, such as 30 years into the future, may also be required.

An Alternative to Building Additional Parking

Costs, lack of available land and other issues often necessitate creative parking solutions. One option is to combine existing institution, public, and private parking resources to meet demand. This strategy was employed when the UW-Madison constructed the new 17,000-seat Kohl Center arena.

Rather than building a new parking structure in conjunction with the arena, which was not feasible for a variety of reasons, a parking management plan was developed that incorporated multiple existing parking resources. An analysis of

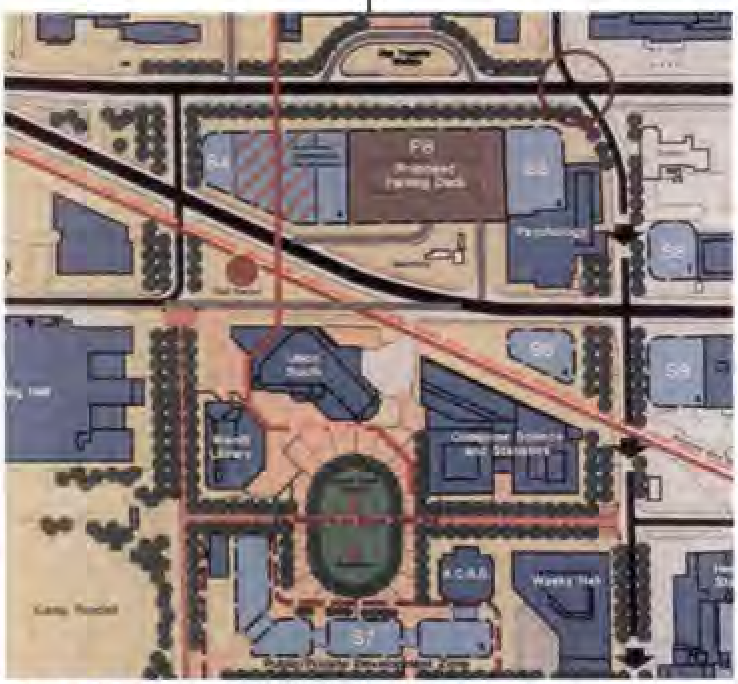
The parking structure built adjacent to the National Advocacy Center at the University of South Carolina reflects the character of the center and the surrounding campus.

event-day use was conducted and the requirements of all users were thoroughly analyzed. The university worked with the City of Madison and many private businesses, including a medical center and several nearby office complexes, to develop joint-use agreements. This approach allowed the university to use existing private and public parking facilities for events at the Kohl Center. The city participated by helping business owners to obtain zoning variances and special-use parking permits that allow secondary use of their parking facilities. The resulting plan, which is continually evaluated and updated as necessary, provides parking for all users within existing public and private parking facilities.

Community Partnerships

Whether the parking structure is a new facility or an expansion, working with the surrounding business and residential community is critical. Both groups are often concerned about the impact that construction of a parking facility will have on the adjacent neighborhood's transportation system while also being concerned about the project's aesthetic impact.

Another UW-Madison project successfully illustrates working with the surrounding community. To meet parking requirements near the engineering campus, particularly for visitors that attend university-sponsored seminars, a new parking structure was required. The structure, which would replace an existing parking lot, was to be located near a well-established neighborhood, which raised concerns among local residents.



The TDM Plan at the UW-Madison enables the University to accommodate parking requirements by using a range of options.

A detailed education effort addressed citizen concerns and illustrated the project's impact on the surrounding area, its design and the benefits to the institution. Traffic count information, both to and from the structure, was combined with management, operation and design material, including lighting, to give residents a clear understanding of the project. Residents were encouraged to provide comments regarding the project, and design modifications were made as appropriate in response to expressed concerns. By working with the surrounding community, the university was able to successfully illustrate the importance of the project coupled with their respect for the concerns of nearby residents.

Character Counts

While parking facilities at colleges and universities have traditionally received more design attention than their counterparts in other markets, higher education parking facility design has also come a long way. Today, parking facilities are reviewed as an integral part of the campus environment—a part that requires a high level of design attention and aesthetic appeal. The design of any parking structure must reflect the character of the institution while respecting the design of adjacent structures.

Construction of the National Advocacy Center at the University of South Carolina, a joint development between the Department of Justice, the Executive Office for the U.S. Attorney and the university, also included a new parking structure. The $10 million, 1,328-space facility mirrors both the design of the center and the character of the historic campus.

The six-level, cast-in-place, post-tensioned, slab and beam concrete structure was terraced to reduce the facility's visual mass. Perforated aluminum panels with canopies accent the facility and broaden its aesthetic appeal. The glass exposed stairways and elevators further enhance the visual appeal of the structure, especially when lit at night, while helping to meet security requirements. To meet concerns regarding the project's impact on the campus' transportation system, entrances and exits were positioned in three locations to facilitate access to and egress from the structure.

The Bottom Line

Parking projects require careful planning and design. Partnerships must be forged with all user groups and potential stakeholders such as business leaders and local residents. Current and future parking requirements, and their accompanying transportation demands, must be thoroughly evaluated and integrated into the institution's master plan. By developing a big picture view, colleges and universities will be able to successfully meet the parking demands of students, faculty, staff, and visitors by providing innovative, efficient, and economical parking management solutions.

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Make Sure Cabling Designers Know What You Need

By Bill Desrosiers

According to some estimates, 75 percent of data/communications wiring and cabling is installed after a new or renovated building is occupied. With information technology playing such a critical role in today's educational facilities, is it right that this vital component of a building's functionality be relegated to fit-out or retrofit status?

A structured cabling system infrastructure can ensure that the building will be a "Class A" space for years to come, regardless of the hardware and system protocol that will be used. But achieving the best cabling system infrastructure requires the active involvement of building owners and managers throughout the design process. How else will the design team know the your needs?

In the absence of firm infrastructure requirements, some designers merely specify high-capacity distribution systems. In fact, this may not be the most cost-effective long-range solution, and it certainly adds up-front costs. Excessive capacity can also compound design and aesthetic problems.

If the solution is not merely adding capacity, then what is it? Before answering the question and deciding on an actual infrastructure design and location, there are several points to consider:

How many services are needed at each point of use?

Typical workstations require five services, including filtered, surge protected, isolated ground AC power; unfiltered AC power; LAN connection; modem line; and telephone line. A growing number of workstations also need specialized services, such as video.

Is the cabling system going to need to be upgraded to meet future technology?

The answer is almost certainly "yes." This means accessibility for change-out is essential. The cabling infrastructure must also accommodate the required bend radius of fiber optic and high-performance copper cable. Make sure the system will have the expected bandwidth and technical performance when needed.

How frequently will it be necessary to move people or add workstations?

The cabling infrastructure must be flexible for moves, adds, and changes with minimal down time.

How much to you want to see?

Aesthetic requirements vary from workspace to workspace. What is effective in a back-office space might not be appropriate for a conference room. Investigate which cabling infrastructure components best suit the surrounding space.

A Building-Wide Infrastructure

Unfortunately there is still a tendency to think of data/communications installations as unrelated "systems" that can

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somehow be slipped into a building moments before the users arrive. In fact, communications cabling is an integral, building-wide infrastructure. Managers and members of the design team who do not consider cabling until late in the design run some serious risks, including:

- Eliminating certain highly effective cabling pathway solutions. Cellular deck and infloor duct systems, for example, must be considered early in the process. Optimal placement of other infrastructure components, such as cable trays and perimeter systems, may be impossible if the design does not provide for them.
- Reducing building flexibility. Effective utilization of open space depends on the availability of communications technology and ability to reconfigure the space with minimal down time.
- Failing to consider the impact of future technology. While no one can predict the future with complete certainty, providing a robust, accessible, adaptable communications cabling infrastructure, right from the start, is an effective strategy for maintaining a building's long-term functionality.
- Increasing the costs and difficulty associated with installing and changing the cabling system.
- Encouraging a patchwork of stopgap wiring that detracts from a building's aesthetic appeal and functionality.

Wire and Cable Management Solutions

Wire and cable management systems may be grouped into four general categories, based on their location: overhead, perimeter, infloor, and open space:

Overhead systems offer a high degree of flexibility, both in terms of locating the components and accessing the cabling contained within them. Cable trays are available in a variety of styles, including center spine, solid bottom, and ladder. Another overhead option is service poles that distribute power wiring and low-voltage cabling to individual work spaces.

Perimeter raceways route wiring and cabling securely along the building's walls. These systems are often specified for areas, such as conference rooms, offices, classrooms, and training centers, that require aesthetically pleasing, easily accessed cabling. Unlike conventional conduit, cabling that is laid into a raceway remains easily accessible at all times.

Infloor systems, including underfloor duct and access floor systems, are an increasingly popular option for designed-in cabling flexibility. Underfloor duct systems offer support and security for communications cabling in reinforced concrete and steel constructions.

Open space systems include poke-thru fittings are installed in holes that have been core-drilled through concrete floors. Underfloor duct systems are also employed to feed open plan areas. Poke-thru and duct service connections can be stand-alone or feed modular furniture.

Early Involvement is the Key

Critical to maximizing a building's technology infrastructure is consideration throughout the design process. Facility managers must work with architects and other members of the design team to fully meet data/communications requirements in ways that will not compromise aesthetics. The objective is to maximize functionality by meeting current and future space and technology requirements.

A flexible communications cabling infrastructure is essential to a well-designed building. As a result, the design team needs to specify a building-wide communications infrastructure with integrated cabling system design. This planning is best accomplished right from the beginning—rather than leaving it until later. This approach maximizes flexibility, increases the value and marketability of the property, and protects the original design against unplanned intrusions.

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Reflections on APPA Services and Programs

by Dina Murray

APPA has just closed its books on another solid and successful fiscal year. Besides completing the yearly audit and reflecting on the financial side of APPA's operations, it is also time to reflect on the technological and member services advances that have been made over the last year. Some of these advances affect member services such as the new membership cards and increased technological accessibility via the Internet, while some advances are broader in scope, affecting a targeted group of facilities professionals such as those at historically black colleges and universities.

Membership cards are a relatively new benefit for members. This is the second year that membership cards will be sent to all paid members. Besides listing APPA's contact information including mail and Internet addresses, phone, fax, and e-mail, it also lists the member identification number. This number is necessary to access the online member directory: www.appa.org/membership/directory. This online 24-hour service has also been available to members for one year now, and offers members more accessibility to their information for reporting changes of address as well as title and university or company updates.

Also, an Avis rental car savings card will be enclosed in the membership card mailing. Avis is the official rental car company for APPA. This is a new membership benefit offered for the first time this year. If you need any additional discount cards, please let us know.

On a recruitment note, APPA will increase its commitment to historically black colleges and univerisities (HBCUs) in a big way. Last year, APPA and the Southeastern region (SRAPPA) encouraged the involvement of HBCUs in APPA; all HBCUs not currently members were sent promotional information about APPA and were offered a discounted membership rate for the first year. While recruitment increased only slightly, the message was getting out to a specific segmented group of facility professionals.

In April, APPA offered HBCUs the opportunity to join the association at no cost to them. The leadership of APPA feels that strongly about increasing the participation of HBCUs. While the majority of historically black colleges and universities are in the Southeastern region, all regions are in unison about making this offer. By making this invitation, it is APPA's hope to galvanize more minority leadership, increase attendance at the annual conference, and make an impact on issues directly affecting HBCUs.

By now all members should have received their copy of the *1999-2000 Membership Directory and Resource Guide*. Members can purchase additional copies for only $45. Payment can be made by check or credit card (VISA, MasterCard, and American Express). Purchase order numbers will also be accepted. If interested, contact Cotrenia Aytch by e-mailing cotrenia@appa.org.

The *2000-2001 Membership Directory and Resource Guide* will be issued in the fall, bringing the directory back on schedule. The delay of the past issue was due to having a new company produce the directory and programming the directory specifications using the new membership database. Your patience during this transition is appreciated; we hope these changes have improved the readability and usability of the directory.

As most of you know, invoices have been sent out. If you have not received one or need a duplicate copy, please call me at 703-684-1446 ext. 232 or Maxine Mauldin-Chappell at ext. 227. By returning your invoice with payment you demonstrate your continued support of APPA and the facilities profession. We rely on strength in numbers to promote recognition of the profession. Your dues keeps us strong, enabling us to provide you with services and benefits that will make your membership in APPA the most fulfilling to you.

Dina Murray is APPA's director of member services and staff liaison to the Eastern region. She can be contacted by e-mailing dina@appa.org.

The Art of Facility Stewardship in Maine

by Matt Adams, P.E.

Every once in awhile, I am treated to a project that is far more fun than work. As luck would have it, the University System of Maine invited me to visit each of its seven state universities to observe and comment on facility stewardship within the entire Maine system. Somewhat incredulous, I asked, "You want me to rent a car and visit all four corners of this state and chat with your facility directors?" That was exactly what they wanted—one big case study, not unlike those that I have completed with APPA before. However, there was one major difference here. Not only did I learn about facility stewardship in Maine, but this city slicker also learned just how beautiful Maine is and how warm its residents, or "Mainers," are.

First of all, Maine is a big state and much of it is accessible by snowmobile only. During my travels, I witnessed large semi-trailers that carried "sleds" as Mainers call them, moving to and from entry points in the forest. In a state where the failing lumber industry has hurt the economy, tourism—especially snowmobiling—is on the rise. There is an entire sub-economy built around recreational snowmobiling in Maine. Everything helps. As vast as the state seems, it is sparsely populated and has a limited tax base. As you might conclude, this does affect funding for post-secondary education. However, as I was about to learn, Mainers have learned to make the most out of a severely resource-limited environment. There is real value in understanding what Maine physical plant directors are able to achieve given their budgets.

My first campus visit was to the University of Maine at Machias. Machias, like most of the state's universities, has a history with another name. This institution was a teaching college prior to entering the USM and is still considered the eastern-most college in the United States. The plant director, Jim Miner, is formerly from the Harvard Maintenance Department. He learned about this university from his daughter and applied for the job. Talking with Jim about the difference between Harvard and Machias plant maintenance is interesting. Jim's entire staff is smaller than the lock shop at Harvard, yet there is a certain pride in ownership that large institutions have lost. Jim and his CFO, Tom Potter, have a much simpler set of priorities for their buildings.

The safety of the occupants is always first. After this, the building envelope is number one priority. The intense climate of Maine necessitates this for each of the campuses. The destructive power of water in all its forms is given great respect at Machias and the other locations. Emphasizing this priority has yielded results for the state; roofs, windows, doors, and the cavity walls of almost every building in the system are very secure. Considering the freeze-thaw cycles of Maine, I would have expected to see considerable damage to the building envelopes, especially for the more than 30-year-old buildings. The state's system office supports the prioritization of the building envelope as well. In a business where there are many competing priorities, the indoctrination of this need into operational philosophy has clearly extended the life of the various university buildings.

Next on the tour was the University of Maine at Farmington, located in the west-center of the state. Farmington, the first normal school in the state, was founded in 1864 and is the alma mater of John Stevens, the engineer of the Panama Canal. The plant director, Bob Lawrence, learned his skills in the physical plant of Northeastern University. Farmington has more residence life space than Machias.

Touring this space, I witnessed space that had seen no upgrades since construction during the 1960s. Nevertheless, the residential-life space was in above average condition than that of peer states. As Bob described the maintenance requirements of these buildings, it became clear that vandalism was not a big issue. I got the impression that the lobbies and common spaces had the same finishes that were originally installed. Bob confirmed this fact. The students in central Maine simply do not damage their buildings as seen in other states. There is still an appreciation of the privilege of access to this *U.S. New and World Reports* #1 ranked school. Despite any appreciable capital upgrades since construction, Bob Lawrence still has residence life space that is treated with respect by the students. When asked about this seemingly old-school set of values, Mainers reply

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that this is the way it's supposed to be.

In the northern part of the state are two more universities: the University of Maine at Presque Isle and the University of Maine at Fort Kent. Presque Isle is home to a potato farming community that dates back to the Revolutionary War. Apparently, the Tories moved to Presque Isle after the colonies won their independence. Allen Culp, the physical plant director, manages the facilities of this university, located just outside of downtown. CFO Charles Bonin and Allen feel a sense of pride in what they have been able to muster for the facilities at Presque Isle.

The system gives the individual universities both the autonomy and associated liability to self-fund much of the capital maintenance of each campus. This forces the plant directors and CFOs to become both disciplined as well as creative. There is firm belief at Presque Isle and the other system institutions that renovations and expansions are more economical that new construction. From an accounting standpoint, we know this to be true. However, the UMS institutions implement this philosophy throughout the life of the facility assets. Most of the large common fund buildings have been expanded rather than adding new buildings. This is not the glamorous way to go, but the cost per student and incremental new space is lower using this practice. This belief that more is not necessarily better is firmly rooted in the mores of Mainers.

Fort Kent, the northernmost site, is largely a French-speaking community. Dick Bouchard, the plant director, is bilingual and shares a deep sense of community with the university and its Acadian roots. The university is located on the same street as the town's high school, middle school, and grade school. It is education row. Enrollment and subsequent demands on the facilities at Fort Kent are up. A large number of non-traditional students cross the Canadian/American border each day to study for teaching certificates at Fort Kent. "These students are very demanding and less likely to tolerate substandard facilities," says Brouchard.

With only 177,000 gross square feet of space, the university serves more than 1,000 students. This intense usage demands a "holistic" approach to facilities management. At Fort Kent, there is no building or space that is not seen by one of Bouchard's staff several times per day. The campus is too small, and the faculty, staff, and students too demanding for any deficiency to last long. "We operate like a 'zone' as defined by many APPA publications," says Bouchard.

Any effort on the part of the maintenance department must make as much impact as possible. There are not enough resources to meet every facility need. Therefore, each decision to repair or improve a facility must consider every variable. Despite aged buildings like the other campuses, I was impressed with the level of daily maintenance devoted to the campus facilities. It is clear that Bouchard and his staff are closely tied to every building. Very little goes on within the facilities without the maintenance staff knowing about it.

In Orono, the University of Maine is the largest of the state's universities. Founded in 1862, the University of Maine is both a land-grant and sea-grant college. Unlike the other universities in the system, this facility has much more variability. In addition to the boom of the 1960s, this facility has substantial space constructed both before and after the typical expansion period. This wide mix of building space has created a substantial workload for the Maintenance Department,

headed by Anita Wihry. The demand of capital renewal and daily maintenance at Orono is clearly greater than the other schools.

This campus is home to programs that require more sophisticated buildings. Unlike the other locations, many of the buildings are air-conditioned and most have forced air systems. Year after year, this added complexity has demanded increased maintenance resources. This contrast with the other campuses provides a good benchmark for plant departments and systems that intend to upgrade HVAC systems en masse. The improved performance of the buildings heating and cooling systems has an associated long-term cost. The maintenance and renewal requirements will both rise. In addition, the technical skills of the plant staff must improve to meet the modern technology.

Without a doubt, each institution, like the smaller schools in Maine, must eventually upgrade building systems. However, to do so without recognition and planning for increased maintenance costs is shortsighted. In Maine, the largest university requires more resources not only because it is the biggest, but because Orono has more complicated building systems than its sister institutions. This fact affects the bottom-line effect in the maintenance budget. In this era of possible decreased enrollment at Orono, "facility competitiveness" is a real issue, says Bob Duringer, CFO.

South of Orono, two campuses offer education to more non-traditional students. In Augusta, the university is the newest in the system. Built in the 1970s, renovations have been used to keep class-space modern. Many of the students who attend classes here demand good labs, having been exposed to them at work and high school. Not large enough to staff many of the trades, this campus is skilled at outsourcing maintenance and renovation requirements. There is a cut-off point at any smaller or satellite campus at which in-house maintenance is not financially justifiable. Here, the staffing requirement for the trades is less than one FTE per trade. Even with cross training, outsourcing is appropriate in this situation.

Formerly the Dow Air Force Base, the University College in Bangor represents a large capital renewal liability to the system. This old base is a gift that has an associated cost. Sheri Stevens, the executive director of administrative services, and Richard Campbell, the CFO, are trying to calculate just how much of this old base can be financially and functionally absorbed by the university system. Empty barrack after barrack sits on this valuable site

across from a Boeing Plant. Once an integral part of our nation's nuclear deterrent force, this base is no longer needed.

The financial model here is quite different than that of the other campus facilities. First of all, how much space is needed for the programs in Bangor? Are there alternatives to using this old base? The renovation cost of the entire facility is too large for the university system alone. They intend to create a multi-use site that houses various public and even private entities. This modern "strategic partnership" approach may be the only way that this site can be fully redeveloped. A variety of leasing and operating arrangements are required for each participant. In some universities, the idea of sharing space on campus with non-related public and private enterprises is taboo. For this old base, it seems to be exactly the right solution.

Finally, the University of Southern Maine welcomed me to its two campuses in Portland and Gorham. Dave Early is director of facilities management at the Gorham campus and Dave Barbour is based at the Portland campus. Both are long-time supporters of APPA. In this state, USM is considered progressive in its facility management practices. During the tour of the two campuses and subsequent meeting with Sam Andrews, the CFO, it was clear that this campus is proactive.

Despite an apparent shortfall of capital renewal funds, facilities are being renovated. I questioned where the funds came from. These three men take a collaborative approach to finding money for renewal and renovations. The system provides matching funds for a limited number of capital projects each year. At most, this provides 50 percent of the project cost. From there, Dave, Dave, and Sam begin to "hustle" for other funds. It is apparent that these men will look to just about everyone that may have stake in the building for some level of contribution. This is a time-consuming, but healthy philosophy. There is an understanding that the state will never have enough funds to meet the renewal needs of the campus. Given this, it is up to these three men and their peers at the other campuses to scrape the money together from whatever source they can find.

This "can-do" attitude is common among the plant directors of the state. In addition, the funds are so hard to come by that they are spent with maximum effectiveness. There is a sense that this money will have to last a long time so a project had better be done right. Every campus that I have visited during the last few years could benefit from a champion within its ranks to take charge of "rainmaking" for projects that cannot be funded through traditional means. These professionals have proven that there are other sources of renewal funds.

After four weeks of visits to each of the seven campuses, I was very eager to report back to the system office. First of all, I reiterated what everyone says when they first work with Mainers, they are very down-to-earth and real. The plant directors and CFOs recognized the meaning of their jobs in higher education and exuded great pride. In addition, the state had attracted talent not through salaries, but through recognition by the directors that this was a great place to live. I had seen many directors at other, better funded states that had become disillusioned, but despite below average resource availability, the staff that I met had a "can-do" attitude that was reflected in their creative and scrappy approaches to facility management. Once again, I have learned that good case study and best practice research is not always found in the well-healed universities and systems. Attitude is everything!

Campus Housing in Review

by Alycia Eck

It's difficult to know exactly what qualifies a building to serve as someone's home or home away from home for several months out of the year, especially for students. They come from across the country and around the globe. They are from varied and countless ethnic backgrounds. They are male, they are female, and they are showing up at your campus' dorms with expectations, lots of luggage, and countless unregistered vehicles. Now they have to learn to live with roommates or suite-mates. Now there's laundry to conquer or ignore. And whoever makes it in and out of the showers in the morning without waiting in line is obviously a talented strategic planner.

Whether it's a dormitory, a residence hall, or faculty lodging, by any name, these buildings are some of the hardest used on campus. But the true test of a dorm's success depends not only on the level of comfort and functionality the rooms provide, but on the buildings' adaptability as tenants change year after year. So how do you plan for new construction of dorm space? How do you decide what's a necessity, what's a luxury, and how many special finishing touches can you allow? And finally, what are the costs that will hit your planning, design, and construction budget?

The following discussions took place on APPAinfo, APPA's Internet-based discussion list.

Alycia Eck was APPA's Internet manager and APPAinfo list manager for three years. She recently started a new position at the Howard Hughes Research Institute.

Dormitory Sweet Dormitory

We are looking to add dorm space over the next few years. The building(s) will be wood frame construction and either traditional double-loaded corridors or suites. Does anyone have cost data they would like to share on either a per square foot basis or per bed. We have some estimates, but they seem quite high to me. There will be no land acquisition costs, but we include all other costs including parking at $1,500 per space.

- Our college just finished two new residence halls last summer with no cost for land acquisition. They are brick and concrete construction using concrete block interior walls, and they also have elevators. Each building houses 48 students in a suite-type setup. Full kitchens and laundry rooms are on each floor. The buildings are three stories above ground levels with full walk-out basements, and each suite has a restroom facility. There are nine resident rooms on each floor, with seven rooms for double occupancy and two rooms for singles. This setup was an attempt at attracting upperclassmen back to campus with semi-private facilities and options for meals. So far it has been a very huge success. Each building cost approximately $2.1 million ($43,750 per bed, $114 per gross square foot). These buildings also have classroom and office space in the basements. Half of one basement is also an RD apartment. These buildings began construction in August 1998 and were ready for occupancy in July 1999. Our hope is to build another next year.
- We are in the final stages of design of two housing units for a total of 350 residents. These are a combination of suite and apartment-style living; some with kitchenettes. There are some common areas and RD apartments. They will be brick, block, and precast outside. Each unit will be four floors with elevator and laundry facilities in each also. We are going water source heat pumps for HVAC with central steam to heat the building loop; natural gas for domestic hot water (steam not available year round). The project does include HV electric work, and emergency generator. It is being built on existing ground so no land acquisition needed. I believe the budget is $4.5 million. Ground breaking is in April with construction starting right after that and required occupancy for August 2001.
- We bid a new residence hall within the past 30 days: 506 beds, masonry construction, air conditioned (2-pipe), sprinklers, double-loaded corridors, three floors including utility extensions, furniture, laundry, computer lab, meeting rooms, contingency, amenities, and A/E fees. Not including parking lot. Shower rooms shared by two two-person rooms. No land acquisition, union area, covered by project labor agreement. Total cost $18 million.
- We are planning to break ground next month on a small two-story dormitory with a full unfinished basement (approximately 22,000 square feet) that will house 31 students. This structure also includes two attached and very nice faculty residences (three bedrooms with study). Each floor of the dormitory is equipped with a large commons area, full laundry facility, kitchenette, common bathroom

with private showers, and very nice finishes. The construction cost will be approximately $3,5 million. Total project costs is just around $4 million. This small and very attractive residence hall makes for an expensive project at nearly $113,000 per bed and $160 per square foot (construction cost only). However, it does include two faculty residences and is setting a new standard. We want to be the best. Also, it needs to be completed by September 1. No land acquisition costs.

- We are currently in the completion stage of two student accommodation projects providing a total of approx 300 additional beds adjacent to the campus. Both projects have allowed for student-flat type configuration (i.e., six bedroom units with kitchens and living rooms and providing two bathrooms per flat). One of the projects has a height of two stories and the other has four stories, which has meant that elevators are required. The costs for the complete project through to a turnkey operation are in the order of $NZ45000 per bed ($NZ1 = 0.50 cents U.S.). The trend toward a demand for flatting accommodation has been noticeable although the option of also having central provision of meals is popular as a back-up even though this is an expensive option for students.
- We opened a new 111-bed residence hall in August 1999. It is a suite-style building without kitchen facilities. Air conditioning (2 pipe system) served from a central heating and cooling plant in a nearby building. Masonry bearing wall construction with brick and stucco exterior and a concrete tile roof. Three floors and partial basement. Fully sprinkled. Total cost approximately $4,562,000 ($115 per square foot; $41,100 per bed).

Other Housing and Construction Resources

And don't forget to check out the Association of College and University Housing Officers International's (ACUHO-I) 1998-1999 College and University Housing Construction report: "Dunkel's essential management aid is a compilation of design and cost data on 42 projects received from 37 institutions in the U.S. and Canada. The data was collected from 1998-1999."

For more information: http://www.acuho.ohio-state.edu/

Indoor Air vs. Indoor Construction: A New Beginning

by Santo Manicone

Indoor air concerns seem to haunt facility directors during construction projects. The future expansion or operation of any type of building is a complex process that leaves facility managers little time for unnecessary activities such as employee relations or mediation. It is difficult to prevent indoor air quality (IAQ) problems especially if building areas are undergoing renovation while adjoining areas continue normal operations. One crucial component of a construction project is helping the building occupants understand that these construction activities can create indoor air quality problems. The beginning steps identified in this article can have a tremendous impact on the progression of your project.

It is not unusual for facility directors to incorporate a manager or a consultant to assist faculty and staff in identifying what to expect prior to any indoor construction project. As we all know, with every construction project performed inside a building, a number of complaints about room temperature, noise, excessive dust, and other elements of the building environment seem to come daily. These complaints will always be common due to the fact that people do not understand that renovation, redecorating, and remodeling activities can create indoor problems such as dust, odors, and emissions.

In the preliminary stage of any indoor construction project, establishing a consistent, healthy indoor environment for occupants can contribute to productivity, comfort, and a sense of health and well being during their workday. Indoor air quality can be managed efficiently with quality maintenance and by employing procedures used in operating and maintaining the building components during construction. Facility personnel such as custodians, HVAC employees, or general mechanics are not generally trained to think about IAQ issues as they go about their daily activities even though building occupants may be reporting events and conditions that are affecting them during their workday.

In order to eliminate potential problem, establishing an IAQ Assessment Program should be performed in the beginning stages with the architect and engineers. This proactive IAQ program will help to develop a profile of the building, looking for potential indoor air quality problems, before they actually occur. This IAQ profile is a picture of building conditions from the perspective of indoor air quality and potential air pathways. A review of construction and operating records, combined with an inspection of building conditions, helps reveal potential indoor air quality problems and identify building areas that require special attention to prevent problems during a construction phase. Additional baseline data collected for the IAQ profile can make later investigations much easier, should problems arise.

The process of developing an IAQ profile should require only a modest effort, from a few days to a few weeks of staff time, depending on the complexity of your building and the amount of detailed information collected. The work can be done in pieces over a longer period, if necessary, to fit into the pre-construction schedule. On the other hand, professional consultants can be hired to perform the review and develop the profile on your behalf.

The information needed for an IAQ profile is similar to that which is collected when solving a heating problem or indoor air quality problem, but includes the entire building rather than focusing on areas that are going to be under construction. The IAQ profile should be an organized body of records that can be referred to in planning for renovations, negotiating with contractors, or responding to future complaints. It is important to remember that an indoor air problem will take over an entire building and not just focus in the direct area of construction.

The process of gathering information for the IAQ profile can be divided into three major stages:

1. Collect and review existing records of equipment that is currently being used in offices or classrooms.
2. Conduct a walkthrough inspection of the building.
3. Collect detailed information on the HVAC system, pollutant pathways, pollutant sources, and building occupancy.

It is important to remember during your audit, airflow patterns in buildings result from the combined forces of mechanical ventilation systems, human activity, and natural effects. Air pressure differences created by

Santo Manicone is president of Facility Support Services LLC, a national environmental and safety engineering consulting firm with offices in Connecticut and Illinois. He has worked and assisted higher education facilities for over 16 years achieving federal and local compliance. He can be reached at support@snet.net.

these forces move airborne pollutants from areas of higher pressure to areas of lower pressure through any available openings in building walls, ceilings, floors, doors, windows, and HVAC system. An inflated balloon is an example of this driving force. As long as the opening to the balloon is kept shut, no air will flow, but when open, air will move from inside (area of higher pressure) to the outside (area of lower pressure). Even if the opening is small, air will move until the pressures inside and outside are equal. If there is excessive amount of dust by the traffic of construction workers, you can bet it will end up on the other side of the building.

In working with a number of facilities in the renovation process, I found out that these additional small steps have proven to be a benefit to the success of any renovation.

Working with professional consultants: Reinforce and communicate your concern about preventing indoor air quality problems to the engineer, architect, interior designer, or other professionals involved in the project.

Product selection: Specify products and processes that minimize odors and emissions, while maintaining adequate safety and efficacy. Review the general information provided by the product labels and MSDSs. Request information from suppliers about the chemical emissions of products being considered for purchase.

Work schedules: Schedule activities that produce dust, odors, or emissions for unoccupied periods if possible.

Isolation of work areas: Block off return registers so that contaminants are not recirculated from the demolition/construction area into adjoining areas, and install temporary barriers to confine dust and noise. If possible, install temporary local exhaust to remove odors and contaminants, and check to confirm that the temporary ventilation system is operating as planned.

Installation of new furnishings: Ask suppliers to store new furnishings in a clean, dry, ventilated location so that volatile organic compounds will be emitted before installation. Minimize the use of adhesives during installation or specify low-emitting products. After new furnishings are installed, increase the ventilation rate to flush the area with outdoor air and dilute emissions.

Smoking: Establish an agreement with outside contractors concerning smoking in the buildings. Although there are many potential sources of indoor air pollution, studies have shown that environmental tobacco smoke is one of the most widespread indoor air pollutants.

Occupant Relations: Managing occupant relations to prevent IAQ problems involves: allocating space and monitoring the use of building areas to isolate odor- and contaminant-producing activities and avoid re-entrainment; establishing a communication strategy that is responsive to complaints and provides tenants with information about their role in preventing indoor air quality problems; and modifying employee manuals or lease agreements as necessary to clarify the responsibilities of occupants and building management. A health and safety committee or joint tenant-management IAQ task force that represents all of the major interest groups in the building can be very helpful in disseminating information and fostering a cooperative approach to IAQ management.

Record keeping: As new practices are introduced into a building such as equipment, an organized system of record keeping will help the start up to become part of routine operations and to "flag" complications that could affect IAQ. The best results can be achieved by taking time to think about the established channels of communication within your organization, so that individuals have an understanding that there is some form of record keeping and control.

Even though the factors that affect the quality of the indoor environment can be numerous during construction, the good news is that most indoor environmental problems can be prevented or corrected easily and inexpensively through the application of common sense and vigilance on the part of everyone in the building. Success depends on cooperative actions taken by management and occupants to improve and maintain indoor air quality during these discomforting times. By becoming knowledgeable about indoor air quality, faculty and employees are in a good position to help facility managers maintain a comfortable and healthy building environment.

The Bookshelf

Book Review Editor: Dr. John M. Casey, P.E.

This edition of The Bookshelf offers a variety of short reviews covering topics that are important to readers of this journal. I cover three areas of facilities management which are perennial problems, including promoting teamwork, estimating repair and maintenance costs, and energy management. I also suggest, under the guise of a book review, that APPA members become familiar with ERIC, an extensive database of almost a million publications on education, which is available on the Internet.

The first review comes to our readers courtesy of Dr. Ted Weidner recently of Eastern Illinois University and soon to be at UMass-Amherst. Ted covers a book that is dedicated to dealing successfully with change in the workplace. Change, of course, is the most ubiquitous topic in education, and all readers should enjoy the information Ted presents.

—JMC

Who Moved My Cheese?: An Amazing Way to Deal With Change In Your Work and In Your Life, by Spencer Johnson. New York City: G.P. Putnam, 1998. 94 pp. hardcover.

When a front-line employee hands the director a book and recommends it, there is a good chance it should be read. If that book espouses an issue the director has been pushing for several years, it is a must read. That is the case with *Who Moved My Cheese*, by Spencer Johnson, M.D. This book presents a simple, short story that suggests ways and reasons to deal with change.

We have heard that the only constant in life is change, but we continue to have problems getting our employees, particularly our front-line employees, to deal with and embrace change. *Cheese* presents four characters that live in a maze. Two characters are mice, with simple minds and essentially one goal in life. The other two characters are more human like with multiple goals and needs. When the cheese is moved from its normal location in the maze, the mice, Sniff and Scurry, quickly move on to find the new location of the cheese; the human-like characters, Hem and Haw, struggle to adapt and deal with the change. Hem has trouble changing, Haw learns how to change and learns its benefits.

There is a reasonable amount of philosophy presented in the book, but it is not overwhelming or forced. The reader has the option of reading the two major parts of the book or just reading the main story and ignoring the second, which is a light commentary. This is not a difficult text, nor is it trivial. It presents the issue of change at a different level from where most directors and managers are likely to address it. *Cheese* presents change outside of a supervisory perspective. That is its benefit.

Since some of our front-line employees recommended the book to me, it seemed appropriate to recommend it to the APPA membership. Our employees are so committed to *Cheese* they have purchased several more copies to circulate among their peers. If you are still looking for an effective way to explain the difficulty, challenge, and importance of change to your employees, this book may do the trick.

Theodore J. Weidner, Ph.D., P.E., AIA
Director, Facilities Planning and Management
Eastern Illinois University
Charleston, Illinois

* * *

Computerized Building Energy Simulation Handbook, by James P. Waltz, PE. Lilburn, Georgia: Fairmont Press, 2000. 211 pp, hardcover.

With gasoline and energy prices soaring in the first quarter of this year and memories of the Arab Oil Embargo of the 1970s coming to mind, an excellent book on energy management surfaces for review. The focus of *Computerized Building Energy Simulation* is to promote energy conservation through an in-depth review of building energy

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John Casey is manager of the engineering department of the physical plant division at the University of Georgia, Athens, Georgia. If you are interested in reviewing a book for The Bookshelf, contact Casey at jcaseype@arches.uga.edu.

systems and usage. This review is based on the input of data to computer programs which model energy consumption and indicate types of systems and operational conditions which can be modified to conserve energy and its associated costs.

The author has a wealth of experience in energy conservation, and teaches seminars on building energy simulation models. Waltz was a founding member of the Association of Energy Engineers and is truly a pioneer in the field of energy management and conservation. His book is logically presented and is not flooded with technical jargon. It contains an excellent appendix with various forms and checklists, including a description of 15 commercially available simulation software programs. He also includes a one-page "Rule of Thumb Values" which should prove helpful to energy managers.

Facilities managers in higher education already have enough to do without having to unravel the intricacies of building energy simulation. Since all such managers are, or soon will be, seriously committed to energy management, I suggest that purchasing and using the *Computerized Building Energy Simulation Handbook* is a good idea.

Dr. John M. Casey, P.E.
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* * *

The Educational Resource Information Center (ERIC). Washington, D.C.: The National Library of Education. (From 1966, over 950,000 documents.)

Using editorial

license, I have decided to discuss what I consider to be the largest "book" in the world concerned with education. Funded through the U.S. Department of Education, the Educational Resource Information Center (ERIC) has, since 1966, become the repository for almost one million publications on education. Much of the information in this database concerns higher education, and therefore, is available to assist facilities managers in the academy.

Using ERIC is very simple in this age of Internet accessibility. Logging on to http://www.accesseric.org/ and then clicking on "Search ERIC Database" will allow you to search ERIC to find information. Searching by keywords and/or author will produce a list of abstracts describing the content, type of publication, length, etc., for each article or publication. If interested, you can download complete copies through the Internet. Also, if your institution's library is an ERIC site, a microfiche copy of each article is available there for review.

To show how ERIC can help facilities managers, I searched the database using "Kaiser, Harvey" as author, and "facilities" as a keyword. This query returned 18 publications, including Dr. Kaiser's extremely important 1998 article in *Facilities Manager*, written with Eva Klein, on space standards. Also, using the search term "facilities management" produced over 300 documents.

I would encourage all APPA members to become proficient in using ERIC to face change head-on and to help sort out the problems on the horizon in higher education. For example, like it or not, we are all in this assessment boat together, and ERIC can help us identify the key issues and actors in this thicket of uncertainty. When the higher education "experts" show up on your doorstep to determine whether or not your facility is being operated efficiently,

they will be asking questions developed and discussed in the higher education literature. A review of the ERIC database, using keywords like "assessment," "retrenchment," "formula/budgeting," "facilities audits," and "facilities management," should give you access to the latest information on these topics. It may not have all the facts you need, but ERIC has the potential to help your institution to understand the changing rules of the higher education game.

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* * *

Teamwork and Teamplay, by Glenn Parker and Sivasailam Thiagarajan. San Francisco: Jossey-Bass/Pfeiffer, 1999. 161 pp, softcover.

The subtitle of this book is "Games and Activities for Building and Training Teams." I must admit that I opened the book with no small degree of skepticism. After all, "games" sounded to me that this was going to be another "touchy-feely" tiptoe through the management tulips, where the organization may go belly up, but at least the employees are content and empowered, but I was wrong.

Teamwork and Teamplay turned out to be a solid work, with much to say to everyone in "a group of people with a high degree of interdependence geared toward the achievement of a goal or the completion of a task." This definition of a team, and the need for teamwork, is very cleverly developed through 35 activities and games. Each is crafted to promote concepts like cooperation, competition, and self-assessment, which are necessary to successfully carry out the team's tasks.

The authors, Parker and Thiagarajan, are team-building facilitator gurus with impeccable credentials and extensive experience in motivation and training. The six-page introduction to the book is a primer on the world of performance improvement methodology, and is, by itself, worth the price of the book. In that introduction, the authors remind graying managers that teamwork in the year 2000 is rooted in non-traditional organizational structures, featuring both global and virtual interaction, with a changing workforce. The authors point out that "employees born in the 1970s and raised on MTV and video games have lifestyles and workstyles different from those of people born earlier."

Teamwork and Teamplay allows all organizational units, including many areas in facilities management, the opportunity to maximize their investment in their most precious commodity—their workforce. I recommend this book as a sound basic toolbox of information and training procedures for all human resource personnel in the facilities profession.

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* * *

The Whitestone Building Maintenance and Repair Cost Reference 1999, by Peter S. Lufkin and Robert M. Silsbee. Santa Barbara, California: Whitestone Research, 1999. 243 pp, softcover.

My admiration for the R.S. Means Company, the premier provider of cost data for the building construction and repair field, should be well known to even casual readers of The Bookshelf. There is, however, at least one other excellent resource available to facilities managers to help with estimating building maintenance and repair costs, the Whitestone Research Company cost handbook.

Whitestone M&R has been published yearly since 1995, and furnishes a comprehensive source of building maintenance and repair cost statistics. The book is aimed at two audiences, the initial designers and investors of buildings, and the facilities managers. The data presented is intended to answer simple but important questions:

- How much does it cost to maintain a building over its service lifetime?
- What is the historic inflation rate of M & R construction costs?
- How do M & R costs vary across different metropolitan areas?
- What is the lifetime of a specific building component?

It should occur to all facilities managers that if the authors are smart enough to ask these questions, they should also be equally smart to present useful information, and they do just that.

Whitestone M&R is a really useful collection of data and ideas which have practical value for all readers of *Facilities Manager*. It is especially comforting to know that the authors have used APPA data to estimate in-house maintenance costs. I feel obliged to recommend this book to everyone, because it is so tuned in to our collective management needs, to budget carefully and to expend money efficiently for maintenance and repairs on each campus.

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[*Ed. Note: The Whitestone Building M&R* book is available at www.appa.org/resources/publication.]

New Products

New Product listings are provided by the manufacturers and suppliers and are selected by the editors for variety and innovation. For more information or to submit a New Products listing, contact Gerry Van Treeck, Achieve Communications, 3221 Prestwick Lane, Northbrook, IL 60062; phone 847-562-8633; e-mail gvtgvt@earthlink.net.

Bird-B-Gone, Inc. introduces Bird Spike 2001, a stainless steel spike that offers the widest coverage of any steel spike system available, 8". Spike 2001 is also the lowest cost stainless steel spike in the industry, which will help keep job costs down. With a ten-year guarantee, Bird Spike 2001 is also available in 3" and 5" widths for narrower applications. Call Bird-B-Gone, 800-392-6915.

Sico America Inc. presents the Sico Instawall, a mobile folding partition that will divide any school space to meet the needs of the moment, no matter how frequently those needs may change. Need to subdivide a classroom? Need to separate students for testing or study purposes? Need more privacy? Instawall can meet all your needs and make a classroom a dynamic learning environment. For more information call Sico America Inc., 800-328-6138.

JLG Industries, Inc.'s new SX Series enhances market leading 110- and 120-foot telescoping boom lifts with performance, ergonomics, and ease of setup. Building on the proven productivity of the high reach HX Series, JLG's telescopic boom lifts offer valuable features such as standard four-wheel drive, a new pinless axle extension system, and four-wheel steer options. For additional info call JLG Industries, Inc., 717-485-5161.

Strobic Air Corporation announces the new Tri-Stack roof exhaust fans for removing hot exhaust gases from furnaces, boilers, diesel generators and many other applications where high operating temperatures damage ordinary fan motors and housings. The new Tri-Stack systems are part of the Generation III systems that have been in use for nearly two decades for roof and laboratory fume hood exhaust applications at universities, hospitals, government facilities, as well as other

industrial applications. For more detail call Strobic Air Corporation, 800-722-3267.

State Industrial Products introduces a system for insect control that includes a line of professional grade products for insect elimination. Zero In is a three-step process for insect control based on Search, Strike, and Secure phases. The Zero In System is a total package for identifying, eliminating, and monitoring insect activity. For more information on professional, safe, and easy insect control call State Industrial Products, 216-931-7524.

Coming Events

APPA Events

For more information on APPA seminars and programs, visit our website's interactive calendar of events at www.appa.org/news/.

July 16-18-*Educational Conference & 87th Annual Meeting.* Fort Worth, TX.

Sep 17-21-*Institute for Facilities Management.* Pittsburgh, PA.

July 22-24, 2001-*Educational Conference & 88th Annual Meeting.* Montreal, Canada.

2002-*Educational Conference & 89th Annual Meeting.* Phoenix, Arizona.

2003-*Educational Conference & 90th Annual Meeting.* Nashville, Tennessee.

APPA Regional Meetings

Sep 22-26-*CAPPA Regional Meeting.* Overland Park, KS.

Sep 23-26-*RMA Regional Meeting.* St. George, UT.

Sep 24-27-*AAPPA/ATEM Annual Conference.* Melborne, Australia.

Oct 1-3-*PCAPPA Regional Meeting.* Long Beach, CA.

Oct 7-10-*SRAPPA Regional Meeting.* Nashville, TN.

Oct 8-11-*MAPPA Regional Meeting.* Ann Arbor, MI.

Oct 8-11-*ERAPPA Regional Meeting.* Burlington, VT.

Other Events

June 10-13-*International District Energy Association 91st Annual Conference and Trade Show.* Montreal, Quebec, Canada. Contact IDEA at 202-429-5111; www.districtenergy.org.

Aug 20-25-*Efficiency & Sustainability.* Pacific Grove, CA. Contact the American Council for an Energy-Efficient Economy, Rebecca Lunetta, 302-292-3966.

Aug 21-23-*Energy 2000.* Pittsburgh, PA. Contact 800-395-8574 or www.energy2000.ee.doe.gov

Sep 13-16-*The National Association of Women in Construction Annual Conference.* Reno, NV. Contact NAWIC, 817-877-5551.

Sep 27-28-*Design-Build Construction.* Washington, DC. Contact Federal Publications Seminars, 888-494-3696.

Oct 10-13-*EDUCAUSE Conference: Converging/Emerging in the 21st Century.* Nashville, TN. Contact EDUCAUSE, 303-449-4430.

Oct 18-20-*Council of Industrial Boiler Owners 22nd Annual Conference.* Savannah, GA. Contact cibo@cibo.org.

Nov 4-7-*PGMS 2000 Annual Meeting.* Indianapolis, IN. Contact Ppgms@aol.com.

Dec 15-17-*Improving America's Schools.* Chicago, IL. Contact U.S. Department of Education, 800-203-5494.

Jan 18-20, 2001-*AACU 87th Annual Meeting.* New Orleans, LA. Contact the Association of American Colleges & Universities, meetings@aacu.nw.dc.us, 202-387-3760.

June 23-27, 2001-*ASHRAE 2001 Annual Meeting.* Cincinnati, OH. Contact 404-636-8400.

Aug 11-15, 2001-*NCSL 2001 Annual Meeting.* San Antonio, TX. Contact the National Conference for State Legislators, 303-830-2200.

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