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# FACILITIES

## manager

NOV/DEC 2010

Sustainability  
Space

**PLANNING  
DESIGN &  
CONSTRUCTION**

Facilities Quality

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Beyond the  
Condition Audit

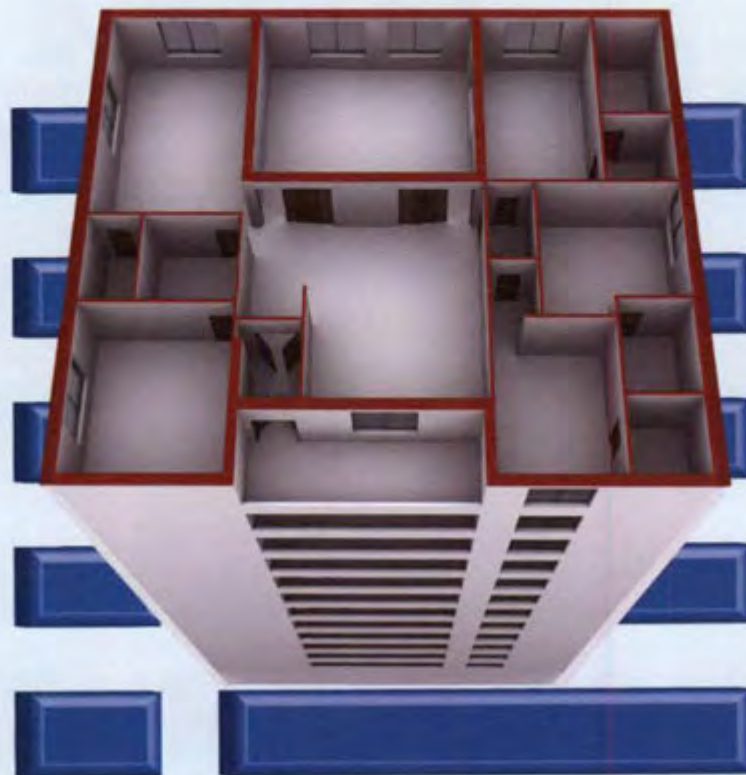
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2010  
Thought Leaders  
Report, Part I

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## PLANNING, DESIGN & CONSTRUCTION



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Assessing and Forecasting Facilities in Higher Education  
*Including the Top Facilities Issues*



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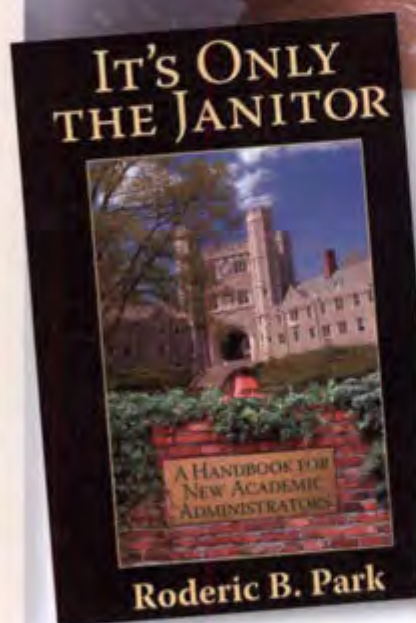
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# SMART GREEN

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## Updating the Staffing Guidelines Trilogy

A dedicated group of educational facilities professionals is currently deep into the work of revising and updating APPA's popular series of guidelines publications on custodial, grounds, and maintenance operations. The target for release of the new editions is mid-year 2011.

- First published in 1992, then fully revised in 1998, *Custodial Staffing Guidelines for Educational Facilities* has become a huge seller for APPA and has been adopted and adapted by thousands of facilities and custodial services operations worldwide. The five levels of clean introduced in the custodial guidelines became a model for the other APPA guidelines books and for other organizations developing metrics and measures for their own facilities activities.
- Published in 2001, the next publication in the trilogy to appear, *Operational Guidelines for Grounds Management*, was jointly developed and published by APPA, the National Recreation and Park Association, and the Professional Grounds Management Society.
- The third book in the series was *Maintenance Staffing Guidelines for Educational Facilities*, published in 2002.


APPA staff and the Information and Research Committee determined that it was time to revise all three publications at the same time. This would result in a more consistent and coordinated approach to definitions, graphics, case studies, and the five levels of service. In addition, the new books will incorporate topics related to technology, service innovations, sustainability, and the application of the guidelines in many different types of institutions and organizations.

We have the great good fortune of having Alan Bigger, APPA Fellow, serve as the editor-in-chief for the entire revision and update process. Alan is a past APPA President and retired in 2009 after years of service at Earlham College, the University of Notre Dame, and the University of Missouri.

Alan is accompanied on this project by three capable and knowledgeable professionals who serve as the chairs of the respective task forces responsible for each of the three books:

- Casey Wick, Hamilton College – custodial
- Tom Flood, Elon University – grounds
- Tom Becker, Philadelphia University – maintenance

In turn, each task force chair oversees a number of skilled practitioners who are researching and writing the chapters for the new publications.

We are excited about the forthcoming revised editions of these key APPA publications. In the months to come we will share more information about the books' availability, related Web-based material, and accompanying software programs. In the meantime, we look forward to providing APPA and the facilities profession with these new and updated resources for campus and facility improvement. 

## Coming in Jan/Feb 2011

- Inventing the Future
- International Focus
- Part 2, Thought Leaders Report 2010

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### About APPA

APPA promotes leadership in educational facilities for professionals seeking to build their careers, transform their institutions, and elevate the value and recognition of facilities in education. APPA provides members the opportunity to explore trends, issues, and best practices in educational facilities through research, publications, professional development, and networking. Formerly the Association of Physical Plant Administrators, APPA is the association of choice for 5,200 educational facilities professionals at more than 1,500 learning institutions throughout the United States, Canada, and abroad. For more information, visit us at [www.appa.org](http://www.appa.org).



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# facilities digest

## PLAN NOW FOR APPA 2011

If you didn't make it to APPA 2010 you missed the profession's major go-to event for career enrichment and advancement, a chance to ask questions of the thought leaders in educational facilities community, and MUCH more. Plan now to attend APPA 2011 to be held July 16-18 in Atlanta, Georgia. Work APPA 2011 into your professional development and travel budgets. Registration will open December 2010.



SAVE THE DATE JULY 16-18, 2011  
**APPA 2011** ATLANTA, GA

## 2011 APPA OFFICER NOMINATIONS NOW OPEN

Consider being a candidate for an APPA elected office, your future contribution to APPA will be an invaluable benefit for our members and ensure that APPA is the "association of choice" for educational facilities professionals. As an elected officer, not only do you give back to the association and the facilities profession we serve, but you also gain enormous leadership skills and develop yourself professionally in many meaningful ways.

### Personal Commitment

We are opening up the governance structure and process to increase understanding of the service and time commitment. The perception is that serving APPA as an elected officer takes too much time away from the office. Although it does require a personal commitment of time and energy — as well as the support of your senior administrator (or institution) — past elected officers will tell you the personal rewards and professional benefits are well worth it.

### Open Positions

There are five elected officer leadership positions available. Three positions are open each year to ensure proper and regular rotation of the APPA Board's elected officers. Consider nominating yourself or others for the office that best matches your passion and areas of expertise.

- President-Elect
- Secretary-Treasurer
- Vice President for Professional Affairs

All applications for election are due no later than *December 15, 2010*. For a copy of the nominations packet and application, visit <http://appa.org/board/documents/Electedofficers2011-12final.pdf>.

## APPA ACCREDITATION AND CERTIFICATION

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- General Administration and Management
- Operations and Maintenance
- Energy, Utilities, and Environmental Stewardship
- Planning, Design, and Construction

To obtain more info, visit <http://certification.appa.org/> or contact Christina Hills at [christina@appa.org](mailto:christina@appa.org).

### Take Your Career a Step Further With CEFP Certification

Beyond the EFP Credential level, the Certified Educational Facilities Professional (CEFP) designation denotes the highest level of educational facilities mastery, elevating the credibility of the individual who holds the certification and the institution their certified professional represents. Learn more by visiting [http://certification.appa.org/cefp\\_home.cfm](http://certification.appa.org/cefp_home.cfm) or by contacting Christina Hills at [christina@appa.org](mailto:christina@appa.org).

## FPI SURVEY DEADLINE OF DECEMBER 13, 2010 IS FAST APPROACHING

APPA's 2009-2010 Facilities Performance Indicators (FPI) Survey is open, and completed surveys are due **December 13, 2010**. This knowledge tool helps you:

- Make the business case for your facilities needs
- Successfully address capital asset realities
- Create a balanced Performance Score Card based on critical data findings
- Compare and contrast your facilities operations with other institutions
- Better align facilities planning with your institution's mission and vision

All these goals are increasingly important in today's environment of economic constraint and increased expectations. Don't miss out on this year's FPI survey. Start the process today at [www.appa.org/research/fpi](http://www.appa.org/research/fpi). If you have any questions, contact APPA Director of Credentialing and Benchmarking Christina Hills at [christina@appa.org](mailto:christina@appa.org) or by calling 703-684-1446 ext. 244.



## APPA EVENTS

- Jan 9-13** Institute for Facilities Management, Orlando, FL
- Jan 9-13** Leadership Academy Tracks 2 & 4, Orlando, FL
- Jan 9-13** Supervisor's Toolkit, Orlando, FL
- Jan 14** EFP Prep Course, Orlando, FL
- Jan 14** CEFP Exam, Orlando, FL
- Jan 14 or 15** EFP Exam, Orlando, FL
- Mar 20-22** 6th Annual Smart & Sustainable Campuses Conference, College Park, MD
- Apr 3-7** Leadership Academy, Asheville, NC
- Apr 8** CEFP Examination, Asheville, NC
- Apr 8** EFP Prep Course, Asheville, NC
- Apr 8 or 9** EFP Examination, Asheville, NC
- Jul 16-18** APPA 2011, Atlanta, GA

## OTHER EVENTS

- Feb 22-25** IDEA's 24th Annual Campus Energy Conference: Cleaner Energy, Greener Campus, Miami, FL

For more information or to submit your organization's event, visit [www.appa.org/applications/calendar/events.cfm](http://www.appa.org/applications/calendar/events.cfm).

## NATIONAL HAND WASHING SURVEY FINDINGS

Bradley Corporation's Healthy Hand Washing Survey was conducted online July 7-15, 2010, and queried 1,053 American adults about their hand washing habits in public restrooms. Participants ranged in age from 18 to 65 and older and were fairly evenly split between men (46 percent) and women (54 percent).

### H1N1 & Hand Washing

- 27 percent of Americans say they are now washing their hands more thoroughly or longer after using a public restroom as a result of the H1N1 virus. That's up from 23 percent in 2009.



### Public Restroom Hand Washing Habits

- Americans claim to wash their hands 89 percent of the time before leaving a public restroom and say they use soap 87 percent of the time when washing their hands in a public restroom.
- However, 54 percent admit on occasion that they have simply rinsed with water only before leaving a public restroom.
- The top three reasons for not washing hands before leaving a public

restroom are: used hand sanitizer instead (29 percent); sinks were not working (17 percent); and sink appeared unclean (14 percent). For more information, go to [www.bradleycorp.com/handwashing/2009handwashingsurvey.jsp](http://www.bradleycorp.com/handwashing/2009handwashingsurvey.jsp).



## DID YOU KNOW?

Many resources are on our website for your convenience and use. They include:

**APPA Online Directory:** <http://appa.org/membership/membershipdirectory.cfm>

**APPA Certification Program:** <http://certification.appa.org/>

**Facilities Manager Magazine (PDF files as well as full version of each issue):**  
<http://appa.org/FacilitiesManager>

**APPA Bookstore:** <http://appa.org/Bookstore>

**APPA Regional Contact Information:** <http://appa.org/regions/index.cfm>

**APPA's Job Express:** <http://appa.org/JobExpress>

**APPA's Body of Knowledge:** <http://appa.org/BOK/>

**APPA's FPI (Facilities Performance Indicators):** <http://appa.org/research/FPI/index.cfm>



# Using FPI to Paint a Picture of Our Profession

By Maggie Kinnaman, APPA Fellow

Enhancing member competence and credibility are two of the most important goals of APPA. The Facilities Performance Indicators Report (FPI) is a tool that can help facilities managers educate campus decision makers about the realities of our physical campuses.

## MAKING COMPARISONS

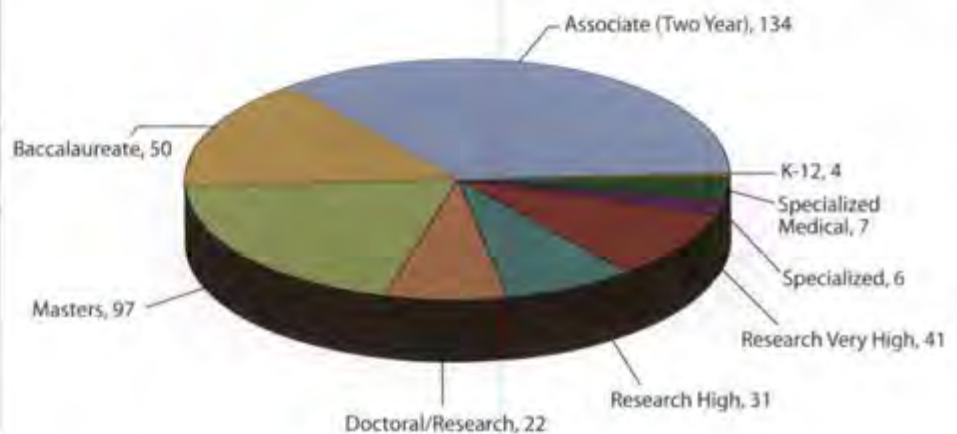
The release of the 2008-09 FPI Report earlier this year allows us to report the overall general results of the annual survey, as well as make a comparison to our baseline year of 2007-2008. Please note that this summary reports on only the overall participant averages. In some cases, the numbers are overall averages that exist for ratios for a single institution, but which do not exist for overall averages (more about this as we get to the module addressing Investments.) This article is merely attempting to capture and report a general picture of our profession and should not be used for specific campus decision making.

First let's look at the demographics related to 2008-09 survey participants. The graph on this page shows participants by Carnegie Classification.

Then, let's look at the 392 participants collectively (see chart on next page) and see how we're able to tell a story about our profession using the entire cohort averages. I'd like to do this using the framework of an essential question set. As you'll note these questions relate to all stages of the total cost of ownership of our campuses and also adds the essential customer and employee perspective.

## APPA Facilities Performance Indicators Reports - Fiscal Year 2008-09

### Distribution of Respondents By Carnegie Class — Fiscal Year 2008-09 APPA FPI Report



	Carnegie Class
Associate (Two Year)	134
Baccalaureate	50
Masters	97
Doctoral/Research	22
Research High	31
Research Very High	41
Specialized	6
Specialized Medical	7
K-12	4

### Q: WHAT FACILITIES MAKE UP OUR INSTITUTION?

**A:** Looking at this question from a very high level, the average gross square feet (GSF) maintained on our campuses is 2,382,942. Additionally the average Current Replacement Value (CRV) for these campuses is \$984,660,439 or \$413.21 per GSF.

### Q: IS MY INSTITUTION ADEQUATELY FUNDING THE FACILITIES MANAGEMENT ANNUAL BUDGET?

**A:** The survey looks at three ratios as an answer to this question. Facilities Operating Expenditures (FOE) divided by GSF, Gross Institutional Expenditure (GIE), and CRV. For the purposes of this report we will look at FOE divided

by GIE, which is 7.3 percent. This is saying that on average our participants are expending 7.3 percent of the GIE.

**Q: ARE THE OPERATING FUNDS THAT MY FACILITIES DEPARTMENT RECEIVES BEING SPENT IN A MANNER THAT SUPPORTS DESIRED OUTCOMES?**

**A:** For the purpose of this report we will look at custodial, grounds, maintenance, and utilities.

- Custodial cost per GSF is \$1.43 and each custodian is cleaning 37,643 GSF
- Grounds cost per acre is \$5,148 and each groundskeeper is assigned 20.1 acres
- Maintenance cost per GSF is \$1.66 and each maintenance person is assigned 67,479 GSF
- The average energy cost per GSF is \$2.44
- The average BTU/GSF is 149,640

**Q: IS MY INSTITUTION MAKING THE RIGHT INVESTMENTS IN OUR EXISTING BUILDINGS, INFRASTRUCTURE, AND ACADEMIC PROGRAMS?**

**A:** The average useful life of our buildings for our 392 participants is 51.53 years. This is how long our buildings optimally support the academic programs. This is the section in which ratios have relationships. To make this point let's look at one institution with a useful life of 51.53 years. This institution would need to make a minimum investment of 1.94 percent of CRV each year in order to properly invest in their facility. Let's further say that this campus invested 2 percent of CRV in their existing facilities. They would have a positive investment of .06 percent.

If we look at the survey overall averages for these same ratios, we lose the mathematical relationships between the ratios since we are dealing with overall averages that derive ratios. So as reported in the overall averages, building useful life is 51.53 years, minimum investment is 2.2 percent of CRV, actual investment is 2 percent of CRV and investment gap is -.5. Again,

**Facilities Performance Indicators  
Comparison of 2008 to 2009 overall averages**

Questions	2008	2009
Number of Participants	225	392
GSF maintained	3,566,144	2,382,942
CRV	\$ 1,078,218,106	\$ 984,660,439
CRV per GSF	\$ 302.35	\$ 413.21
Facilities Exp/GIE	6.6%	7.3%
Custodial cost GSF	\$ 1.40	\$ 1.43
GSF per custodian	35,037	37,643
Grounds cost acre	\$ 5,749	\$ 5,148
Acres per grounds FTE	15.9	20.1
Maintenance cost GSF	\$ 1.55	\$ 1.66
GSF per maintenance FTE	66,751	67,479
Energy cost per GSF	2.62	2.44
BTU per GSF	155,939	149,640
Useful Life of MCB	54	51.53
Minimum Investment	2.10%	2.20%
Actual investment	2.1%	2.0%
Investment Gap	0.00%	-0.50%
FCI	15.6%	9.7%
Needs Index	20.7%	18.4%
Customer rating	3.6	3.5
Employee rating	3.3	3.4

Note that the FCI for 2008 was corrected from 9.4% to 15.6%.

because these are averages the mathematical logic is lost. To compare apples to apples we will utilize overall averages when comparing our year-to-year performance. It should be noted that this same anomaly will occur whenever more than one institution is averaged (basically all cohort groups).

The overall average Facility Condition Index (FCI) is 9.7 percent, and the Needs Index is 18.4 percent. Remember that the difference between FCI and Needs is the inclusion of renovation, modernization, and plant adaptation backlog in the Needs Index. As a profession, our 2008-09 survey results are telling us that 18.4 percent of our campus space does not optimally support the academic program.

**Q: ARE CUSTOMERS SATISFIED WITH SPACE AND SERVICES?**

**A:** This question is obtained from customer service surveys. On a scale of 1 to 5 (with 5 being the highest and 1 the lowest), our institutions rated 3.541.

**Q: IS MY FACILITIES DEPARTMENT DEVELOPING STAFF THAT CAN SUSTAIN EXCELLENCE?**

**A:** This question relates to employee satisfaction and is based on employee satisfaction surveys (again, the scale is 1 to 5 with 5 being the highest). Our participants averaged 3.421.

Now let's look at a comparison of overall average results from the 2008 Report to 2009 and see what observations can be made.

Note that the FCI for 2008 was corrected from 9.4 percent to 15.6 percent

#### MAKING OBSERVATIONS

Let's draw some plausible observations about the data reported overall from 2008 to 2009. Immediately we see a huge increase in the number of participants. We also know that we do not require participants to complete each module of the survey. These two dynamics can certainly affect our overall average results year to year. We also see that our GSF maintained went down by over 1 million GSF. This probably says that of new participants, many are small schools. Likewise our CRV went down from that overall average reported in 2008 and that to be expected with the reduction in GSF.

In all cases but Grounds our employees are being asked to clean/maintain

more GSF per FTE. In the energy arena we see reductions in both the cost of energy per GSF and the BTU/GSF. This is certainly due to the focus that has been placed on sustainability at all of our institutions. It appears that overall our institutions are investing appropriately in existing space.

Again, be mindful that this is based on looking only at the overall averages. The story presented on an individual institutional basis will look much different. Finally, both our customer and employee satisfaction levels remain virtually unchanged from last year.

By the time you read this article you will already be well into the survey cycle for 2009-10. I encourage you to continue participating in the FPI survey and encourage those of you who haven't participated in the past, to do so this year.

APPA has dedicated a great deal of resources toward capturing essential data related to our profession and your participation will help to make the dataset more representative. ☺

Maggie Kinnaman is a past APPA President and can be reached at [maggielkinnaman@comcast.net](mailto:maggielkinnaman@comcast.net).



The FPI Survey deadline of **December 13, 2010** is fast approaching! Be sure to visit <http://www.appa.org/research/FPI/index.cfm> or contact Christina Hills, director of credentialing and benchmarking, at [christina@appa.org](mailto:christina@appa.org) for more information!

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**By**  
Harvey H. Kaiser  
and Eva Klein

Sustainability  
Space  
Capacity  
INFRASTRUCTURE  
Facilities Quality

# QUALITATIVE FACIL

## Toward a More Comprehensive View of Facilities Quality

In APPA's recently published book, *Strategic Capital Development: The New Model for Campus Investment*, the authors make a case for substantial change in capital planning for higher education institutions. The new model posed is intended to urge institutions and systems to 1) identify more systematically all capital needs of all types; 2) integrate quantitative space needs with qualitative facility assessment to define whole-building solutions; 3) prioritize projects, based on planning principles, while minimizing the influence of politics; 4) associate the needs/projects with financing sources in a comprehensive long-range capital investment plan; and 5) via all the above, ensure that perpetually scarce capital resources are applied as productively as possible.

This article, drawn from the book, focuses on one very important element of capital needs assessment and planning — comprehensive qualitative assessment of existing facilities — as part of the still more comprehensive four-part needs assessment model that includes:

- Space Capacity
- Facilities Quality
- Special Facilities
- Infrastructure, Campus Environment, and Sustainability

These four needs assessments, in turn, are embedded in the comprehensive planning model shown in Figure 1.

### METHODOLOGY OVERVIEW

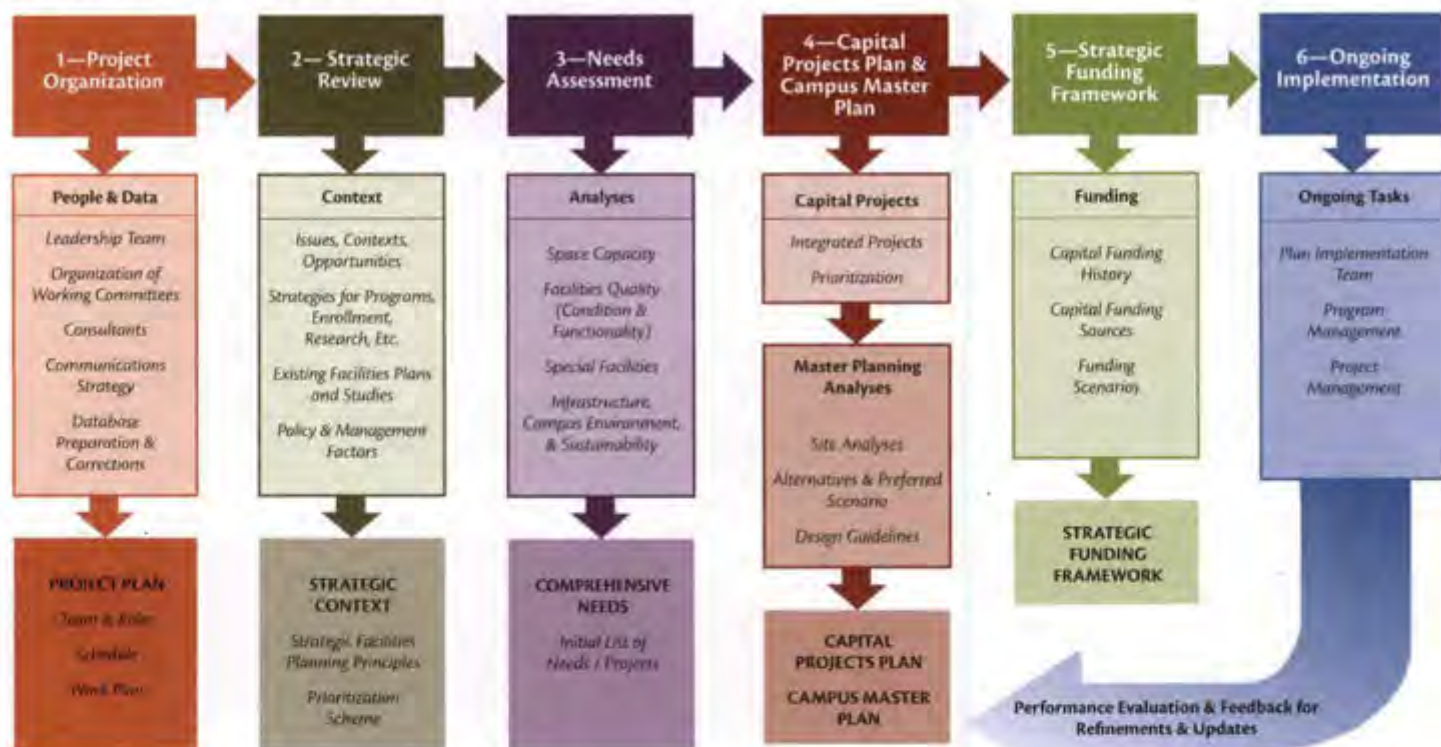
*Facilities Quality* is defined in this model as the combination of condition, functionality, adequacy, and modernity/obsolescence factors that make a building both 1) of sound physical condition, and 2) appropriate or suitable as space to support program functions for which the space is intended. With this definition, the *Facilities Quality Assessment* (FQA) is defined as an assessment methodology that combines and integrates the findings of the more familiar *Facilities Condition Audit or Assessment* (FCA) with the findings from a new methodology, the *Facility Functionality Assessment* (FFA).

In the now-familiar FCA, engineering experts identify physical deficiencies of building systems and subsystems, as well as deficiencies with respect to compliance with applicable codes and conformance with the American Disabilities Act (ADA). The FCA can be a fully detailed *audit* or a *statistical forecast* based on life-cycle expectations, or a combination of the two. Although many features of the building that may affect users (lighting, finishes, safety, etc.) are evaluated as building systems, nothing about the methodology directly addresses the question of how well the space functions programmatically.

In contrast, the FFA is not an engineering-oriented exercise. It must be performed by evaluators with knowledge of programs and pedagogy (rather than building systems). The FFA captures elements of qualitative deficiency from the program/facility users' point of view that a condition audit cannot capture.

# BEYOND THE CONDITION AUDIT FACILITIES ASSESSMENT

Figure 1 Strategic Capital Development: A Comprehensive Model



Harvey H. Kaiser Associates, Inc. and Eva Klein & Associates, Ltd. © 2009

## CONDITION—THE CONDITION AUDIT AND/OR LIFE-CYCLE FORECASTING

### Condition Audit

An FCA answers this question: *What will it take to bring the building or infrastructure back to its original condition and to meet current codes?* The audit reveals observed conditions and permits formation of remedial projects to correct deficiencies—ranging from deferred maintenance backlog to projected future renewal needs.

The FCA data sources include field inspections of buildings and infrastructure; observations from maintenance staff and records; building and infrastructure feasibility studies; and review of proposed capital projects that incorporate condition deficiency remedial work. The methodology provides a database of systematically collected information, including findings from inspections and other sources, preliminary prioritization of remedial work, graphics, building images, and estimated costs.

Ideally, to remain optimally useful, the FCA must be updated periodically. Although all facilities can be included, the FCA can be omitted for buildings in temporary use; buildings below a size threshold; or non-essential campus structures. Unique facilities with special structural systems or a high level of public use, such as arenas, performing arts complexes, or convocation centers, may warrant inspections at more frequent intervals.

### Life-Cycle Forecasting

Forecasting of capital renewal needs is based on building system life cycles and remaining useful life of building and infrastructure subsystems (such as mechanical, plumbing, electrical, elevators, roofs, and so forth). The forecast produces a calculation of the scheduled year for system renewal and estimated renewal cost. Calculations of costs to restore various systems when life cycles expire are totaled on an annual basis and can

Figure 2: An Integrated Facilities Quality Assessment Model





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be averaged over a period of time to calculate an annual capital renewal expenditure allowance.

### Combination

The two methodologies—detailed FCA and predictive life-cycle modeling—vary widely in cost and in how the results are used. In 2010, the statistical life-cycle modeling technique is likely to cost less than 20 percent of the cost of performing full field inspection condition audits. In addition, life-cycle modeling requires less time to produce findings. Both techniques depend on in-house staff input in varying degrees. The inspection-based audit provides the advantage of more detailed information—and is thus more useful to develop budgets for actual implementation of projects, but these data also have a “shelf life.” The predictive modeling approach provides less detail and does not fully incorporate actual observed conditions, but it can be useful for broader capital renewal planning purposes.

The authors recommend that institutions consider a combination in which life-cycle forecasting is applied to the entire facilities portfolio and, in addition, detailed field inspections are done for a subset of buildings and infrastructure that are considered either most critical or most at-risk, or both. This combined approach achieves a balance between details and costs; delivery of findings on a timely basis; effective use of in-house staff time; knowledge of plant conditions; and data updating requirements. It provides sufficient data for long-range planning and details for a subset of buildings.

## FUNCTIONALITY—THE FACILITIES FUNCTIONALITY ASSESSMENT

Although references to a comprehensive approach combining physical condition and functionality have appeared in the facilities literature, application of the functionality concept has been by far the exception, rather than the rule. As the authors have developed it, the FFA methodology is intended to answer the question: *How well does the existing space meet contemporary functionality needs for the program (programs) it is supposed to serve?*

The FFA takes into account factors of program requirements. For this reason, and in complete contrast with the FCA, this assessment is done *by space type* (e.g., classrooms, teaching laboratories, research laboratories, offices, and the like), rather than by building systems. It is based on 1) field evaluations of buildings against a set of pre-established *Facility Quality Criteria* that express the desired qualitative and functional performance features of space, and 2) information about functionality and program needs from *user interviews*.

The assessment team does not require engineering/architecture backgrounds but does require knowledge of pedagogy; state-of-the-art space configurations; equipment for specific programmatic needs; and other use-driven technical space requirements. The assessment team also needs to have the experience base to formulate interview questions and then to interpret comments of interviewees correctly.

The scope of an FFA is tailored to the specific size and complexity of an institution. Generally, all major buildings serving instruction, research, service, and student/campus life programs are included. Typical exclusions are new buildings (e.g., ten years old or newer); recently renovated/modernized buildings; and minor structures.

### Facility Quality Criteria

*Facility Quality Criteria* are a baseline set of qualitative characteristics that, together, make a space suitable to the conduct of a particular program. Criteria for space configuration, finishes, equipment, and mechanical, electrical, lighting, communications, and other unique requirements are specific to each major space type.

### Field Evaluations of Buildings

After the *Facility Quality Criteria* are developed and adopted, then, an evaluation format must be created, for use in the building inspections. The building evaluations (walk-throughs) are conducted and extensive notes are made and edited.

### User Interviews

User interviews generally are conducted with groups of users that may be organized by schools, groups of departments, a single building, or a group of related buildings. The initial selection of user groups is itself an important part of the methodology, as the interviews need to generate information that is balanced between being too general and too specific.

The interviews then must be structured by a well-crafted interview protocol and conducted by personnel with interview experience. Any time that college or university users are interviewed on the topic of facilities, it is likely that the comments received will include a broad range of responses—from thoughtful expressions about real needs to “wish-list” items. In this case, the point is to learn about actual *qualitative deficiencies and needs*, rather than “*we need more space.*”

#### Four Tools Required for the Facilities Functionality Assessment:

- Facility Quality Criteria
- Evaluation format for building inspections
- User interview protocols and methods
- Cost template

### Project Definition and Cost Template

Upon completion of the user group interviews and the building inspections, using the *Criteria*, the analysis involves defining what qualitative improvements are required to bring the buildings to the equivalent of “modern,” and the cost template is applied. Now these findings are ready to be integrated with the condition audit findings.

## BRINGING TOGETHER CONDITION AND FUNCTIONALITY

An FCA (audit or forecast or combination) and an FFA

provide two counterpart views of capital improvement needs for each building evaluated—but there will be some overlap and need for integration. In some cases, the costs identified by the FCA and FFA findings can be added together. For example, for Building X, the FCA yields \$2 million of building system and code corrections—including a new roof; exterior painting, HVAC system upgrades, and so forth. For Building X, the FFA review yields another \$2 million of interior space reconfiguration, for example, to change the sizes and configurations of classrooms or to make a suite of offices smaller but better organized. In this example, total project need is stated at \$4 million (\$2 million in condition deficiencies plus \$2 million in functionality deficiencies).

In other cases, the findings of the FFA may trump FCA findings. For example, in Building Y, a *Condition Audit* may find that some light fixtures in classrooms are broken and require replacement. The FFA, however, may conclude that the entire lighting system is inappropriate for modern instruction and will yield a cost for complete replacement of the lighting system. In such an event, the deficiency cost of replacement of some broken fixtures would be replaced by the cost of an entire new lighting system.

#### SPECIAL STUDIES

Discussion of *Facilities Quality* is not complete without mention of special sub-studies that may be required in connection with the FCA and FFA. For example, although review of ADA compliance typically is included in today's FCAs, it is not unheard of for an institution to need a special ADA assessment. Similarly, many campuses have historic buildings—both on historic registers and not. Assessment of historic buildings usually requires special expertise, beyond the scope of a typical FCA. Safety and security, likewise, may require special evaluation and new solutions (not all of which are facilities solutions). And, finally, it is often useful to conduct a specific study of energy use and sustainability—to make plans that involve a range of “green” solutions—from energy generation changes to facility energy features to policy and behavioral elements.

#### A NEW METRIC—THE FACILITY QUALITY INDEX

The universally accepted measure of facility condition has been the *Facility Condition Index* (FCI), defined as the es-

timated cost to correct condition and code compliance deficiencies, divided by the current replacement value (CRV) of the building.

$$FQI = \frac{\$ \text{ to Correct Condition and Code Deficiencies} + \$ \text{ to Achieve Functionality Improvements}}{\$ \text{ Current Replacement Value}}$$

With about three decades of FCA experience, consultants have established comparative data and ranges to define the severity of needs. Building on the concept of the FCI, a new metric, intended to capture both condition and functionality needs, is the *Facilities Quality Index*, or FQI—which provides a metric of the relative severity of qualitative building needs.

The higher the FQI, the more extensive the condition and obsolescence deficiencies defined as the capital need, and the more urgent the need to modernize the building. Based on their experience, the authors propose interpretive ranges as shown in Figure 3—Ranges for Facility Quality Index.

Due to the combination of estimated costs to correct condition and code deficiencies and estimated costs of functionality-driven programmatic improvements—often resulting in a comprehensive building renovation or modernization project cost—calculated FQIs always will be higher than calculated

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Figure 3 Ranges for Facility Quality Index

Level of Need	FQI Range	Description
A	0.00 - 0.05 (0% to 5%)	Requires continued normal maintenance and attention to life-cycle systems renewal
B	0.06 - 0.29 (6% to 29%)	Limited to Moderate Renovation, including correction of some condition deficiencies
C	0.30 - 0.49 (30% to 49%)	Moderate to Extensive Renovation, combining functional changes and correction of moderate condition deficiencies
D	0.50 - 0.99 (50% to 99%)	Comprehensive Modernization, combining extensive functional changes and/or correction of extensive condition deficiencies
E	≥ 1.00 (100% or greater)	Candidate for Demolition (or Demolition and Replacement), or Comprehensive Modernization which may include downgrade to less demanding use

FCIs. In fact, for any given building, the FQI can exceed 1.0—meaning that the cost to make the building “right,” from both condition and functionality perspectives (overall building quality) may exceed the building’s CRV. This provides an interesting new view of options. An FQI of 1.0 or greater indicates that it is uneconomical to renovate the facility, at least for its current use; other alternatives, such as demolition, replacement, and use conversion, should be explored. (A building of historic or sentimental value to a campus, even if its FQI exceeds 1.0, would not be a candidate for demolition.)

#### IMPLICATIONS FOR NEW DIRECTIONS IN CAPITAL PLANNING

The outcome of an FQA is a series of whole-building capital projects, each with described condition and functionality deficiencies to be corrected, and with an order-of-magnitude cost. Each building also will have a calculated FQI that provides input to prioritization decisions.

Importantly, the FQA findings have another critical use. They can be integrated with the results of a *Space Capacity Analysis* that has defined current or projected surpluses or deficits of space, by space type. Using Capacity and FQA findings together, modernization plans for buildings can incorporate changes that aid in “rightsizing” of instructional, office, research, and support spaces.

The FQA (especially when used with Capacity findings) is a better tool for

defining major projects for long-range, strategic capital planning (as opposed to annual renewal management), because it leads to a broader set of decision options:

- Condition deficiency remedial (system renewal or replacement) projects
- A range of moderate to full renovation and modernization projects that variously include correction of system condition deficiencies; functionality improvements; space reconfiguration; or even entire change of use
- New/replacement building and downgrade of the existing building to a less demanding use (e.g., a new science lab building and conversion of the old science building to another use)
- Demolition or disposal.

Thus, the comprehensive *Facility Quality Assessment* is a methodology that is intended to support governing boards, presidents/chancellors and chief academic officers in strategic capital planning—in addition to supporting chief facilities and financial officers in capital renewal budgeting. ①

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The background of the entire page is a collage of US dollar bills. The top half features a blue band with the word "Portfolio" in a large, black, serif font. Below this is a green band with the word "Management" in the same font. The bottom half is a light green band. The dollar bills are visible in the background, with the faces of presidents partially obscured by the colored bands and text.

# Portfolio

# Management

One nice thing about working in a single industry for many years is the opportunity to try out a number of new-fangled ideas and see which ones actually work. For my career in higher education facilities management, the list of new concepts attempted is quite extensive. Such was the case with the idea of "Deferred Maintenance."

In the mid-1980s I read Harvey Kaiser's book *Crumbling Academe*. Like so many others I followed the prescripts of the time by surveying the condition of all my facilities, estimating the cost of repair, and packaging it into a report

I could use with our trustees. I bought lock, stock, and barrel into the idea of "Stewardship" and argued with all I could reach that we had a responsibility to save our investment in facilities the previous generations had sacrificed for and that the future of higher education depended upon. (Sounds good doesn't it?) The result? No increase in funding, a president fearful that students would bypass a campus loaded with maintenance problems, and a chief business officer who thought he'd be blamed for the whole mess. Obviously it did not work out as intended!

# 1. Product Based Management

By William A. Daigneau, APPA Fellow

Fast-forward 25 years. What is the number one topic amongst facilities managers in higher education? Deferred Maintenance. The most oft-cited role of the chief facilities officer? Stewardship. Huh? How much longer are we going to beat our head against that wall?

Some years ago I stumbled across the idea of viewing facilities management, or any service enterprise, as a manufacturer of products. I wrote an article about the concept and called it Product Based Management, aka PBM [*see September/October 1997 issue of Facilities Manager*]. The idea was not revolutionary; it just suggested that we need to shift

our focus from “activities” to the final “desired outcome,” i.e., the product of all those activities. Thus the product of maintenance (an activity) was a functional, reliable building (the desired outcome). I found that systematically applying the concept led to improved results because it helped identify waste in the activity. In other words, if the activities employed in maintenance did not lead to a functioning building, they should be reduced or eliminated. As a result we abandoned many things most facilities managers would consider sound and standard practices in our business, such as centralized work control.

Now for the revelation! It didn't take me long to realize that my perception of a functional, reliable building was different from that held by its occupants, or by my boss, or by the president. For example, in one instance I felt we needed to replace the library's boiler and repair the steam heating system. But the head of the library wanted the roof fixed (books and water don't do well together). The president wanted me to repair and refurbish the main hall (where he held receptions). My boss wanted the brick exterior repaired (he could see the library from

his office window). Total rolled-up cost for all the listed work was \$5 million. Amount budgeted for repairs to the library was \$1 million. What to do!

After trying the usual assortment of capital prioritization schemes developed by various other colleges (with little success), I again turned to other industries to see how they handled resource allocation decisions. I didn't look too far when I came across a concept used to make allocation decisions in the world of financial investments: Portfolio Management.

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## THE CONCEPT

While much has been written about Portfolio theory, and the term is widely used in the facilities management industry, it still amazes me how little is really understood about the concept and its real-world application. For the purposes of this article a brief review of the basic premises of portfolio management, primarily as it pertains to non-liquid assets (e.g., buildings versus financial instruments such as bonds or mutual funds), is necessary.

A **Portfolio** is a group of **assets** owned by an individual or an organization, which they have purchased or invested in with the anticipation the asset will generate some returns on their capital. These returns may be in the form of revenue or to avoid expenses (negative revenue), such as owning a house in lieu of renting it. Each and every asset is expected to generate a return, but there are some risks or variability associated with those returns (rewards). Thus the assets in the portfolio each have a different degree of risk and reward associated with it. This can be displayed in chart form, shown in Figure 1.

The key principle of portfolio theory is the idea that the asset owner can minimize risk and maximize reward by managing the *entire* portfolio, not each individual asset. The greatest risk to the owner of an asset is that no returns are generated or that the invested capital is lost (bankrupt). The lowest risk is that returns are consistent and the asset is durable (profitable). At any given point in time, returns for each asset vary, as well as their degree of risk. This year an asset may be durable and generating a return, while another is not. Next year, the situation may be reversed.

The idea behind a portfolio is that since the individual assets do not have the same risk/reward in any given period, the portfolio manager will always have a collection of performing and underperforming assets. The portfolio manager must make continual decision about 1) the right balance between performing and underperforming assets, and 2) the likelihood the underperforming assets will generate a return in the future. Thus, the portfolio manager is constantly making investment decisions about the composition of the portfolio and how to use current income to further minimize total risk into the future.

Figure 1



#### APPLICATION

So how does portfolio theory help anyone make decisions about facility maintenance, repair, remodeling, or new construction? First to successfully adopt Facilities Portfolio Management (FPM for short), facilities managers must shift their thinking from one paradigm to another. The old paradigm about always preserving the institution's physical assets (stewardship) must give way to a new paradigm about preserving the functions of those assets. John Moubray describes this new paradigm in his excellent paper *Maintenance Management: A New Paradigm* ([www.reliabilityweb.com](http://www.reliabilityweb.com)):

As we gain a deeper understanding of the role of assets in business, we begin to appreciate the significance of the fact that any physical asset is put into service because someone wants it to do something. So it follows that when we maintain an asset, the state that we wish to preserve must be one in which it continues to do whatever its users want it to do. This in turn implies that we have to focus our attention on maintaining what each asset does rather than on what it is.

Once the mindset is shifted, we can apply FPM by first examining the core purpose of a college or university. At the heart, its "core" function is education and research (expanding knowledge). Without performing these basic functions, a university would be something else. While universities do other things as

well, such as public service and athletics, these are secondary or ancillary to its core purpose. Thus, every function performed on a college campus can be scaled, from low to high, on its direct relationship to the delivery of Education and Research.

Next we can examine the collection of buildings that exist and rank them in order on their relationship to the core function. Physical assets generally fall into one of three categories, but they too are scalable. These categories of buildings are:

- **Core:** those buildings that directly provide education and research, such as classrooms, instructional laboratories, research laboratories, faculty and academic department offices. These are the Class A assets.
- **Core support:** buildings that house functions that directly support the delivery of the core function, such as dormitories, food service, central plants, maintenance and operations facilities, libraries, student services, administration. These are the Class B assets.
- **Ancillary:** Buildings for everything else a university is engaged in, such as art museums, performing arts facilities, athletic and recreation facilities, parking. These are Class C assets.

The basic logic of FPM goes something like this: If an institution cannot teach students and support the expansion of knowledge, then the support functions aren't needed, and the ancillary functions should be spun off to someone else.

Using this logic, one could rank order the relative importance of each building in each class by assigning a point value to it. There are several degrees of sophistication that can be used to determine this, primarily revenue generation of the asset, but for the purpose of this article and to keep it simple, let's assign a point value for Class A assets from 20 to 30, Class B from 10 to 20, and Class C from 0 to 10. The higher the number, the higher the importance. For example, an instructional laboratory building that generates a lot of credit hours, and would be hard to replace even temporarily, might get 30 points. A faculty office building with lots of faculty who teach lots of classes, but who might work from home if the building is damaged, might score a 20.

Now we introduce the concept of Risk. For every physical asset, there exists some risk that it will cease to provide safe and reliable space for its intended purpose. Fire, tornadoes, flood, building system failures, IAQ...all can lead to loss of the asset or its temporary disablement. Risk is a function of probability of occurrence and the severity to a building's loss if it occurs. We can rate risk simply by multiplying probability by severity. Using a scale of 1 (low) to 5 (high) for each factor, we can score risk as follows.

- **Risk from fire:** Probability is medium, so it is rated a 3. Severity is likely high, leading to loss of the facility or portions of it, so it is rated a 4. The risk of fire is probability times severity, or a total scored risk of 12.
- **Risk from tornado:** Depending on where you live, tornadoes are common or rare. Let's say they are rare in this example, so it earns a 1 on probability. But severity is quite high, so risk from a tornado is 1 times 5, for a total of 5.

• **Risk from boiler failure:**

Let's assume the building has a very old and dilapidated boiler. Thus probability is high, a 5. If the boiler fails in a cold climate where it provides heat, there could be some serious freezing of pipes and extensive damage, so we give it a severity of 3. Total risk is 15.

This process would continue for every possible risk and every building system. Then either the total or an average of all individual risks would be computed to provide an overall risk score for each individual building. The important concept is that for every campus, there is a collection, or portfolio, of buildings with varying degrees of risk associated with them at any given point in time. That risk is a function of location and condition of the physical asset, and can be numerically rated.

So now we have two dimensions to use to evaluate where scarce resources are deployed. We can evaluate every physical asset on its importance to the core function of the institution, and evaluate the level of risk associate with those assets. Graphically,

Figure 2



each physical asset can be plotted on a matrix shown in Figure 2:

Knowing the Risk/Return ranking of all the assets in the portfolio enables resource allocation decisions designed to maximize the return of the entire portfolio. For example, in the above example Classroom Building A would be in the "Protect" category, and we

would allocate a larger proportion of our O&M resources to ensure building systems did not prematurely age. Laboratory Building A is in the "Manage" category and would be allocated a larger proportion of Capital Renewal Funds (CRR) in order to extend its useful life. The Art Museum (Ignore) would receive little attention in both O&M and CRR, as would the Old Main Admin Building (Eliminate), until it is either demolished, renovated, or replaced. Thus both short-term and long-term resource allocation decisions can be made on where to focus limited O&M, CRR, and replacement construction dollars, and a long-term capital plan can be developed and prioritized.

The same model can be used to make decisions on operating and capital allocation decisions in every individual building. In this case,

the building systems are assigned a level of importance based on a ranking of the impact of its failure on continued building function. Likewise risk can be determined by the condition of the building system and its probability of failure. So in the earlier story about the Library, the roof replacement might get funded before the boiler based on an assessment that the roof was more likely to fail due to its condition than the boiler, even though the boiler was rated as more important (sorry Boss, but the brick repairs came in dead last).

Just as in an investment portfolio, the entire portfolio of physical assets must be reviewed each year and "rebalanced." That's because every asset ages from wear and tear (depreciates) or functionally changes due to technology or educational pedagogy. Eventually Classroom Building A, even with good maintenance will migrate to one of the other categories as its building components age (risk increases) or technology impacts its functioning (importance decreases). Likewise Laboratory Building A, given some attention on CRR funding, may have migrated to the "Protect" category. This is the dynamic aspect of FPM. You just can't ignore the assets; they must be actively managed, just like a 401k portfolio!

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Why use FPM? It offers the chief facilities officer a number of benefits:

- **Whiner to Winner!** Once one gets out of the stewardship trap, and your interest becomes protecting the function and mission of the institution, your funding requests are now allied directly with the interests of the president and the trustees. Decisions are no longer based on a choice between facilities funding and programs, but on which programs do they want to protect or enhance with facilities funding.
- **Transparency.** The basis on which all facilities decisions are made is both understandable and defensible. The mystery on why certain things are funded and others are not is removed and is visible to all. Frankly, it's hard for the most ardent debater to argue against the logic.
- **Politically Indifferent.** The model is indifferent to political power or status. The English department gets the same treatment as the Business school since even business majors must take an English class or two. The model looks only at mission criticality and credit-hour production in a facility, regardless of what classes are taught or who is teaching them.

## CONCLUSION

Resource allocation decisions have historically been difficult for higher education. When resources are plentiful the loudest and most aggressive interest groups get a larger share, and when resources are scarce, administrative areas, especially capital outlays and facilities operations, get the largest cuts. In such an environment it is difficult to make wise long-term investment decisions in the management of physical assets. Many books and articles have been written about strategic planning and decision-making, yet few reflect the reality of how higher education is actually managed.

FPM is a tool that facility officers can use to make annual funding decisions that are not dependent on an entire culture shift in the real world of higher education. It applies portfolio theory in a practical but effective manner that does not require extensive data gathering or new software systems. While facility managers have used many of the concepts intuitively for many years, FPM introduces a degree of rigor and defensible strategy to the process. And it takes the Facility organization out of the role of just another voice crying for more resources, to becoming an ally of the president, the business officer, the deans, and the faculty. Now wouldn't that be nice? ☺

Bill Daigneau is vice president & chief facilities officer at the University of Texas, MD Anderson Cancer Center, in Houston, TX. He can be reached at [daigneau@mdanderson.org](mailto:daigneau@mdanderson.org).

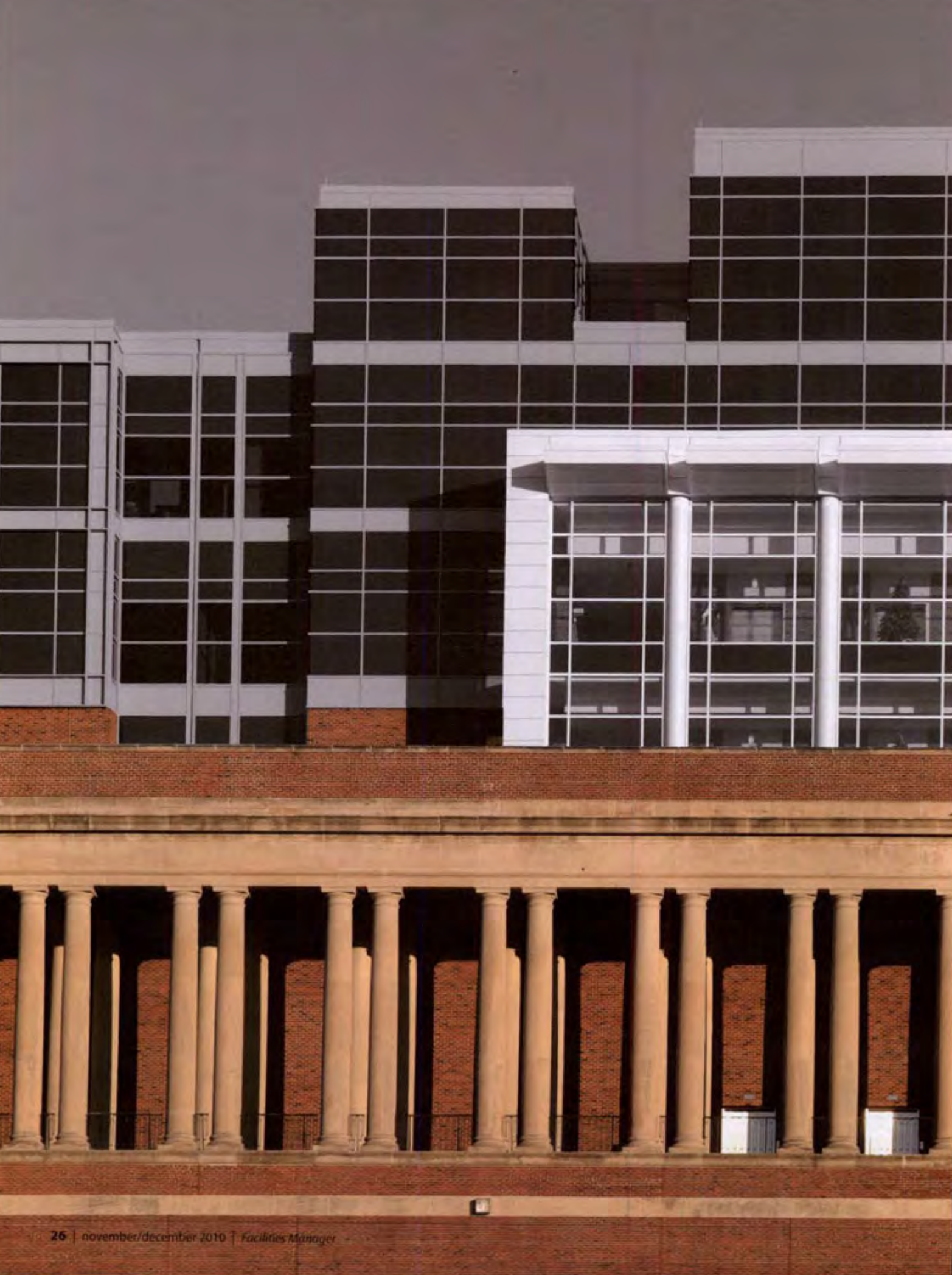
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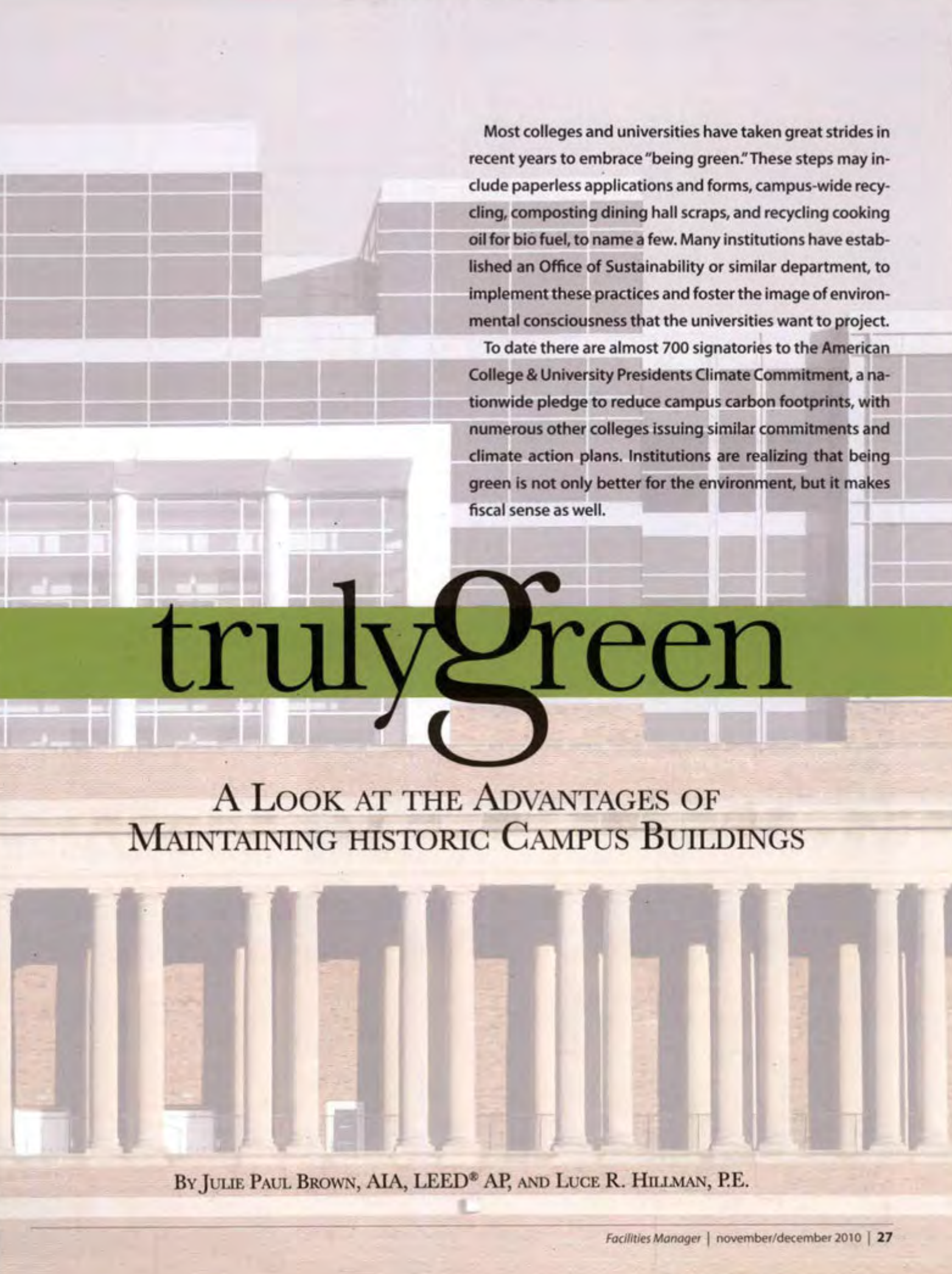


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Most colleges and universities have taken great strides in recent years to embrace "being green." These steps may include paperless applications and forms, campus-wide recycling, composting dining hall scraps, and recycling cooking oil for bio fuel, to name a few. Many institutions have established an Office of Sustainability or similar department, to implement these practices and foster the image of environmental consciousness that the universities want to project.

To date there are almost 700 signatories to the American College & University Presidents Climate Commitment, a nationwide pledge to reduce campus carbon footprints, with numerous other colleges issuing similar commitments and climate action plans. Institutions are realizing that being green is not only better for the environment, but it makes fiscal sense as well.

# trulyGreen

## A LOOK AT THE ADVANTAGES OF MAINTAINING HISTORIC CAMPUS BUILDINGS

BY JULIE PAUL BROWN, AIA, LEED® AP, AND LUCE R. HILLMAN, P.E.

## THE GREENEST BUILDING IS THE ONE THAT IS ALREADY BUILT

LEED (Leadership in Energy Efficiency and Design) Certification, a rating and certification system currently administered by the U.S. Green Building Council, has taken hold in both public and private construction. Most institutions pursue some level of LEED when constructing new buildings and do so with great fanfare. But one often overlooked, or at least undervalued, method of achieving overall resource efficiency is to maintain and/or adaptively reuse our older building stock. As the preservation and

sustainable design worlds meld together through organizations like the AIA, USGBC, National Trust for Historic Preservation, and the Association for Preservation Technology, the slogan that you'll be hearing is: *"the greenest building is the one that is already built."*

The idea of "green building" is not a new concept, having taken root in the 1970s (if not earlier), but in the last few years, it has finally become what its early promoters have longed for: accepted. No longer does the argument need to be made as everywhere you look, buildings, cleaning supplies, shoes, appliances, etc., are being

marketed as green. This flooding of the market tends to water down what really constitutes being green, and the general inclination tends to be that all things green must therefore be new. The problem with that is we lose sight of what is right in front of us: our historic buildings are green by their very nature.

### HISTORIC BUILDINGS CONTRIBUTE VALUE TO OUR CAMPUSES

This article makes a deliberate distinction between "existing" and "historic" buildings. "Historic buildings" are defined as buildings that are greater than 50 years old and contribute to our cultural value. Thus, there are many buildings constructed after the 1960s that are now becoming eligible for historic status. These buildings are generally excluded from the category of "historic" for the purposes of this article, along with many post-World War II buildings that were not typically constructed with energy efficiency in mind. Quite the opposite it seems, since energy at the time was cheap and seemingly plentiful.

Therefore, these buildings tended to have a greater reliance on mechanical heating and cooling, allowing experimentation with newer materials and technologies that weren't always successful in their response to the environment and microclimate. In addition, the surge of the personal automobile was booming and as a result buildings were constructed farther apart, fostering further reliance on cars. These buildings contrast sharply with the more traditionally historic buildings erected prior to this era, particularly at the turn of the 20th century, and certainly the 19th and

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18th centuries when time-tested principles of design for climate were typically utilized and communities were more pedestrian-oriented.

College campuses are home to many of our oldest buildings, and these historic buildings contribute tremendously, if not define, the character of our campuses. It's the historic buildings that dominate marketing materials and draw students to campus. They convey an image of a solid, lasting institution appealing to both the students and the parents paying tuition. These iconic historic buildings are often what alumni think of as they remember the campus. In architecture, this is known as cognitive mapping: the images that are seared into your brain when you think of a place. For example: while Harvard University occupies large portions of Cambridge and Boston, Massachusetts with many new buildings, it's hard not to think first of Harvard Yard with its historic red brick buildings around the campus green.

Historic buildings are truly the hearts of our campuses. Harvard's own oldest surviving building is Massachusetts Hall, built in 1718 as a dormitory. Housing John Hancock and John and Samuel Adams, it still operates as a residence hall today. Many colleges, such as the University of New Hampshire and the University of Vermont, use their oldest buildings (Thompson Hall and Old Mill, respectively) as their official logos. The College of William and Mary, the second oldest continuously operating campus (after Harvard), has the oldest surviving campus building, the Wren Building, now in its fourth century. Perhaps W&M says it best in their own marketing, with a banner across the image of the Wren Building on their website proudly proclaiming: "Some call it history, we call it campus."

#### THE ORIGINAL "GREEN BUILDINGS"

When you combine the history, character, and culture that these buildings contribute to our campuses, the case becomes very strong for reinvesting capital funds. The little known secret is that these buildings are *already green*; tying in quite nicely to campus goals to reduce overall energy and resource consumption. While often revered for their beauty and detail, historic buildings admittedly may seem to many facility departments however as just "old," obsolete, or inflexible to current needs. They are often leaking or full of lead paint and asbestos...rarely are they thought of as being green.

Yet, compared to what is involved in constructing an entirely new building; renovating an existing building wins when it comes to sustainable site development, resource conservation, embodied energy, and construction waste management. In addition, historic buildings were designed for the climate: passive heating and cooling, natural ventilation, daylighting, and utilization of durable and regionally sourced materials.

There are reasons that our New England campuses have so many brick buildings with steep slate roofs. The brick was locally produced, its mass retained heat in winter and kept interiors



UVM's Williams Hall, circa 1896, is listed on the National Register of Historic Places following masonry, terra cotta, and window restoration to address building envelope and life safety issues.



The University of Vermont



Universities recognize the value of their historic buildings in defining the images of their campus, such as "Old Mill," which is used as the logo for the University of Vermont.



Dome and tower of Ira Allen Chapel at UVM following restoration.



Massachusetts Hall, circa 1718, is the country's 2nd oldest continuously operating campus building. Dormitory to John Adams, John Hancock, and Sam Adams. It was designed for climate, with locally sourced brick, granite, and slate (key points – if only they had LEED certification back in 1718).

View of the historically-significant campus buildings at UVM: William's Hall, Billings, and Ira Allen Chapel (from closest to farthest) following recent renovations by Gale Associates, Inc.

cool in summer, its thickness kept water out, and it is durable enough for the tough winters. Slate is locally retrieved, easily worked, lasts a century, and perfect to use on steep sloped roofs to shed snow. Southern campuses often have historic buildings with deep arcades and porticos to shade buildings and pedestrians, and central entrances with large halls to encourage natural ventilation (e.g., Thomas Jefferson's designs at the University of Virginia). Buildings in both climates incorporated passive solar heating and cooling concepts (before they knew to use those terms) because they were not initially serviced by fossil fuels or able to rely on them to the extent we do today.

#### DOES REHABILITATING BUILDINGS REALLY CONTRIBUTE TO SUSTAINABILITY?

While major renovations to historic buildings can sometimes be as costly as new buildings, the life-cycle (or cradle-to-grave) cost will typically be less. This may not be as appealing to a private developer planning to sell the building in a few years, but should be appealing to universities and colleges, many of whom have been in existence for centuries (Harvard, William & Mary, Yale, Princeton, UVA, and Rutgers to name a few) and hope to continue long into the future. A rich inventory exists in the north-east alone with nine of the ten oldest campuses in the United States and literally hundreds more with historic campuses. Several of these institutions, such as Middlebury College, UVM, Colby, Harvard, and Champlain College, have discovered the contribution of their historic campus buildings through renovations which have achieved LEED Platinum and Gold Certification.

However, a campus does not have to pursue LEED to prove it is reducing its carbon footprint. Maintaining existing buildings and adaptively reusing them goes a long way toward meeting campus sustainability goals. When comparing a new building to an existing building, no matter how green the new building is, there are still huge embodied energy costs consumed by the construction of a new building. Embodied energy is defined as the total amount of energy it takes to construct a building. This includes the energy required for extraction and transportation of raw materials; energy to process, transport, and manufacture the materials into a product; energy to transport it again to the site and erect it; and then additional energy to transport construction waste to a recycling or waste facility. There is an immense amount of energy expended in constructing a building, no matter how green the building is

going to be. When maintaining or rehabilitating existing buildings, we are preserving energy that has already been consumed.

Another advantage is the ability to reuse high-quality materials that may no longer be available (e.g., historic elements built of solid, old-growth wood). Not only are the old-growth woods no longer available (or are expensive if found), but the newer growth wood used today (particularly fast-growing species available from certified sustainable forests) typically lacks the rich resins and inherent durability of the old growth heart pine, Douglas fir, or mahogany that was common a century ago. Reuse and restoration not only saves valuable resources in this instance, but preserves the historic character of the campus.

While it may seem that older buildings require more work compared to newer buildings, the reality is that these buildings were constructed to last and now having aged a century or more, are in need of maintenance. Buildings much younger (post-War to present), on the other hand, are exhibiting premature failure due to inferior design, materials, and workmanship and may require as much, if not more work, than historic buildings. As universities consider new construction projects, they need to ask themselves, will the proposed assemblies and construction details last 100 years or more?

#### PRACTICALITIES OF MAINTAINING HISTORIC CAMPUS BUILDINGS

The University of Vermont (UVM) is an example of where maintaining historic campus buildings has been an ongoing practice. As the fifth oldest college in New England (est. 1791), UVM has over 40 continuously operating campus buildings on the National Register of Historic Places, with 29 of these buildings built between 1800 and 1900. In fact, UVM has more historic buildings on campus than modern. Having acquired several of these buildings over time, many were originally constructed for other purposes and have been adaptively reused more than once by the University. UVM is no stranger to a backlog of deferred maintenance, however, common to most institutions. Understandably, with so many buildings and limited budgets, only so much can be done at a time. As a result, priorities must be established.

When maintaining historic campus buildings, health and safety must be first on the list of priorities. A common issue with historic buildings is that they have been modified over decades and as mentioned previously, certain time periods used materi-



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als or technologies that were later found to have unintended consequences. Asbestos is an effective fire protection material and lead paint made a great preservative coating for wood. Both of these materials were used widely in the early part of the 20th century until about the 1970s. However, we know now that there are potential health issues related to their use, and abatement or encapsulation is a familiar process for many facility departments.

Also related to health and safety, and one of the highest priorities to address when it comes to historic buildings, is stabilizing the exterior envelope. Keeping water from infiltrating the exterior walls, roof, structure and foundations prevents damage to materials that can result in life safety issues (i.e., structural degradation and masonry falling to the ground), as well as indoor air quality issues related to the growth of mold. It's not only important to address these issues, it's even more important to address them *appropriately*. This does not mean having someone go around with a caulking gun, sealing up deteriorated joints. An investigation of the building envelope should be performed to identify deficiencies and sources of water infiltration.

Different approaches for repairs should be considered that balance cost with occupancy considerations and scheduling

requirements, as well as effectiveness and durability. Waterproof coatings over masonry may have a lower first cost vs. repointing, for example, but may lead to other problems if water is trapped in the wall system. Without qualified designs, appropriate materials, and careful workmanship, more damage can be done to the building than the original repair may have required. This may lead to irreparable harm to the historic fabric, as well as further costs being incurred to repair the additional damage.

At UVM, the long-term maintenance of items is also examined when selecting replacement material. For example, when can a newer synthetic material, such as Fipon, be used to replace finials and balustrades while maintaining the historic integrity of the building? If wood elements are necessary, the university selects wood materials that can tolerate lack of routine painting, such as Spanish cedar or mahogany. There may be a higher initial cost, but the wood integrity is maintained for a longer period of time when maintenance staff is stretched thin. Window restoration is always a challenge when balancing historic considerations and energy efficiency. Several options might be evaluated prior to design selection, including renovating existing wood windows, installing interior storm windows, or total window replacement.

Other important considerations include balancing the work being done to an historic building with meeting current building codes including: structural loads, energy efficiency, handicapped access, and integration of life safety systems. The newer code requirements often reflect a use that the building may not have been originally intended for, particularly if it has been adaptively reused or no codes were in place when the building was originally constructed. For example, restoring or returning a roof surface to slate may require a structural evaluation to determine if the roof structure can support the heavier dead load.

Addition of insulation to meet current energy codes may also be necessary on low-slope roofs, which can increase the snow load on the roof, as less snow will melt from heat escaping from the building. Thus a new roof may also require structural upgrades to the framing. Reconciling the code requirements with historic commissions, preservation standards, occupant needs, and budgets requires a partnership between the facility department and designer, and communication with the State Historic Preservation Office and the local planning and zoning office.

Whether the project includes an existing historic building that has been a mainstay of the campus, or an historic building recently acquired for adaptive reuse, or even an historic building that is salvaged and relocated to make way for a new building, universities have an opportunity to do something truly green while fortifying the character of the campus. ☺

Julie Brown is senior project manager for Gale Associates, Inc., Weymouth, MA; she can be reached at [jpb@gainc.com](mailto:jpb@gainc.com). Luce Hillman is a project manager at the University of Vermont, Burlington, VT; she can be reached at [luce.hillman@uvm.edu](mailto:luce.hillman@uvm.edu). This is their first article for *Facilities Manager*.



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# BIM in the FACILITIES



# FACILITY MANAGER'S TOOLKIT



There has been a tremendous increase in use of Building Information Modeling (BIM) in the design and construction industry. There have been numerous case studies that have documented the improvements. The majority of these improvements have focused on better coordination of design resulting in fewer Requests for Information and/or change orders. There have also been a number of projects that have reduced timelines due to the more precise design documents.

The owners and facility managers have been slower to adopt BIM. A portion of this delay is directly related to projects moving from design to construction to substantial completion. Other delays may be related to the increased investment that is necessary to move to a BIM platform. *[Editor's Note: Read more about BIM and facilities management in the May/June 2009 issue of Facilities Manager and in APPA's Body of Knowledge (BOK).]*

Working with the design and construction team on a new project is the ideal time to be exploring the advantages that BIM can provide to the facility manager.

By Timothy M. Peglow, P.E., MBA, MSE

## FROM DESIGN TO CONSTRUCT TO MANAGE TO RENOVATE TO DEMOLISH

Routinely, as projects move through their life-cycle process from design to construction to occupancy, information is lost. This loss of data can come from a number of sources, including change in project team personnel, inadequate transfer of information on key assumptions, or change in expectations or strategies on multi-phase projects.

The ability to capture information in a systematic way throughout the project provides the opportunity to improve understanding of the capabilities and performance of the facilities throughout the process especially upon completion.

Practically, a well-designed model can be modified as the facility needs change or expand. These changes can be in the physical nature of the facility or information about the facility. A BIM model may start with basic room or space information and expand to include robust information on various assets or spaces over time. The initial model may include location of fire alarm or telephone outlets the later phase may include make, model, and identifiers used in the fire alarm system.

The model must be managed in near real time to assure integrity of information. The success of a BIM model is the

accuracy and ease of access of the information. If the model is not maintained, it will cease to be an asset to the facility management team. This has been the author's experience with past practices of basic CAD floor plans and traditional paper methods of information capture.

## BETTER TOOL FOR FACILITY DATA MANAGEMENT

As one begins to explore BIM, the support for data input and analysis is much more robust than with previous CAD tools. Revit includes bidirectional flow of information using various tools such as external spreadsheets or schedules of information. It is also easier to modify properties for various elements in the BIM model.

Adding additional elements is not much more difficult than adding a column in a spreadsheet. Auto formatting as well as using drop-down menus or yes/no options improves data integrity.

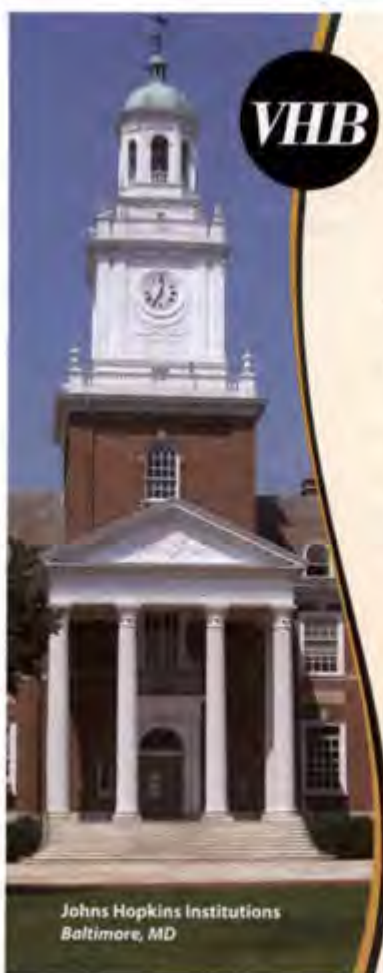
This flexibility and power does create challenges during the implementation process. It requires careful design of data elements and expectations by the facility manager. The other options to personalize the BIM model to the particular nuances of a facility manager are to post process the information received from the designer or contractor using either in-house expertise or outsource the post processing.

The base Revit software provides a good starting point for designing data collection plan. It is my experience that developing a common connecting identifier for assets is important to integrate information between systems. If the facility tracks assets or spaces with a unique identifier the data collection and entry scheme should include a plan to support the identifier, i.e., if a facility manager assigns a number to an asset in CMMS the same number should be used in the BIM model.

Equipment manufacturers are developing BIM families that provide significant amounts of information about their equipment. Wherever possible, using these families will increase the accuracy of the model and the information available in the model.

## MANAGING PERFORMANCE OF SYSTEMS WITH BETTER SYSTEM INFORMATION

One of the exciting tools in BIM is the ability to review system-level information with modifications. I



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have spent many hours with my team trying to determine simple items such as how many sinks and toilets are connected to a sanitary sewer line, or how many coiling coils are connected to which chilled water pipes. If the BIM model is maintained it is easy to understand what capacity is or is not available in the current infrastructure. Accurate models can also be used to develop more precise troubleshooting and recovery scenarios.

Current trends indicate that energy modeling and performance analysis will be more accurate and reliable in the near term. There are a number of specialty programs that have been developed to help manage the design and operation of facilities. As these programs improve it can help the facility manager better understand the potential efficiencies for a facility.

More accurate asset and space information can assist in developing work plans and staff models. Knowing how much carpet and tile can assist in developing floor tech work plans and staffing models. Accurate counts of assets can help develop a better facility staffing model. Certainly an office building with 50 water source heat pumps will perform and cost differently than a building with 50 variable air volume boxes. Early access to counts and types of equipment can assist in developing a building operating budget.

#### GRAPHIC VIEW OF ASSETS VERSUS STRICTLY CMMS PROCESS

Although most high-performing facility management departments have a CMMS system, it can be extremely difficult to find assets using text-only system. It also becomes more complicated finding assets after the facility has been remodeled several times. I have had above-ceiling assets in a section of the building linked to the rooms below. It became difficult to reassign location after the spaces were significantly remodeled once or twice. Using a BIM model the assets can be more tracked more easily in relationship to spaces.

Also, search features in BIM software can locate items much easier automatically. Doing a search on key data elements to find assets such as make or model number can be easily accommodated in BIM. The BIM model can then locate those assets for further review.

#### CREATING MODEL

##### Challenges creating model

Unfortunately, there is not a lot of guidance on creating a BIM model for

facility management. There is a lot of information tailored to the design and construction industry. The key to success is to analyze current information needs and to develop a plan to support that in a phased approach. If there are active building projects, tracking use of BIM in those can provide significant insight into future benefits and opportunities.

There are also significant amount of training available on BIM. These can include webcasts, virtual training and classroom training. Exposure to BIM products will help understand how they can be tailored to meet individual organizational needs.

If your organization currently uses some of the advanced features of CAD products the transition can be much easier.

If your organization has an extensive CAD models consideration to conversion or continued use of CAD is a must. Migration may not be cost effective for buildings with robust CAD files.

Certainly, strong consideration to any existing project being designed in BIM may help promote the transition to BIM.

In the medium term the facility manager may have to support the CAD environment for existing inventory of buildings, while using BIM for new buildings.

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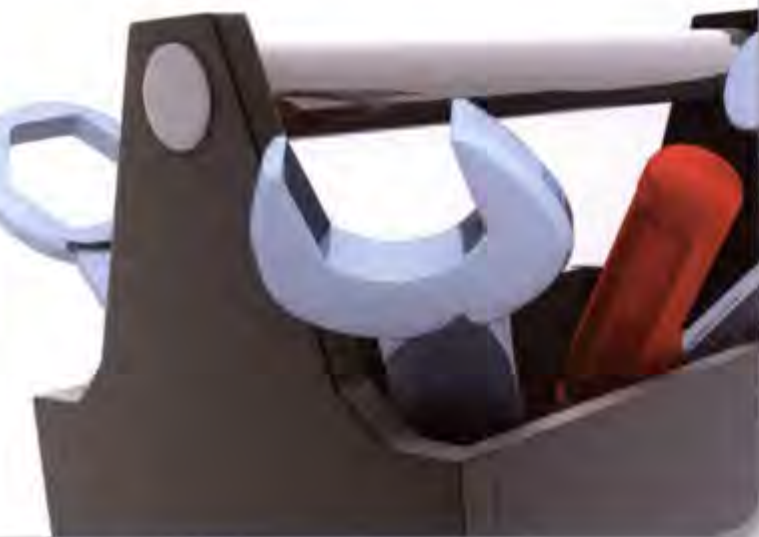
Before



After



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Currently, there are some limitations to size of the BIM model and its overall performance. Most recent information suggests that BIM models exceeding 1 gigabyte are difficult to use. Performance of the model and computer make working in this environment difficult.

#### **BIM PROCESSING POWER AND MEMORY ARE IMPORTANT**

Model performance can be severely impacted by hardware. This limit is changing rapidly due to faster computers with more memory, better graphics cards and 64-bit operating systems. Specifications need to be considered as part of the implementation plan. Lack of investment in hardware and networking can derail a BIM implementation.

#### **DEFINING DESIRED INFORMATION**

This is the most critical decision once you have decided to move to BIM. The flexibility and power of BIM will require this to be carefully planned. It is also important if you developing standards to be included in your design and construction contracts.

A good starting point would be to review your existing information about you facility and determine how much of that data could and should be incorporated in you BIM model. Based upon experience I suggest that space information be fully implemented. Space information is important because when developing schedules, groupings or zones space in Revit is the foundation needed to move this quickly. The plan should include how much detail that is incorporated. Consideration should be given to departments;

room types and finishes can be easily included. Thought should also be give to setting data entry methodology as well. These formatting options must be considered to allow better data reporting and queries. Drop-downs, yes/no, and other options should be reviewed.

To keep the model efficient the facility manager needs to define items to be included. Give careful consideration to modeling every pipe, conduit, and valve regardless of size. One thing to remember is that the data must be managed throughout the building life for the model to be valuable. Routine updating and support are important.

#### **OPPORTUNITY TO REPLACE SPECIALTY APPLICATIONS**

As a BIM implementation plan is developed, an inventory of software and databases should take place. This review is important because through a BIM application there may be opportunities to eliminate, consolidate, or interface this information. Completing this type of review may also improve data integrity within operations because there are fewer data sources and fewer opportunities for disparate data.

#### **TRAINING AND DESIGN WILL BE MORE COMPLEX THAN CURRENT PACKAGES DUE TO THE OPEN NATURE OF DESIGN**

Training is an integral part of a successful BIM implementation. Depending upon current skill set of operators it may require one to three weeks of training during the first year. Training should be geared to the duties of the users. It is also important for the users to being using the application upon completing training.

#### **FOUNDATION PRODUCT FOR FACILITY MANAGEMENT INFORMATION BIM**

BIM can be the source of critical model information. This includes both graphical information about a facility as well as design and asset information. This is the strength of the BIM. A well articulated plan will include information flow between BIM and the following applications that should also be in the facility manager's toolbox.

#### **CMMS**

Computer Maintenance Management System (CMMS) is a key application of all high-performing facility management operations. There are endless interface opportunities between BIM and CMMS. The flow of information between CMMS and

#### **Resources**

*BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors*, Chuck Eastman, Paul Telcholz, Rafael Sacks and Kathleen Liston

*Building Information Modeling: A Strategic Implementation Guide for Architects, Engineers, Constructors, and Real Estate Asset Managers*, Dana K. Smith, Michael Tardif

National BIM Standard, buildingSMARTalliance <http://www.buildingsmartalliance.org/nbims/>  
BIMFORUM <http://bimforum.org/>

U. S. General Services Administration 3D-4D-BIM Overview <http://www.gsa.gov/portal/content/102276>

*Journal of Building Information Modeling*, <http://www.wbdg.org/references/jbim.php>

BIM can help analyze key performance and cost targets. This data can help define true maintenance operating costs per square foot by assigning cost to spaces and departments through use of room and asset assignments.

By assigning work orders cost where appropriate to spaces. Combining data from BIM with cost data from CMMS an accurate cost per square foot can be calculated.

#### BAS

With energy costs being such a significant portion of facility operating costs, being able to analyze performance and efficiency becomes more critical. Existing performance data from Building Automation System (BAS) can be compared to design information in BIM. BIM modeling information can be used to refine system characteristics and modify operations.

Full understanding of system equipment installation, zones, and space relationships can assist in equipment scheduling, shutdowns, and system performance analysis. Much research and effort is being invested in modeling existing facilities to improve performance.

#### FIRE AND SECURITY SYSTEMS

Linking fire and security systems with BIM can provide information about the incident location and severity. Also, effectively documenting these systems can assist in maintenance and management of system infrastructure. Linking device information in fire and security to space information in BIM can help identify location quickly.

Spatial information with device location can help assure adequate coverage and identify code conflicts more easily. Defining these systems spatially has been helpful in demonstrating compliance to Authorities Having Jurisdiction such as local fire marshals or, for hospitals, the Joint Commission. When combined with CMMS as well it is easy to determine if all components of the fire system have been managed to code.

#### PROJECT MANAGEMENT


BIM use can help the design process as well as the construction phase. Accurately defining components to be modified, demolished, or constructed can help define budgets and scheduling. Quantity take-off can be a helpful to manage budget in Job Order Contracting environment.

System capabilities are easily understood if current BIM information is available.

#### DOCUMENT MANAGEMENT

Links between equipment families and websites (internally or externally) provide excellent opportunities to link aspects of the model to documentation such as submittals, operating and maintenance manuals, preventive maintenance procedures, or operating instructions. This feature is preferred to the current method of looking through numerous notebooks.

#### ROLE OF MAINTENANCE TECHNICIAN

We are giving carefully thought to how BIM can be used by the technicians. We believe that the ultimate power of BIM will be getting letting all members of facility team access data that is contained in BIM. We expected to use create read-only access to information. We also recognize the important role that BIM play in helping comply with many aspects of the Joint Commission survey process in our health-care environments. 

Tim Peglow is associate vice president, patient care and prevention facilities, at the University of Texas MD Anderson Cancer Center, Houston, TX; he can be reached at [tpeglow@mdanderson.org](mailto:tpeglow@mdanderson.org). This is his first article for *Facilities Manager*.



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# Considerations When Upgrading Renovating Window Systems

By Steve Gille

**T**oday's educational facilities managers face many challenges. As stewards of their campus' physical assets, these professionals are charged with improving students' learning environments, saving money, and maintaining the historical and aesthetic integrity of their buildings.

For schools and universities that have not replaced their windows in many years, a window systems upgrade can help meet these challenges by creating facilities that are more comfortable, energy efficient, and conducive to learning.

Many windows systems found in older institutions are leaky, single-glazed with conductive framing systems. They can be difficult or even dangerous to operate, promote unhealthy condensation, mold or mildew formation, and require occupants to keep away from exterior walls to avoid glare, drafts, and noise.





University of Notre Dame's historic Farley Hall renovation. The existing window frames were left in place and encapsulated with aluminum interior trim to preserve and restore the campus' architectural legacy.



## ENERGY EFFICIENCY

The greatest gain from replacing or upgrading educational facilities' windows systems may be the savings from improved energy efficiency. Heat loss and heat gain through windows impact heating and cooling demand. Maximizing the daylight in classrooms also can lessen the demand and cost for electrical lighting.

Energy-efficient replacement windows play an important role in achieving green building recognition by such programs as the

U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®), and the U.S. Department of Energy's (DOE) ENERGY STAR® for Buildings. Criteria from these programs often are part of a campus' architectural and sustainability initiatives helping conserve natural resources and increase efficient use. For example, George Washington University's Foggy Bottom Campus Plan guided the design of the school's South Hall residence. The plan's "Grow Up, Not Out" approach allows the Washington, D.C.-based university to meet its academic and housing space within its existing campus boundaries.

Helping compare energy costs related to existing windows with new windows, the DOE and Lawrence Berkeley National Laboratory offer publicly available software. When these tools' calculations are integrated with a whole building design approach, they also provide valuable information on reducing HVAC capacity and costs. These benefits may be enhanced by modeling windows and daylighting devices' positioning to optimize buildings' energy savings of passive ventilation with operable windows and to optimize occupants' productivity by managing glare, temperature, and outside views.

These attributes and performance objectives are supported by a window system's orientation, style, framing material choices, and glass selection.

## Climate and Orientation

Local climate, site selection, and building orientation should be among the first considerations when choosing a window system. The window's direction determines the potential for unwanted solar heat gain and disruptive glare. East and west facing windows warrant special attention for solar control, especially in warmer climates. Although a south orientation typically provides the most natural light throughout the day, the indirect and ambient light offered by north-facing windows can be significant. In cold weather climates, south-facing windows provide the best potential for passive solar heating.

Even in colder climates, operable windows provide a seasonal opportunity for natural ventilation. Not only can these help reduce demands on the HVAC system, but they also can assist with emergency venting and egress requirements.

## Window Style

Options available for colleges and universities' retrofit and replacement projects include:

- Fixed
- Single-hung
- Double-hung
- Horizontal-rolling (sliding)



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Whether selecting operating or fixed windows, the type and configuration of these units influence the glazing and framing options.

- Framing
- A range of framing materials is available for windows:
- Wood
- Wood/polymer composites
- Vinyl
- Fiberglass
- Steel
- Aluminum

The type of material selected for window frames impacts a window systems' performance. Due to its durability, low maintenance and ability to provide great structural strength, aluminum often is the material of choice for college and university projects. Supporting campuses' green building goals, aluminum framing for window systems can be fabricated with secondary billet. This material should be free from contaminants and may exceed 40 percent recycled content from combined pre- and post-consumer sources.

#### Glass Selection

Aluminum framing systems may be manufactured with a thermal barrier to aid in its energy efficiency. This thermal improvement inserts a physical barrier between the window unit's glass lites for added performance. With the use of Low-E glass, these high-performance, insulating glazing units minimize unwanted heat loss and heat gain, reduce glare, block ultraviolet (UV) radiation and increase occupants' comfort. Multiple glazing options are appropriate for educational institutions.

- Low-E coatings – increase the insulating properties of a window by reducing the amount of heat transferred through the glazing

- Spectrally-selective, Low-E coatings – reflect the infrared rays that generate heat, while admitting the visible light spectrum associated with natural lighting
- Reflective coatings – provide greater glare and solar heat gain reduction; also restrict the amount of daylight entering a room
- Electrochromic or "smart" glazing – reacts to solar heat gain and glare by changing from clear to tinted; actively managing lighting and cooling through smart glazing could reduce peak electric loads by 20 to 30 percent in many buildings<sup>1</sup>
- Laminated glazing – consists of a tough plastic interlayer that is bonded between two panes of glass under heat and pressure; offers increased protection for campuses prone to hurricanes or earthquakes.

#### ACOUSTICAL PERFORMANCE

Laminated glazing frequently is preferred when upgrading windows to improve the acoustical performance of a classroom by reducing exterior noise. This can be important for campuses located in high-traffic areas and close to airports. Quiet learning environments contribute to increased attention and concentration, which enhances student achievement.

#### WELLNESS AND COMFORT

In addition to avoiding noise pollution, access to natural light positively impacts student performance and test scores, reduces absenteeism, and boosts staff morale and job satisfaction. A California study showed that students who had access to natural daylight progressed faster in both math and reading, and had higher test scores.<sup>2</sup> Negative factors such as glare, temperature extremes, and stuffy air can offset the positive affects of daylight.

Students and staff work best in a space with a comfortable air temperature and humidity level, air movement, and daylight. Drafts near windows can be a major source of discomfort, especially in cold climates. Drafts are caused not only by windows

### Several ratings can help determine which window systems are right for the project.

The American Architectural Manufacturers Association (AAMA) and the National Window & Door Manufacturers Association (WDMA) developed voluntary specifications for aluminum, vinyl, and wood windows. These specifications have made it easier to select windows for air, water, structure, and thermal performance. AAMA/WDMA also have defined window categories from residential to architectural grade. Windows selected for college and universities should be AAMA commercial (CW) or architectural (AW) grades.

National Fenestration Rating Council (NFRC) Energy Ratings account for the performance of the whole window system. In U.S. jurisdictions, building energy codes require that windows bear the NFRC label to verify energy rating code compliance.

The energy ratings included on the NFRC label are:

- U-Factor – measures the level of insulation; the lower the U-Factor, the better the window insulates.
- Visible Light Transmittance (VT) – indicates the amount visible light that passes through glazing; the higher the VT, the more light.
- Solar Heat Gain Coefficient (SHGC) – expresses the solar heat gain transmitted through the glazing; the lower the SHGC, the less solar heat the window transmits.
- Air Leakage (AL) and Condensation Resistance (CR) are optional – AL ratings indicate the amount of air leaking through closed windows in the presence of a specific pressure difference; a lower AL value indicates less air leakage. CR measures how well the window resists water build-up; the higher the condensation resistance factor, the less build-up the window allows.

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with significant air leakage, but also by poorly insulated windows, which allow cold air to pool next to windows. This cold air circulates throughout the classroom through the building's ventilation system, causing uneven temperatures as the warmer air rises and the colder air sinks. When the interior surface temperature of marginally performing glass falls below interior room air temperature, the Mean Radiant Temperature (MRT) is reduced. This MRT effect can cause students near windows to feel chilled, even if the room air temperature is comfortable.

Controlling glare is a major consideration when upgrading or replacing window systems. Whether it occurs in a classroom, library, or other learning environment, glare from windows can cause discomfort, and headaches, and can impact learning. Several glazing options, including reflective, electrochromic, and Low-E coating, will help lessen or eliminate glare, as will traditional window treatments and blinds.

### AESTHETIC AFFECTS

Maintaining a campus' look and feel is paramount in many window systems upgrade and replacement projects. Most window manufacturers offer a range of operating window types that can replicate a building's original profiles and sightlines with modern performance and materials.

If a campus is located in a historical district, replicating the original window profiles and sightlines may be mandatory. While local regulations and building codes directly impact the criteria established for the window systems in some cities and designated historic districts, the exterior appearance of proposed replacement windows can require redevelopment authority approvals. While sometimes viewed as a roadblock, such approvals can serve the valuable purpose of maintaining period and neighborhood ambience, which can help preserve both property values and community values.

For example, simulated double-hung windows are a popular choice for schools. These mimic the look of traditional double-hung windows with offset glass planes and matching sightlines, while offering the reliability and affordability of project-in hopper vents, project-out awning vents, and casements. The compression seals and ease of operation that characterize projected and casement windows may improve functionality of replacement windows, versus replacing "in kind" with double-hung sash. Facilities managers can request these products with extended warranties and accelerated delivery schedules to support their renovation project needs.

### Panning vs. Tear-Out

A key, logistical decision on an historic property is whether to leave existing window frames in place, or do a complete "tear-out" and start again.

Removal of existing operable sash, while leaving existing framing in place, usually makes for faster installation and minimizes disruption. The existing frames are used as anchorage points, and an extruded aluminum sub-frame or "panning" system lines the opening.

If a tear-out of existing frames is the option, perimeter protection often is required in occupied spaces and the process is slowed considerably. Caution must be exercised in determining what concealed wall materials may be disturbed, including asbestos.

### MAINTENANCE AND DURABILITY


Maintenance, durability, and life-cycle costing all play a part in selecting products for educational facilities window upgrades. Several factors also can contribute to a project's longevity:

- Integral blinds, installed between the glass panes by the manufacturer, require no cleaning and are protected from damage or vandalism
- Hermetically-sealed, double- or triple-insulating glass units that have been certified by American Architectural Manufacturers Association (AAMA) or the Insulated Glass Manufacturers Alliance (IGMA) ensure long-term resistance to between-glass fogging
- Anodized aluminum finishes offer an ever-expanding color palette of abrasion-resistant, UV-stable surfaces that resist corrosion and are easy to maintain
- Architectural (AW) class windows are life-cycle tested for up to 4,000 operating cycles, and must pass the most stringent performance tests

Regardless of which type of window system is selected, using materials that are successfully tested to meet stringent industry standards and are backed with a comprehensive warranty will help minimize maintenance and repair costs.

### VENDOR RELATIONSHIPS

Window system upgrades frequently occur during the summer months when school is not in session. In some cases, replacement continues into the academic year, and extra effort must be employed to minimize disruption to occupants. Regardless of the time of year, a good relationship with the contracting team, including a specialty-glazing contractor, is essential to a smooth process. Involving the team early and communicating clearly will contribute to keeping the project on budget and on time.

Whether planning a learning institution's window systems upgrade or retrofit, energy efficiency, acoustical performance, occupant comfort and wellness, historic and aesthetic integrity, and maintenance and durability should all be considered to ensure a successful project. 

### NOTES

1. The Efficient Windows Collaborative Tools for Schools, 2008.
2. Heschong Mahone Group. "Daylighting in Schools," Pacific Gas and Electric Company on behalf of the California Board for Energy Efficiency Third Party Program, August 1999.

Steve Gille is education market manager for Wausau Window and Wall Systems, Wausau, WI; he can be reached at [sgille@wausauwindow.com](mailto:sgille@wausauwindow.com). This is his first article for *Facilities Manager*.



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## Distribution Efficiency

Considerable improvements have been made in generating the hot and chilled water for building comfort systems, but little attention has been given to distributing that water efficiently. Many standard designs and specifications still include technology that is approaching fifty years old or leave separators out altogether. Air and dirt in the system fluid inhibits heat transfer, collects in the piping or equipment and restricts flow, actually taking away from the return on investment made in high efficiency boilers and chillers.

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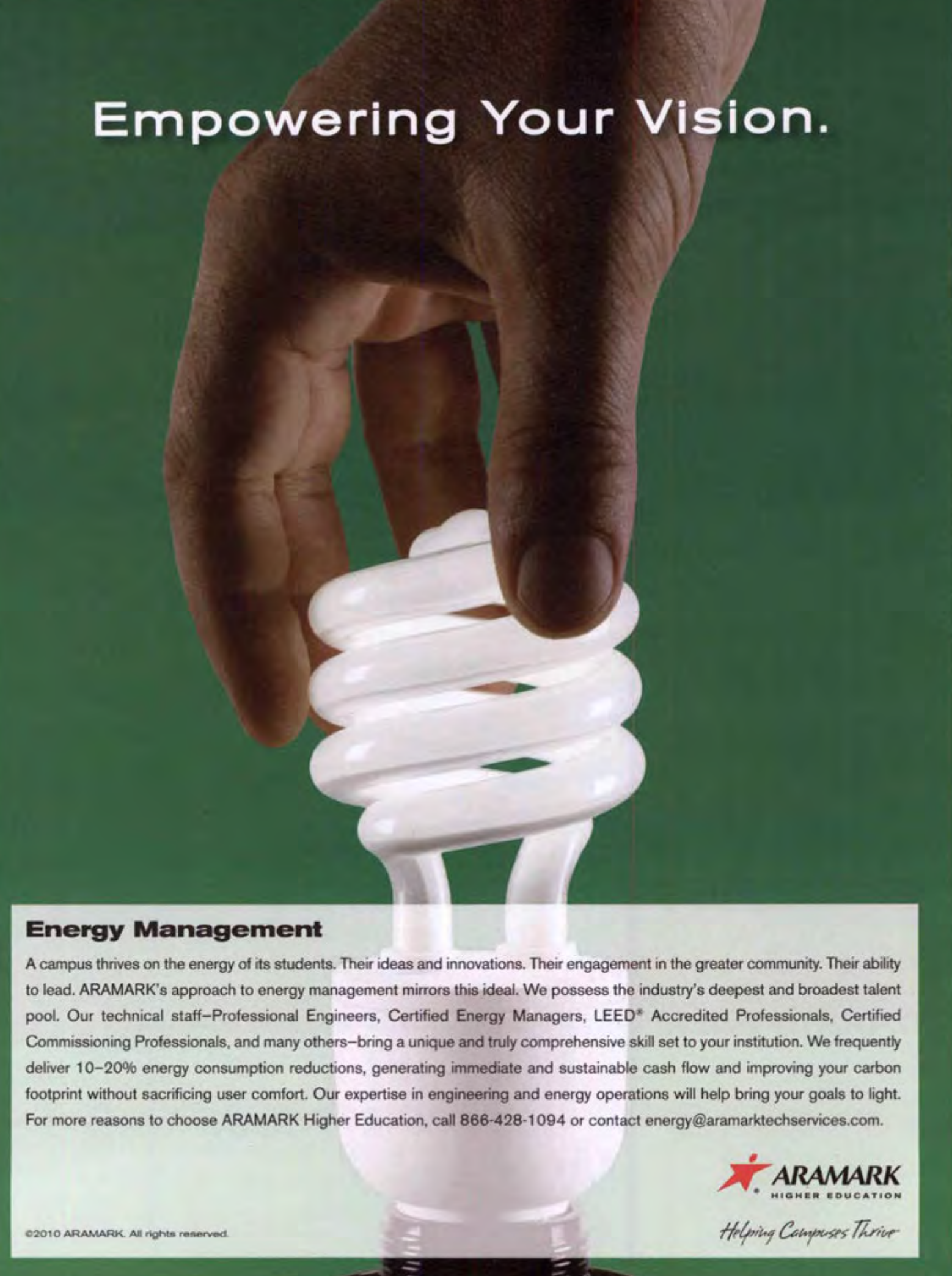
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A close-up photograph of a hand holding a glowing compact fluorescent light bulb. The hand is positioned at the top, with fingers gently gripping the bulb. The bulb is illuminated, casting a warm glow. The background is a solid, dark green color.

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*Helping Campuses Thrive*



# Codes and Standards for the Campus Environment: Regulations for the Future

By Robert Solomon, P.E. and Michael A. Anthony, P.E.

*Of the 39 breakout sessions at the APPA 2010 Conference in Boston last July, 29 of them dealt with campus security, environmental, energy, or sustainability issues. The process that underlies leading practice in all of the foregoing were discussed in a single session in Boston, by the authors of this article.*

Much of the infrastructure criteria in the college and university environment originates in consensus documents developed according to rules set by the American National Standards Institute (ANSI). Documents developed according to the ANSI process bring together thought leaders from the safety community, architecture and engineering firms, testing

laboratories, insurance industry, contractor organizations, manufacturing, labor unions, and many other segments of the economy. The National Fire Protection Association (NFPA) is one of the largest and oldest standards developers in the world (its implementation of the ANSI process illustrated in Figure 1.)

Fire protection technology has developed in parallel with electrical power systems, signaling and alarms, behavioral science, hazardous materials handling – all present in great and complex abundance in educational campuses. That is why the footprint of the NFPA is so large in our construction, operation, and maintenance enterprises — as well in the security, environmental, energy, and sustainability issues discussed in Boston.

## Codes and Standards Making Process

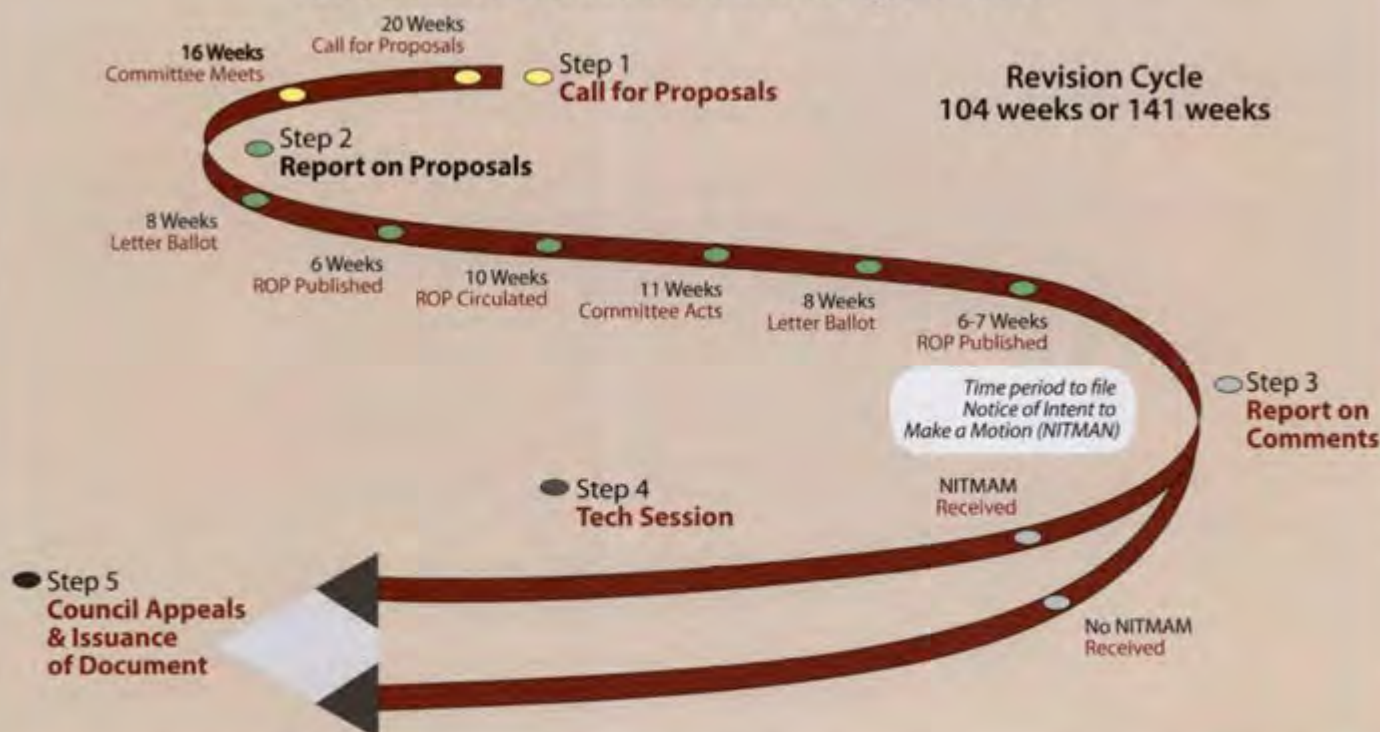


Figure 1. NFPA implementation of the ANSI document development process. This process is used by industry thought leaders to develop leading practice documents that are suitable for adoption as model law.

Most of the documents that govern the cost structures of our industry are the consequence of decades of debate among various interest groups. Although APPA has had a representative with voting rights on the National Electrical Code® since 1997, it was not until the formation of its Code Advisory Task Force (CATF) in 2007 that code intervention as an APPA member benefit was broadened. While every APPA member institution has its cadre of code experts (architects and engineers), authorities-having-jurisdiction (fire marshals and risk managers), and enforcers (inspectors), these workgroups are concerned mainly with a particular project at hand, i.e., tactical activity.

The CATF takes a long-term strategic approach to cost structure management by having a hand in writing the rules to which our industry is bound. The CATF is a shared resource for the industry, guided by a pool of experts who take a proactive posture in the methods of innovation and regulation.<sup>1</sup>

Some of the broad concepts on the agenda of the CATF are the following:

- How can exceptions and variances to standards be taken (as equivalencies) without increasing liability risk?
- Do specific material requirements embedded in many prescriptive codes impede innovation?
- Can insurance costs be rationalized with an industry-specific life and property protection document?

The specifics in each of the foregoing appear in documents developed by the ICC, ASME, ASHRAE, the EPA, and other standards-developing organizations. Of the nearly 300 code, standard, and recommended practice documents developed by the NFPA, about 160 directly apply to the structures, systems, processes, and hazards that are common on our campuses. Most of them are informed by a single-building/single-system governing assumption and have proven to work well. Campus-style facilities, however, may be significantly different. [See sidebar.]


In May 2009 the CATF submitted an application to NFPA for a new committee

document that could be used by the educational facilities industry as a living document for leading practice, as well as be used by the many agencies that control the flow of money to APPA member institutions. The effort was intended to take advantage of the National Technology Advancement and Transfer Act<sup>2</sup>—which directs all federal agencies to adopt industry-developed standards—before attempting to write an industry's regulations for it.

After a series of conference calls and Web meetings with the CATF and NFPA staff, the NFPA Standards Council rejected a full-scale committee project as proposed and instead referred the concept of an APPA-NFPA partnership to its staff, "to explore the viability of a product compilation to suit the needs of APPA in lieu of a new standard." In light of the pace of change in information technology and regulations, the NFPA is launching new content delivery platforms. The CATF's objectives might be met more quickly—and at lower cost—if APPA were among the first to partner with the NFPA on new delivery platforms.

The next level of dialogue between the CATF and the NFPA will consider ways to:

- Consolidate/centralize infrastructure criteria
- Make criteria easier to locate in the NFPA universe of documents
- Define/establish which infrastructure criteria matters most.

As this dialogue continues, CATF will continue intervening codes and standards development, document-by-document; asserting the interests of our industry issue-by-issue. The process is time consuming; it does not yield results overnight but the pipeline of regulatory intervention initiatives is filling. Initiating the regulatory process is the best way to set the agenda. 

Robert Solomon is a division manager at the National Fire Protection Association in Quincy, MA. He can be reached at [rsolomon@NFPA.org](mailto:rsolomon@NFPA.org). Mike Anthony is a senior electrical engineer at the University of Michigan, Ann Arbor, MI; he can be reached at [maanthony@bf.umich.edu](mailto:maanthony@bf.umich.edu).

#### REFERENCES

1. Code Talkers, Mar/Apr *Facilities Manager*, 2010, "Innovation and Regulation".
2. National Technology Transfer and Advancement Act of 1996 [http://standards.gov/standards\\_gov/index.frm](http://standards.gov/standards_gov/index.frm)

### Multi-Building Infrastructure

When an Owner has one isolated facility there is an (relatively easily) identifiable cost associated with maintaining its 100 percent conformity to prescriptive construction and O&M code requirements. When an Owner has 1-10 buildings in campus-style arrangement, a part-time, off-site staff may be able to manage code conformity at a lower cost per building by asking following questions:

- Can fire pumps and generator be shared between buildings?
- Is a central sprinkler system more economical?
- Can we run feeders between buildings with less than 300 kVA of load?
- Where is the boundary of responsibility along the perimeter of city outdoor lighting and campus security lighting?
- What is the optimal arrangement of city sprinkler water access to campus buildings?
- Can a utility source of emergency power be used in place of a generator?

When an Owner has 100 to 1,000 buildings in a campus-style arrangement, the economy of scale is rather different—with performance-based code conformity frequently allowed by insurers. In actual litigation however, plaintiffs will challenge performance-based exceptions. They will assert that the single-building single/system model works and that 100 percent conformity should apply. But in the world of APPA managers, there is not enough money for 100 percent conformity. The need for an industry-specific leading-practice document that is recognized by funding and enforcement agencies is an urgent reality.



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

## This is a time of change —

changes to deal with restricted or shrinking budgets, staffing changes, looking for efficiencies, and trying to become a better organization. The facility officer is called upon to do more than just keep things working. The first book addresses how to leverage teams to work effectively. The second book looks on the technical side to measure building efficiency and responsiveness to user needs. Right now, I'm up to my eyebrows in work that demands the help of both of these books. You may find similar reasons to use them.

### IT'S ONLY THE JANITOR

Roderick B. Park, Rockpile Press, Geyserville, CA, 2009, 207 pages, hardcover, \$29.95.

Every now and then a chief facility officer should get the perspective of the academic community in which he or she serves. That's the reason to read *It's Only the Janitor*. I'll confess, the title caught me and I was fully expecting to read something derogatory about the folks who keep the campus running. With my mind partially made up, I dug in. But rather than being a diatribe of

the sufferings of the academic community, Professor Park assembled some interesting reflections on the challenges faced by the academic administration; something facility officers experience with regularity.

Roderick Park is a noted scholar and academic administrator. He rose through the academic ranks at UC Berkeley in the '60s and '70s, a time of excitement and turmoil at Berkeley. This is where the title of the book comes from. During one of the protests Park was dressed in casual attire but was called into the office late at night. His escape from the building, through the front door, was eased by an unknowing protestor saying, "It's only the janitor." Obviously, radical students don't view the O&M staff as a threat to their goals.

Park posits that, among other things, colleges and universities are inhabited by three types of people: the moderately transitory staff; the intransitory faculty; and the highly transitory students. These three different groups of people must be handled in different ways. Faculty are the most conservative, interested in conserving the status quo and campus organizational structure based on their consent. Students are the most liberal, and a new group with different ideals appears every four years.

The challenge for an academic making the move into administration is three fold:

- to understand the different types of people
- to navigate a successful career through the disparate ideas of the three groups

- to address the larger objective identified by the campus executives and the board of trustees or regents.

It's not an easy path to navigate and it's not getting any easier in the current economic climate.

While I cannot say this book is relevant to most APPA members (because the focus is toward academics,) the senior facility officer may find significant relevance in this book, and gain a greater understanding of what is needed to be successful.

### SMART GREEN: HOW TO IMPLEMENT SUSTAINABLE BUSINESS PRACTICES IN ANY INDUSTRY, AND MAKE MONEY

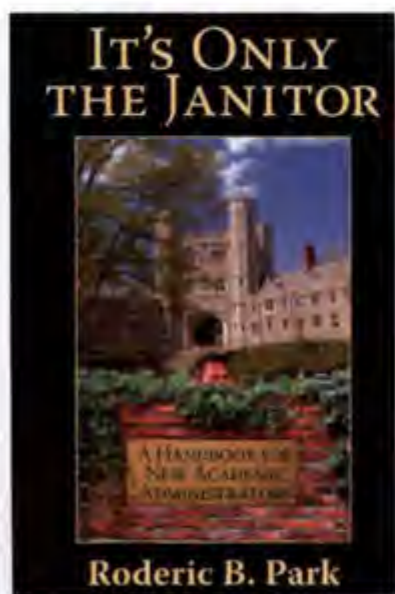
Jonathan Estes, Wiley, New York, 2010, 177 pages, hardcover, \$29.95.

Timing is everything, and I seldom achieve it. I received this book after making my presentation at APPA 2010 about my campus green initiatives that are not based on the Presidents

Climate Commitment. Had I read this book before, I might have made a more compelling argument. Obviously, I agree with the fundamental premise of the book, which is that the best reason to go green is to pursue the money behind the issue.

*Smart Green* is not anti-sustainability or any of the arguments in favor of it. *Smart Green* addresses the

issues of sustainability by finding the cost savings available through a more sustainable business operation, and leveraging it to meet societal as well as business needs. That's exactly what facility officers in APPA do every day. We



try to find economical methods to address the academic needs of the campus, teaching, research, and public outreach, and to ensure the long-term sustainability of the physical infrastructure that the campus comprises.

Corporations are perceived as being focused on the short term, quarterly in-

## ESTES PRESENTS SEVERAL STEPS AND TECHNIQUES TO SUCCESSFUL SMART SUSTAINABILITY.

come, and profits. They receive a great deal of criticism about this perceived focus. Colleges and universities, on the other hand, are focused on maintaining the academic mission usually in a single location for a hundred years or more. However, sustaining the organization's operation, whether it be profits

for the shareholders or shepherding the next incoming freshman class through to graduation in four years, the importance of sustainability is the same. Colleges and universities have the added challenge that they are supposed to be about "setting an example" for the future.

I have occasionally argued that while colleges and universities are about developing social relevance and liberal thinking, we can't do that if we take our eyes off the basic drivers for sustainability and cost efficiency. Estes does a good job presenting the arguments for being sustainable and presents the false methods of "green washing" as being both unsustainable as well as not being cost efficient.

Estes presents several steps and techniques to successful smart sustainability. They are well organized with planning, measuring, building, and marketing the sustainability (cost-effective greening) efforts. There is nothing wrong with the pragmatic, business focus, even at a college or university. There is, however, plenty wrong with ignoring the importance of sustainability even if the corporation or college is focused on the short term.

As we approach the new year I can think of no better way to make it successful by reading this book and adopting the recommendations for being more cost effective while being greener. ☺

Ted Weidner is assistant vice chancellor of facilities management & planning at the University of Nebraska-Lincoln; he can be reached at [tweidner2@unlnotes.unl.edu](mailto:tweidner2@unlnotes.unl.edu).



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# Professional Development

WRAP-UP

## ONE STOP ONE LOCATION: SCOTTSDALE HOSTS A GREAT EVENT

By Suzanne Healy

September 2010 marked another successful presentation of APPA's key professional development offerings. The Supervisor's Toolkit, Institute for Facilities Management, and Tracks 1 & 3 of the Leadership Academy were offered in Scottsdale, Arizona, allowing facilities professionals from around the globe to network at all levels of the institutional hierarchy.

In collaboration with RMA, APPA offered the ever-popular Toolkit, while the Institute, the cornerstone of APPA's professional development offerings, delivered content in the core areas of general administration, operations & maintenance, energy & utilities, and planning, design & construction. And, for the first time, we co-located Tracks 1 & 3 of the Leadership Academy.

The central location of these three programs allowed participations to see what their next steps on APPA's professional development continuum will be, and how to take the necessary steps to get there. The success of these offerings would not have been possible if not for the dedicated faculty — with a special note of thanks to **Shawna Rowley**, Qualified Toolkit

Trainer, **Lindsay Wager**, Toolkit Trainer-in-Training, the Institute Deans: **Mary Vosevich**, **Jay Klingel**, **Lynne Finn**, and **Don Guckert**; and our Academy Facilitators: **Lander Medlin** and **Glenn Smith** in Track 1; and **Matt Adams** and **David Judge** in Track 3. Students had the opportunity to interact with experts who brought not only their knowledge but their experiences from vast backgrounds that provided a rich environment.

As the week drew to a close, we celebrated with ceremonies for the Class of September 2010. Kudos to all those institutions that supported the professional development of your staffers! Now, like at no other time, we must take the leap of faith and spend on behalf of the institution. This is no time to pinch pennies!

The professional development of any individual must be as customizable as the individuals themselves—and APPA is here to help you achieve your departmental and institutional goals. Please visit [www.appa.org/training](http://www.appa.org/training) for more information on all of our programming offerings.

We look forward to seeing you and your staff at the next APPA event! ☺

Suzanne Healy is APPA's director of professional development; she can be reached at [suzanne@appa.org](mailto:suzanne@appa.org).



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 Gerry Berkel, Arizona State University  
 Fred Bingham, Arizona State University  
 Geraldo Bryant, El Paso Community College  
 Ish Cano, Arizona State University  
 Charles Daprato, Arizona State University  
 Mike Dugan, Arizona State University  
 Larry Earle, Arizona State University  
 Ivan Escobedo, Arizona State University  
 Chris Gahan, Arizona State University  
 Robert Gailey, Arizona State University  
 Floyd George, Arizona State University  
 Michael Helwig, Arizona State University  
 Rick Hocking, Arizona State University  
 Craig Hoisington, Claremont Colleges  
 Will Kellerman, Arizona State University  
 Cheryl Koetzel, Arizona State University  
 Glen Loftis, University of Arizona  
 Albert Lopez, Texas A&M International University  
 Louis Matus, Arizona State University  
 Cody McLean, Casper Community College  
 Vincent Natale, University of Arizona



Paul Olson, University of Montana/Missoula  
 Tammie Padilla, Arizona State University  
 J.C. Reyes, Arizona State University  
 Norman Rollins, Arizona State University  
 Daniel Ross, University of Arizona  
 Leo Saucedo, Arizona State University  
 Mike Schantel, Arizona State University  
 Mark St. Onge, University of Arizona  
 Joanne Stanley, Arizona State University  
 Mike Talbot, Northern Arizona University

Aaron Terrien, Athabasca University  
 Joseph Thomas, University of Arizona  
 Carlos Vasquez, Arizona State University  
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# Thought Leaders at Five: Assessing and Forecasting Facilities in Higher Education

*Including the Top Facilities Issues*

## SECTION I: Executive Summary

The APPA Thought Leaders Series turned five years old this year—a significant event in a momentous time for higher education. Participants in the 2010 symposium looked back at both the achievements and the missteps of higher education over the last half-decade, a period that posed many challenges for colleges and universities. Soaring enrollment, fluctuating energy prices, an economic crisis, demands for reform, sweeping changes in technology—all have stretched the resources and ingenuity of higher education leaders.

The focus of this year's symposium was general, almost global, as the group worked to get a big picture of higher education in 2010. The group began by considering the origins and achievements of the Thought Leaders Series. Participants reviewed the results of previous symposia and evaluated the impact of the program on both higher education in general and facilities leaders in particular. This discussion is reviewed in Section II of this paper.

Next, participants conducted what is known as a "SWOT analysis" on higher education, assessing the

strengths, weaknesses, opportunities, and threats confronting colleges and universities. Participants identified the **mission** and **scholarship** of institutions as key strengths, while **an inability to be nimble** and a **flawed business model** were noted as weaknesses. Nevertheless, higher education has an opportunity to **build a new business model** and **take advantage of technology**, so long as it overcomes the threats posed by **economic stressors** and **lack of leadership**.

The next stage of the symposium was devoted to identifying major **issues confronting higher education** now and in the next five, ten, and twenty years. The top issues identified were:

- **securing the future of higher education;**
- **reduced public support for higher education;**
- **a broken financial model;**
- **communicating the value of higher education;**
- **campus safety and security;**
- **shifting workforce demographics;**
- **global competition; and**
- **developing leaders to drive change.**

Participants considered the ramifications of these issues and proposed approaches institutions should take to minimize potential negative impacts. Section III of this paper reviews both the SWOT analysis and these major issues.

The Thought Leaders symposium then turned to what has become a signature discussion of the event: the identification of the **critical facilities issues for 2010**. The results are wide-ranging, reflecting the multiplicity of challenges facing higher education and the built environment:

1. **Crafting an integrated strategic plan**
2. **Achieving financial sustainability**
3. **Creating change agents in facilities**
4. **Addressing regulatory compliance**
5. **Facing the challenge of changing demographics**
6. **Creating an environmentally sustainable and energy efficient campus**
7. **Managing the impact of technology**
8. **Addressing campus safety and security.**

The final stage of the Thought Leaders symposium introduced a new area of discussion: the role of the senior facilities officer within colleges and universities. APPA members have long been concerned that these highly skilled, educated, and experienced professionals do not fulfill their potential in contributing to strategic decision-making on campus. Symposium participants

began by assessing the status and role of senior facilities officers. They then identified steps that these individuals should take to improve their image and influence—align facilities with the institution's mission; create more opportunities for collaboration; and increase understanding and improve communications—to ultimately achieve a position of influence with senior institutional officers.

At the end of the day, a big-picture view of higher education reveals both remarkable strengths and intimidating challenges. On the one hand, the fundamental structure and financing of colleges and universities seems unlikely to survive in its current form. On the other hand, students and parents seem more convinced than ever before of the value of post-secondary education.

So we turn to you and the view from your campus. How has your institution changed in the last five years? How do you expect it to evolve in the next five? Is the structure of your institution sound, or are major shifts in governance and financing on the horizon? Have you considered the impact of factors such as campus security, changing demographics, regulatory compliance, global competition, and new technology? Have you embraced sustainability and made it a factor in all decision-making? How will you position yourself to achieve greater influence in the decision-making process?

We look forward to your feedback as the dialogue continues.

## SECTION II: The Thought Leaders Series at Five Years

As the APPA Thought Leaders Series reached its fifth year, it is appropriate to consider the origins and evolution of the program. The Thought Leaders project began when APPA leaders and senior staff decided to address a longstanding concern of members: that facilities professionals were not in a position to influence strategic decision making on their campuses. How could APPA help its members achieve greater influence?

Part of the answer was to prepare its members to understand the challenges facing senior administrators and to give them better tools for addressing the long-term shifts in higher education and their impact on the built environment. While facilities professionals are often busy in the trenches of day-to-day activities, they also have the opportunity to focus on the big-picture issues—the challenges that will, in the long run, dramatically affect facilities.

The result was the Thought Leaders Series. The purpose of Thought Leaders is to *engage in an annual discussion and distillation of the driving forces, major trends, and current issues impacting the future of higher education with particular attention to its built environment*. The goals of the annual symposia are to:

- Identify and analyze driving forces and trends for the education enterprise
- Identify critical facilities issues
- Enhance institutional dialogue
- Connect the goals of the facilities operations with educational outcomes
- Help improve performance
- Positively impact the future state of educational facilities.

A process was established in which both senior facilities professionals and other institutional officers and administrators would gather annually to participate in structured workshops designed to determine and assess broad industry trends and the top critical facilities issues. After the symposium, a written analysis of the results and supporting background information is disseminated both to APPA members and to the entire education

### Data Point: Driving forces in higher education

#### A 5-Year View from the Thought Leaders Series

While each year's Thought Leaders symposium considered a targeted set of driving forces, the following have consistently been identified as major drivers of change:

- Financial constraints
- The evolving role of technology
- Changing stakeholder expectations
- Shifting demographics
- Impact of competition
- Demand for innovation *and* tradition
- Institutional resistance to change
- Accountability
- Energy cost and volatility
- Sustainability.

community.

So who has the Thought Leaders Series engaged and touched over the past five years?

- Nearly 90 people have gathered to discuss the future of higher education, including 53 higher education representatives, 24 corporate representatives, and 7 industry association representatives.
- Participants have represented 46 colleges and universities in the United States and Canada.
- Institutional job titles of participants include chancellor, president, executive vice chancellor, provost, trustee, vice president of finance and planning, associate vice president for student affairs, director of human resources, chief information officer, director of residence life, associate vice provost for facilities, vice president of operations and facilities management, capital planning director, and director of energy services.
- More than 10,000 copies of the Thought Leaders monographs have been printed and/or distributed to higher education institutions as well as to key

education associations including the American Council on Education, the Association of Governing Boards, the National Association of College and University Business Officers, and the Council of Higher Education Management Associations, among others. In addition, several thousand copies have been downloaded from the APPA website.

- Associations actively contributing participants to the Thought Leaders symposia have included NACUBO, SCUP, ACPA, CUPA-HR, AACC, ACE, AGB, EDUCAUSE, ACUHO-I and NAEP.
- APPA has received generous support from business partners, without whom the Thought Leaders Series would not be possible. Sponsors have included Carter & Burgess, Inc.; Delta Controls; Haley & Aldrich, Inc.; IBM; Jacobs; and UGL Unicco, now known as UGL Services.

And what has the Thought Leaders Series achieved in five years? The greatest achievement is the way the monographs have helped facilities professionals

understand critical issues and engage in further dialogue on their campuses. The senior facilities officer at a large private institution in the Southeast highlights relevant points from the Thought Leaders report for his vice president for further conservation. The SFO of a large public university in the Midwest uses the monograph during a standing annual meeting with senior institutional officers to pinpoint the critical facilities issues and discuss their impact on his campus in particular. Another facilities AVP at a large public university in the Southeast engages his senior staff in a dialogue about the issues to help determine their focus and direction in addressing the state funding challenges for the coming year.

APPA believes the Thought Leaders Series has helped both facilities professionals and the entire higher education community gain a clearer understanding of the challenges facing our campuses. APPA is committed to continuing the series and furthering the task of helping facilities leaders increase their influence in support of their institutions.

## SECTION III: A View of Higher Education in 2010

### Assessing Higher Education's Strengths, Weaknesses, Opportunities, and Threats

Higher education has endured a rocky decade. The global recession capped off a period of growing financial constraints; public institutions faced sharp declines in state support, while private colleges and universities saw the value of their endowments plummet. Technology expanded into every corner of the institution. The **demographics of students shifted slowly but steadily to become older and more diverse**. A scandal erupted over financial aid, resulting in changes in the entire financial aid system, and a study by the U.S. Department of Education raised concerns about both **educational standards and regulatory interference**. A growing class of for-profit and online universities attracted an astounding number of students, and **enrollment rose** across the board—particularly after the recession resulted in job losses and **large numbers of Americans returned to school for education and retraining**.

The first task of participants at the Thought Leaders symposium this year was to **assess the status of higher education in the wake of all of these challenges**. The group conducted a SWOT analysis, looking at the strengths, weaknesses, opportunities, and threats facing colleges and universities. SWOT is a technique used to assess both the internal (strengths and weaknesses) and external (opportunities and threats) factors that will affect the future of a project or organization.

**Strengths.** The strengths of higher education will be critical to helping colleges and universities confront future challenges.

- **Mission.** Several participants noted that the mission of higher education was a unique strength. No other organization combines the goals of education, research, and public service through learning, discovery, and engagement with social and scientific challenges.

- **Scholarship.** The brain power of the community of learning is a powerful strength. Participants pointed to the research resources on campus as well as the knowledge base and formalized learning processes.
- **Economic engine.** Higher education infuses the economy with new ideas, new technologies, new workers, and new leaders.
- **Community.** Colleges and universities are masters at creating and supporting communities—among students, alumni, fans, businesses, non-profits. A tradition of collaboration makes these communities all the more powerful.
- **Diversity.** Higher education has a long-standing appreciation for others and unique skills at fostering diversity.
- **International opportunities.** Higher education has always been a global enterprise, and college and university faculty routinely collaborate with colleagues around the world. This international engagement promotes global economic growth and increases the competitiveness of North American institutions.
- **Infrastructure.** Perhaps it is not surprising that a symposium crowded with facilities professionals would point to campus infrastructure as a strength, but buildings and grounds are a strength others in the academy would be wise to notice. Higher education institutions own some of the most valuable real estate in the world with some of the most significant architecture, specialized research facilities, and beloved sports complexes.
- **Identity.** The “brand” of higher education is widely respected. The public values higher education institutions and education in general.
- **Tradition.** The United States and Canada are still young countries, but our colleges and universities are some of our most long-standing institutions—some even older than our constitutions. The traditions of higher education give these institutions a solid footing on which to build while promoting a powerful sense of community and continuity.
- **Change engine.** Higher education may have strong

traditions, but it also has the ability to change and evolve along with society—sometimes, even, in advance of society. Further, society accepts the role of higher education as a leader of social, technological, and intellectual change.

**Weaknesses.** Higher education must face its weaknesses to succeed in the future—particularly since many weaknesses are the flip side of strengths.

- **Inability to be nimble and flexible.** Higher education may be a change engine, but that doesn't mean that change happens easily. It requires huge effort for many colleges and universities to overcome institutional inertia. Many struggle to respond to external pressures to change and find it difficult to react to shifts in the marketplace. Ironically, many institutions have on hand experts in change management who teach flexibility and adaptability in the classroom. Institutions struggle to move from a theoretical understanding of change management to the actual practice of implementing change.
- **Lack of focus.** The mission of higher education as a whole may be clear, but individual institutions struggle with a lack of focus. All higher education institutions, public and independent alike, have public obligations, and these must have priority lest they lose public confidence. When institutions wander from their mission or try to reconcile conflicting visions, the result is a faltering of momentum and institutional confusion.
- **Communications failures.** Even if an institution does possess a clear sense of its mission, it is often unable to articulate that mission and vision to the wider community. Many Thought Leaders participants saw communications failures—both internal and external—as a profound weakness.
- **Unsustainable business model.** Thought Leaders participants expressed concern that higher education was pricing itself out of business. The model is broken—it's not sustainable for tuition to rise at an average rate of nearly 5 percent greater than inflation over a decade while state appropriations decline by 12 percent. Entrenchment in the current model was perceived as a contributing factor, as was a rigid organizational structure.
- **Political intrusion.** Government and political interference pose a particular challenge for colleges and universities, since so much of their funding is tied to

government sources.

- **Infrastructure.** While campuses and facilities were identified as a strength, they were also perceived as a weakness. Aging buildings combined with rising materials and energy costs can make the physical campus a drag on the institutional budget.
- **Sense of entitlement.** Its many strengths and long traditions can give higher education an unwarranted arrogance. Colleges and universities tout their uniqueness at the risk of unnecessarily alienating potential allies.

**Opportunities.** Despite these weaknesses, higher education can take advantage of available opportunities to overcome challenges and embrace future success.

- **Develop a new business model.** If the old model is broken, it's time to create a new one. This won't be an easy process, but widespread acceptance of the systemic problems with current higher education financing means now is the time to tackle the problem. Colleges and universities have a chance to embrace best practices from other industries and apply strategic business thinking to their institutions. Although higher education is not a private sector business, taking a more business-like approach to markets, services, and financing would help institutions secure their futures.
- **Build partnerships.** Collaborative relationships will be critical to higher education's long-term success. Partnership opportunities are available with businesses, social services, state and local governments—in fact, with a whole range of national and international organizations and agencies. Partnerships can also be formed with other colleges and universities, opening up opportunities to share resources. Further, embracing the challenge of being a partner with the community rather than separating from it will give higher education new insight into community needs and new allies to support the academy.
- **Take advantage of technology.** Too often, higher education has seen technology as a problem to be solved rather than as an opportunity to be seized. Yet technology is already transforming education in North America—for-profit, online institutions were the first to really recognize this. Colleges and universities need to understand the potential for

## Data Point: The Chronicle of Higher Education on *strategic finance*

*Using rigorous analysis to identify the actual cost of programs*

"Simply put, strategic finance is an approach to planning and budgeting that involves rigorously identifying the full expenses of programs to gain a complete picture of their costs—including indirect costs (like utilities and marketing) that are rarely quantified to that scale. With that information, an institution or system can better identify where costs might be out of line and where to invest to take advantage of new opportunities, untapped demand, and, in the best tradition of the academic mission, societal need. Large public institutions in Indiana, South Carolina, West Virginia, and Wisconsin, as well as many private institutions, have already taken the plunge.

"The approach, which [Ellen Earle] Chaffee [a former college president who heads up a Lumina Foundation for Education-backed project on strategic finance for the Association of Governing Boards of Universities and Colleges] describes as "more of a concept than a method," is no magic bullet.

"But for an industry where the general level of financial analysis is still relatively unsophisticated—privately, one expert calls it "primitive"—any movement that pushes universities closer to actually adding up the direct and indirect expenses of the programs they offer is a good first step toward understanding what makes higher education's spiraling cost model so unsustainable. . . .

"Used thoughtfully, strategic finance can help to identify opportunities. Richard Staisloff, vice president for finance and administration at the College of Notre Dame of Maryland and another member of the cadre,

often cites the example of his institution's psychology department. Initially identified as overly expensive based purely on enrollment, the department won more support from the college once professors were able to show how it could be a revenue generator. They did that by putting extra resources and attention toward attracting the prospective students who initially expressed interest in the major but then failed to enroll. . . .

"More clarity, contends Kent Chabotar, president of Guilford College and another member of the cadre, could even strengthen the case for continuing so-called unprofitable programs and using (diminishing) cross subsidies to support programs that fall within the institution's mission-guided strategic priorities.

"Those subsidies will be "easier to justify because they'll be out there," he says, even as he allows that people "might be ticked" when they understand which programs receive financial support.

"It's a sensible theory. But it no doubt depends on an institution's having not only a realistic mission and a practical strategy for achieving it, but also a leadership with the managerial and political wherewithal to shed what's unnecessary and subpar, and truly protect and strengthen what's vital, promising, or just plain important."

— Goldie Blumenstyk

Excerpt from "A Bottom-line approach that looks beyond the bottom line," *The Chronicle of Higher Education*, April 4, 2010

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technology to enhance learning, increase communication, cut costs, and build community. Technology is another arena where institutions need to move from the theoretical to the practical. The same colleges and universities where advanced technological solutions are pioneered for research and teaching may have difficulty maximizing technology's potential for transforming institutional operations.

■ **Embrace changes in student demographics.** The "traditional" student—middle-class, white, between 18 and 24—is rapidly ceasing to be the norm on college campuses. Institutions need to understand how their student population is changing in terms of age, income, ethnicity, experience, and goals. Different students want and need different things from higher education, and these new needs create

new opportunities for colleges and universities.

- **Act now.** Thought Leaders participants felt that the time is ripe for change. The environment is right, the opportunities are out there, and institutions need to strike while the iron is hot. The economic crisis exposed many of the flaws of the current educational system, making it clear to faculty and administrators that change is necessary. Meanwhile, government officials are calling for change, and the student body is positioned to understand and accept new approaches.

**Threats.** If institutions want to act now, what would get in their way? What threatens higher education's future?

- **Economic stressors.** Economic challenges confront higher education from all sides. Rising energy costs. Union demands. An unskilled workforce that requires training. Healthcare expenses. Higher interest rates and the threat of inflation. Combine these threats with the long-term decline in state appropriations and you have the potential for a perfect storm of financial unsustainability.
- **Internal competition.** Economic challenges only grow worse when everyone in the organization is fighting for scarce resources. Individual units within colleges and universities have typically valued their autonomy and operated independently, but that approach isn't viable when the stability of the entire institution is at stake.
- **External competition.** College and universities have always competed, but that competition could grow much more intense in the next few decades. Demographic shifts will result in a smaller traditional college population. Meanwhile, nontraditional students have different priorities and are more likely to look for direct correlation between the price they pay for education and the jobs they can secure after graduation. Furthermore, international students who once looked almost exclusively at North America have an increasing number of quality global institutions from which to choose.
- **Perceived value.** The previous threat is related to this one: In an era of increased competition, the general value of higher education is increasingly questioned. Students, parents, businesses, and even governments are asking what accounts for the difference between one degree and another. How is a \$50,000/year

education different from a \$5,000/year education?

While some lower-priced institutions could gain against this threat, many could lose if public perception concludes that all degrees are the same and that the only value in an institution is its ability to grant that degree.

- **Lack of leadership.** Thought Leaders participants agreed that higher education lacks visionary leaders who can envision future trends and then articulate how the institution needs to respond. Too often, leadership is focused on the short-term and fails to provide that inspirational and visionary guidance and direction. What is needed are iconic figures who can articulate higher education issues and shape the debate with elected officials, government authorities, the media, and the public at large. A good starting point for reasserting higher education leadership is to "speak truth to power" and acknowledge the weaknesses as well as strengths of colleges and universities, buttresses by an agenda for constructive change to better align institutional mission with higher education's public purpose.

## Determining the major issues facing higher education

The second step undertaken by participants at the Thought Leaders symposium was to identify the critical issues facing higher education in general.

The group first generated a long list of issues that they expect higher education will likely confront in the next several decades. Then they narrowed this list to focus attention on the most significant issues. At the end of the process, several issues were determined to have the greatest potential to impact the future of higher education.

**Securing the future of higher education.** Institutions need to be true to and confident in their articulated mission and vision and retain the integrity of that focus and direction rather than be pressured to change by other externalities.

Close consideration of the issues raised on day one of the Thought Leaders symposium meant examining threats to the very existence of higher education. Symposium participants felt that these threats will not just go away but need to be confronted aggressively and confidently. One of the biggest risks is that change could

## Data Point: Looking ahead

*Preliminary list of issues identified by Thought Leaders participants*

Participants at the Thought Leaders symposium developed a list of issues they anticipate will impact higher education in the next several decades. Most of those issues are listed below:

- Limited access to higher education for the middle class
- Increased gap between Haves and Have-Nots
- Increased uncertainty
- Potential loss of tax-free status for higher education institutions
- Increased risk/liability associated with facilities and the built environment
- Changing workforce demographics
- Changing student demographics
- Reduced public support
- Increased demands for accountability
- Decline of the traditional 4-year institution; rise of research institutions focused on product development and commercialization
- New regulatory demands
- Increased energy cost volatility
- Threats to the safety of the campus
- Increased global competition
- Transformations in information technology
- New accountability demands related to sustainability
- Political shifts that could lead to either reduced or increased environmental regulations
- Need for a new financial model to ensure viability
- Global events that could cause breakdowns in communications
- Privatization of public institutions
- Implementation of a voucher system to replace direct appropriations to higher education
- Decline of K-12 public education

overtake the institution and render it unrecognizable. Colleges and universities need to be ready for change and committed to the mission, vision, and form of their organization. Only if the institution knows itself will it be able to retain that identity through the twists and turns of the coming years.

Thought Leaders participants believe higher education could be a very different type of institution a century from now. It is not clear if the current models of public, private, and for-profit will remain relevant or that traditional structures will continue indefinitely. Change will have many drivers including cost, access, and competition:

- **Cost:** Will affordability impact the mission of higher education? Are the finances of the institution sustainable? How will public institutions manage with reduced state support?
- **Access:** Will some students be priced out of higher education? How will the institution retain diversity in the race/ethnicity and economic origins of students?
- **Competition:** How will the institution position itself to compete for a smaller pool of quality students? Is the institution prepared to compete globally?

Institutions also need to ask if their core processes are up to the challenge of the future. Is the business model sound? Are other models available that would make more sense or provide more opportunities for the institutions? What drives the business model?

The ultimate question is this: Who decides? Who decides what an individual college or university will become in 15, 50, or 100 years? University leaders will naturally say that the institutions themselves should decide—that those within higher education know best what their mission should be and how that mission should be executed. However, there is a risk that university leaders will fail to act (or fail to act quickly enough). Other players—state governments, the federal government, business leaders—could step in and shape higher education to their liking if university leaders are not committed to a clear mission.

Some strategies identified to address this challenge include accepting that higher education will inevitably change in the next century and taking on the challenge of shaping that change; focusing on the mission of higher education as a whole and the individual institution in particular; confronting the challenges of cost, access, and competition; and analyzing the institution's organizational structure, governance, and financial systems for their long-term sustainability.

**Reduced public support for higher education.** State-sponsored higher education is facing both a short- and

long-term funding crisis. State governments have historically provided significant subsidies for their residents, creating a nationwide system of public colleges and universities that provide first-class educations at cut-rate prices. However, that entire system is under threat.

The recession exacerbated the continued challenge to adequate state funding. The financial crisis created state budget shortfalls that could only be met by either raising taxes or reducing spending, and few were willing to raise taxes. In fiscal year 2009-10, state support of higher education declined nationwide, although the impact was blunted by federal stimulus money through the State Fiscal Stabilization Fund. These nearly \$40 billion in federal funds resulted in only an average 1.1 percent

decline in state support instead of the 6.8 percent decline had stimulus money not been available. That average hides significant variability between states: funding drops ranged from 0.2 to 16.4 percent across the nation. The harder-hit state institutions had no choice but to slash budgets, close programs, and increase tuition and fees. For example, the University of California system turned away 2,300 students in the fall of 2009 and 1,500 students in the fall of 2010, since no money was available to educate them, while fees for students who did attend rose by 32 percent for 2009-10 and 2010-11 combined.

Even more worrisome is the budget situation for the upcoming year. Stimulus funds are running out, but tax

## Data Point: State funding for higher education

### Implications of state funding cuts

As of August 2010, at least 43 states have implemented cuts to public colleges and universities and/or made large increases in college tuition to make up for insufficient state funding. Here's a survey of the situation in several U.S. states:

- Alabama's fiscal year 2011 cuts to higher education have led to 2010-11 tuition hikes that range from 8 percent to 23 percent, depending on the institution.
- The University of California increased tuition by 32 percent and reduced freshman enrollment by 2,300 students; the California State University system cut enrollment by 40,000 students.
- Colorado funding for higher education was reduced by \$62 million from FY 2010 and this has led to cutbacks at the state's institutions. For example, the University of Colorado system will lay off 79 employees in FY 2011 and has increased employee workloads and required higher employee contributions to health and retirement benefits.
- Florida's 11 public universities will raise tuition by 15 percent for the 2010-11 academic year. This tuition hike, combined with a similar increase in 2009-10, results in a total two-year increase of 32 percent.
- Georgia cut state funding for public higher education for FY2011 by \$151 million, or 7 percent. As a result, undergraduate tuition for the fall 2010 semester at Georgia's four public research universities (Georgia State, Georgia Tech, the

Medical College of Georgia, and the University of Georgia) will increase by \$500 per semester, or 16 percent.

- New York's state university system increased resident undergraduate tuition by 14 percent beginning with the spring 2009 semester.
- In North Carolina, University of North Carolina students will see their tuition rise by \$750 in the 2010-2011 school year and community college students will see their tuition increase by \$200 due to fiscal year 2011 reductions in state higher education spending.
- Texas instituted a 5 percent across-the-board budget cut that reduced higher education funding by \$73 million.
- Washington reduced state funding for the University of Washington by 26 percent for the current biennium; Washington State University is increasing tuition by almost 30 percent over two years. In its supplemental budget, the state cut 6 percent more from direct aid to the state's six public universities and 34 community colleges.

– Nicholas Johnson, Phil Oliff, and Erica Williams  
*"An Update on State Budget Cuts: At Least 46 States Have Imposed Cuts that Hurt Vulnerable Residents and the Economy," Center on Budget and Policy Priorities, August 4, 2010*

revenues haven't improved; states are looking at drastic mid-year and next-year cuts. In Nevada, for example, lawmakers approved a 6.9 percent midyear cut in state allocations to higher education—on top of the 24-percent reduction the previous year. Even though the economy seems to be recovering, the situation looks grim for the next two to five years, since the recovery of state budgets tends to lag behind the economy as a whole.

Even worse could be on the horizon if long-term trends in reduced public support continue. State spending on higher education has steadily declined in terms of the proportion of state budgets and the proportion of college budgets; funding has not kept pace either with enrollment growth or with inflation. For example, between 1992 and 2010, appropriations to higher education in Virginia dropped from 14 percent to 11 percent of the state budget. On a per-student basis in Virginia, general fund allocations declined by 18 percent at four-year institutions and 9 percent at community colleges during the same period.

Participants at the Thought Leaders symposium believed declining state support threatens the entire higher education system in the United States. They acknowledged solutions won't be easy. Institutions are working to develop creative solutions to the problem other than eliminating faculty and reducing programs. Many are seeking **funding from alternative sources** including corporations, foundations, and the federal government; others are increasing fundraising and recruiting lucrative out-of-state students. But these strategies aren't enough.

Participants believe a critical strategy will be to **focus on and invest in core competencies**. Outsourcing is not a panacea, but sometimes it is the right solution to providing services at a reasonable cost. Higher education also needs to better leverage its resources through smart purchasing decisions and strategic partnerships. Finally—and most critically—**higher education needs to make a better case for itself**. As an industry, education needs to explain the value it provides to the local community, to the state, and to the nation. Colleges and universities value their independence, but in this instance they need to speak with one voice and deliver a consistent message: that the success of higher education determines the success of the nation.

**Broken financial model.** Related to the challenge of declining public support is the challenge of the entire higher education financial model. In short: it's unsustainable.

The cost of higher education simply cannot continue to rise at its current rate. If established trends continue, higher education will become too expensive for the average family. In the past 25 years, average college tuition and fees have risen by 440 percent, more than four times the rate of inflation and almost twice the rate of medical care, according to the National Center for

## Data Point: State funding for higher education

### *Higher education at a critical junction*

"Enrollment demand has grown relentlessly for more than a quarter century, from 7.0 million in 1980 to 10.8 million in 2009, with no signs of stopping. Even with the substantial increases in state and federal funding for higher education, public financial support has not generally kept pace with enrollment growth and inflation. These trends have contributed to persistent increases in tuition and fees, and in some states, to subtle, less visible reductions in opportunity and quality. . . .

"State support for higher education has been resilient, but inconstant. In every recession over the past 35 years, enrollments have grown, while state funding has not kept up with enrollment growth and inflation. During economic recoveries following recessions, states historically have "caught up" by providing more support. While the historical pattern provides reassurance and evidence of enduring public commitment, the current recession and a convergence of other pressures on states and the American economy have eroded the ability of states to rebuild their financial support for higher education. The resiliency of public financial support for American higher education is threatened, putting its quality and capacity at risk."

— Paul E. Lingenfelter, President, State Higher Education Executive Officers (SHEEO), in his editorial "A Critical Juncture for Higher Education in the United States," published to coincide with SHEEO's annual report on state funding for higher education

Public Policy and Higher Education. This dramatic increase in the cost of an education is increasingly difficult for families to bear; between 1999 and 2007, a degree from a public institution jumped from 39 percent to 55 percent of the median income of the lowest-earning quintile of American families. Still reeling from the sub-prime mortgage crisis and the credit freeze, families are increasingly reluctant to take on huge loans. Increases in financial aid are unlikely to keep up with demand; Congress recently increased Pell Grant limits from \$4,731 to \$5,350 a year, but that figure is still \$14,000 less than total expenses for a residential student at a public institution at in-state rates—and more than \$33,000 less than expenses at the average private college or university.

Institutions must continually raise tuition and fees, conduct fundraising campaigns, and lobby for state funding because their internal costs keep going up. To some degree, the pressures on higher education are the same as those on every large organization in the United States; healthcare costs, for example, have risen sharply. But these types of costs cannot account for all of the price pressures on higher education. The organization and governance systems at colleges and universities can promote high costs and discourage efficiencies.

For example, the shared system of governance between trustees, administrators, and faculty makes it difficult for institutions to react quickly to changing situations. College deans are disincentivized to comply with university-wide cost-cutting initiatives since their base of support is with the faculty in their own college and provosts or presidents are limited in their ability to motivate or further penalize recalcitrant deans.

Further, the budget system at universities often gives significant financial freedom to deans in what researcher Ronald Ehrenberg of the Cornell Higher Education Research Institute calls the “tub” model of resource allocation. In this model, each college keeps the revenue it generates, including tuition, and is responsible for all costs it incurs, remitting funds to central administration to cover shares of general costs. According to Ehrenberg, the tub model is not the best model for improving efficiency and controlling costs, since the best interests of the individual unit are not necessarily the best interests of the entire university.

Fundamental changes will be necessary to reduce the cost of higher education and stop the spiral of ever-

rising tuition. The solutions generally adopted by institutions when faced with budget cuts are short-term reductions of obvious targets—hiring freezes, travel restrictions, training budget reductions, limits on library purchases, etc. As noted by higher education economics expert David W. Breneman, “Few institutional leaders have undertaken the hard tasks of rethinking the university strategically and systematically reallocating resources to permanently lower costs.”

Nevertheless, participants at the Thought Leaders symposium pointed to several measures already underway at institutions. Colleges and universities are looking for areas of redundancy and seeking to **consolidate services**. Some have examined their real estate assets and leased out land and facilities not used for academic purposes to raise revenues. Other institutions are making the difficult decision to **close underperforming academic programs**.

However, more needs to be done. Thought Leaders participants pointed to **better space management** as a powerful tool. Colleges and universities historically have used their space poorly, using buildings heavily for a few hours a day, a few months a year and hardly at all other times. Keeping buildings full all day/every day, all month/every month, makes better use of the investment in facilities and reduces the need for new buildings. **Energy conservation strategies** are usually considered in

### Data Point: Higher education costs Why does college cost so much?

“The objective of selective academic institutions is to be the best they can in every aspect of their activities. They aggressively seek out all possible resources and put them to use funding things that they think will make them better. To look better than their competitors, the institutions wind up in an arms race of spending to improve facilities, faculty, students, research, and instructional technology. . .

“Top institutions have chosen to maintain and increase quality largely by spending more, not by increasing efficiency, reducing costs, or reallocating funds.”

— Ronald Ehrenberg  
Tuition Rising: Why College Costs So Much

terms of environmental sustainability, but they can also have a significant effect on cutting energy costs and reducing risk posed by energy price volatility. Tuition needs to be reassessed so there is a clear **relationship between what a student pays and what it costs to educate that student**. Institutions need to analyze their organization and governance, eliminate disincentives to cost-cutting and university-wide thinking, and institute management and budget approaches that **encourage efficiency**.

**Communicating the value of higher education.** Thought Leaders symposium participants believed strongly that higher education is not adequately nor effectively communicating its value, its role in society, or its achievements. Higher education is widely perceived as important; nevertheless, with so many assaults on public support and so many criticisms of large endowments, higher education needs to increase its efforts to communicate its value. Institutions need to make the case for higher education not only to encourage students to enroll but also to keep education as a priority in national and state policy. Colleges and universities would be severely impacted, if not devastated, if state governments came to doubt the impact of public institutions or if families lost faith in the power of higher education to help their children build a brighter future.

Some key points about higher education will be universal. Everyone can agree that colleges and universities contribute immeasurably to the economies of the United States and Canada by training workers, supporting businesses, and developing new technologies. Most will also come together on the value of educational institutions in creating informed citizens, promoting culture, and generally preserving an environment where creativity, innovation, intellect, and endeavor are valued. Beyond these core principles, different institutions will have different stories to tell. A community college, for example, might need to promote its ability to train a wide range of students of all levels of ability for the next step in their education and/or for their careers. A research institution, on the other hand, might need to tell the story of its technological innovations. College and universities need to understand their institutional assets, tangible and intangible—which are likely to be more than one.

Only once the institution understands what differentiates it from the competition should it craft a

## Data Point: Communicating the value of higher education

### Effective branding

"Build on strong facts: Bob Dylan said, 'All I got is a red guitar, three chords, and the truth.' Without denigrating Dylan's guitar chops, it's fair to say that he relied primarily on the truth. University marketing and communications programs should do the same.

"Effective marketing (or public relations – the terms mean different things to different practitioners) should be thought of as an accelerant. It's the lighter fluid we pour on a fledgling fire to create a full-blown blaze. As a result, even the strongest communications program will fail if it is not built on strong facts—on the truth.

"Within your institution, find three to five strong institutional assets—the ideas, initiatives, and people that differentiate you from the rest. These could be research programs, student successes, or an innovative approach to admissions. The point is, you should fan the flames where you have the potential to outshine others."

– Michael Armini, senior vice president for external affairs at Northeastern University, from "Beware Higher Ed's 'Mad Men', Inside Higher Ed, May 27, 2010

communications message. It is essential that the communications strategy be rooted in the vision and truth of the institution—that it reflect the real values and identity of the college or university. Faculty and staff at some institutions have reacted against the rash of branding and marketing that they see as ineffective and hollow—usually when a brand identity or marketing message reflects a lack of understanding about the organization. Communications messages should not attempt to make a college or university into something it is not. The effort will be dismissed internally and ultimately will be ineffective externally: audiences are too savvy and too well-informed not to see through an ill-prepared message.

If, however, the message arises out of the truth and vision of the institution, then the institution should be able to develop a plan for promoting that message. An experienced public relations and marketing team needs

to craft a strategy that includes multiple media and multiple ways of telling the story. Good communications plans are hard work—they require sustained effort. Smart institutions will stick to a plan for years; the rule of thumb in marketing is that by the time you are sick of a message, your audience has just noticed it. The final element of a strong communications plan is the creation of mechanisms to evaluate its impact. Institutions need to measure the effect of their strategies with surveys and other tools.

**Campus safety and security.** Campus security poses one of the most urgent and difficult problems for colleges and universities. One on the one hand, colleges and universities need to create a safe and secure campus. On the other hand, institutions need to preserve the rights of their students, faculty, and staff, including the right to privacy, and seek to create an open environment conducive to community, learning, and exploration.

Tragedies in recent years exposed many flaws in campus security, and in the last decade strides have been made in developing security plans. A 2010 survey by the University of Central Florida discovered that 85 percent of respondents had developed comprehensive emergency management plans, results identical to those of a 2009 survey by the National Campus Safety and Security Project, an initiative of nine higher education associations including APPA. These plans generally address the institution's response to acts of violence, natural and manmade disasters, and pandemics; about half of responding institutions also have plans to deal with disruptions to communications and computer systems. Many of these plans were developed in association with local police and emergency response personnel and include emergency communications systems.

However, gaps remain in campus security. To some degree, these gaps are inevitable. Campuses are not controlled environments like airports or courthouses, nor do most people desire background checks of new students or metal detectors at classrooms. But other gaps should be confronted by campus leaders. For example, a 2008 study of security on University of California campuses identified several aspects of security that needed improvement, including communications interoperability with local police, fire, and emergency medical service providers; lack of established procedures to handle situations such as active shooters and hostage

## Data Point: Campus safety and security

*Behavioral Concerns Advice Line helps students, faculty, and staff concerned about others*

One program that is proving successful at preventing dangerous incidents on campus is the University of Texas's Behavior Concerns Advice Line (BCAL). Begun in 2007 as a partnership between the dean of students, the Counseling Mental Health Center, the Employee Assistance Program, and the University Police Department, BCAL operates 24 hours a day, 7 days a week taking calls from students, faculty, staff, and parents. Individuals are encouraged to call when they have concerns about the behavior of another member of the campus community; these concerns might include a faculty member bothered by disturbing comments in a paper, a student worried about a roommate's drinking habits, a staff member upset about an increasingly angry co-worker, or a parent anxious about changes in their child's behavior.

Calls are assessed first for the level of threat they represent, and immediate threats are passed along to campus police. Barring a crisis situation, calls are routed to either the student or faculty referral processes.

As a partnership between several campus departments, BCAL avoids many pitfalls. It's not a counseling service, so information doesn't fall under the confidentiality rules of the mental health center. It's not a police line, so students or faculty don't feel they're "ratting out" their friends. UT staff believe the program has been highly successful at intervening in potentially dangerous situations; reported cases include incidents of stalking/harassment, aggressive behavior, mental health breakdowns, erratic behavior, and abuse of alcohol or drugs. This collaborative program gives UT a unique tool for identifying problems before they escalate.

situations; and the lack of multidisciplinary behavioral management teams designed to identify and address students, staff, or faculty who may pose a threat to the campus community.

Thought Leaders participants believed more extensive planning was needed to address **emergency**

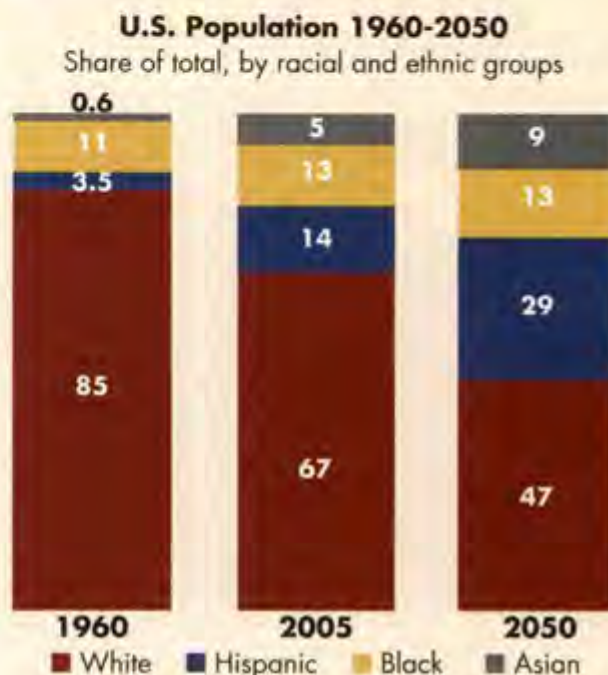
preparedness, incident command, business continuity, and campus community involvement and awareness. In particular, symposium participants believed a gap existed between the administration and operations side of colleges and universities and the academic and research side; few faculty members have received adequate training. Plans are good, but if faculty are stuck in classrooms with students and do not know the plan, its usefulness is limited.

Further, participants believed more emphasis should be placed on **prevention**, particularly the prevention of dangerous incidents from students, faculty, and staff. Members of the campus community need to know how to recognize troubling behavior as well as how to report that behavior to someone who can take action.

**Workforce demographics.** The population of the United States is changing in unprecedented ways. The population is expected to hit 438 million by 2050, and the majority of that growth will be among minority populations, according to a 2008 report by the Pew Research Center. The white population will grow to 207 million, but the African American population will grow to 59 million, the Asian American population to 41 million, and the Hispanic population to 128 million. In other words, by the middle of this century, 47 percent of the population will be white, 29 percent Hispanic, 13 percent African American, and 9 percent Asian American.

At the same time, the population as a whole is aging as the baby boomers reach retirement age and life expectancy increases. The workforce is aging, as well, and not just due to population shifts: older workers are staying in the labor force longer and younger adults are delaying going to work. According to one government estimate, 93 percent of growth in the labor force from 2006 to 2016 will be among workers ages 55 and older. Some older workers simply enjoy the activity—54 percent of workers ages 65 and above cite this as their reason for working, compared to 20 percent of those 64 and younger, according to Pew—but others have delayed retirement due to the recession. Meanwhile, a rising share of Americans 16 to 24 years of age are in school and thus not participating in the labor force, a drop from 66 percent in 2000 to 57 percent in 2009. Nevertheless, baby boomers will eventually retire, taking with them their skills and institutional wisdom and knowledge, and the smaller generations that follow will enter the

### Data Point: Changing demographics Shifts in the U.S. population by 2050



— U.S. Population Projections:  
2005-2050, Pew Research Center

workforce with less training.

Of particular concern is the anticipated shortage of skilled workers. It doesn't seem possible right now, with an estimated 2 million construction workers out of a job, but the situation is expected to quickly reverse itself, and skilled trade workers will be in high demand. Different researchers have made different predictions of the extent of the problem—the U.S. Department of Labor predicts that by 2012 the construction industry would be short 1.5 million workers, while the Construction Labor Research Council estimates that each year for the next decade the industry will need 95,000 replacement workers and another 90,000 new workers. The situation is likely to exacerbate if many of those out of work now retrain and find jobs in other industries, notes FMI Corporation, a management consulting and investment banking firm to the construction industry; furthermore, many of the most highly skilled and experienced tradesmen are nearing retirement age. "When backlogs approach capacity in 2013 and 2014, the industry will have lost expertise and be in need of skilled workers," notes FMI in a recent

report, "The Next Big Threat . . . And It's Probably Not What You Were Expecting." According to FMI, "It will not just be a matter of finding skilled workers; the challenge will be recruiting and training specialists for a changed industry."

Participants in the Thought Leaders symposium felt higher education is **paying insufficient attention to the challenge of shifting demographics**, particularly for facilities departments. Facilities professionals are right to fear they will be unable to hire enough skilled staff to fill the holes created by retirements; many believe the institution will need to train new employees itself. Participants observed that some institutions have begun to recognize the problem and have developed new training resources as well as started apprenticeship programs. However, the recession resulted in hiring freezes for many institutions, so the majority of organizations have been unable to fill the gaps left by retirees or begin to train the next generation of workers.

Institutions need to do more to identify the staff members they will need in the next five, ten, and fifteen years and then develop a plan to find those employees. Facilities departments need to work with human resources experts on **strategies for recruitments, skills assessment, and compensation structures**. They also need to work on **skills development and training** to bring on the needed skilled workers. Institutions need to look at building partnerships with technical and community colleges—with the understanding that competition for these workers will increase. Finally, departments need **succession/accesion** plans so employees are confident they have a future with the institution.

**Global competition.** At first glance, the United States seems to be highly successful at attracting students from around the world. In academic year 2007-08, the U.S. set a new record of 623,805 foreign students, up 7 percent from the previous year. However, 7 percent really isn't as good as it sounds—the U.S. would need to attract far more students to keep up with competitors in Europe, Asia, and Australia.

It all comes back to supply and demand. An increasing number of students are seeking to study outside their home countries; the total of international students has grown from 600,000 in 1975 to 1.2 million in 1990, to a whopping 2.9 million in 2006, according to a report from the Centers for Study in Higher

Education at the University of California, Berkeley. Experts anticipate this number will only grow as the world's population increases in numbers and mobility. At the same time, students find it increasingly difficult to attend U.S. colleges and universities. The rising cost of education as noted elsewhere in this report has discouraged students, as have complicated and lengthy visa procedures implemented after the September 11, 2001 terrorist attacks. Global politics have played a role, with many nations expressing their disapproval with U.S. policies by looking elsewhere for an education.

Other nations have taken advantage of the situation to make their higher education institutions more attractive to international students. While the United States was once the leader in recruiting international students and faculty, other countries have increasingly recognized the benefits of international students and have begun eliminating barriers and encouraging enrollment. Several nations, including Australia, New Zealand, the UK, and France, expedited visa approvals for students, visiting faculty, and researchers and modified their immigration policies to make it easier for foreign nationals to work in the country following the completion of their degrees. Institutions have created curricula and degree programs targeted to the needs of the international market and developed financial aid programs for foreign students. Several in non-English-speaking countries have even adopted English as the language of instruction, particularly at the graduate level.

As a result, the U.S. share of the market of international students is on the decline. From 25.1 percent market share in 2000, the United States dropped to 20 percent by 2006; at the same time, Australia rose from 5.6 to 6.3 percent, Japan from 3.3 to 4.4, France from 7.2 to 8.5, and New Zealand from 0.4 to 2.3.

The implications of this decline are greater than a reduction in the diversity of U.S. campuses. International students are the lifeblood of many graduate programs; since 1977, in fact, virtually all of the growth in doctorates in the sciences and engineering can be traced to foreign students. Some programs might find it hard to survive if these international students go elsewhere. Further, international students have had a major impact on the U.S. economy.

International students inject more than \$15 billion into the economy through tuition and living costs. Those students who choose to stay in the U.S. after

graduation bring unique energy and have a significant economic effect; one study found that in the 1990s, more than one-third of successful start-ups in Silicon Valley were founded by foreign nationals, most of whom received their education at American universities. Another study estimated that immigrants helped start one of every four technology companies between 1997 and 2007, companies that generated \$52 billion in sales in 2005.

Thought Leaders participants believed higher education institutions need to take action to increase their share of international students. Symposium participants recognized that several institutions have begun to fashion responses. For example, some institutions are actively **recruiting overseas**. Others are **establishing joint ventures** with local institutions or creating satellite campuses in other countries—a move that not only produces revenue but also promotes the institution and attracts students to the United States and Canada.

However, these measures are not enough to reverse the trend. Some of the solutions to the problem fall outside of the control of higher education and will require extensive lobbying and education. First, the **immigration process needs to be streamlined** to shorten application times and reduce complexity. Second, the United States needs to develop a national higher education policy that encourages everyone in U.S. higher education to think of institutions not as simply local or state assets but as **nationally important**. This policy also needs to support recruiting of faculty and staff, provide new financial aid opportunities, and seek out other ways to make the U.S. higher education system more competitive. Finally, **new funding for research and development** should have the side effect of promoting international enrollment by increasing enrollment in research programs overall.

Other solutions are more easily controlled by institutions. Colleges and universities can begin by striving to **increase the diversity of their faculty** and recruiting internationally. They can also find new ways to increase their profile around the world and attract international students. Academic units should examine their **programs to see if they are desirable to international students**. Could programs be modified so that they better meet the needs of international students? Could the time to graduation be reduced, or

options for study at home institutions for some courses be expanded? In general, institutions should not take international students for granted and should start focusing further on making themselves competitive globally.

*Developing leaders to drive change.* Thought Leaders

### Data Point: Global competition

*Economic impact of foreign students in the U.S.*

Top Ten States	# of Foreign Students	Tuition and Fees (billions)	Total Contributions (billions)
California	85009	\$1.40	\$2.45
New York	69940	1.30	1.90
Massachusetts	31683	.80	1.00
Texas	51823	.60	1.05
Pennsylvania	25994	.60	.72
Illinois	28604	.56	.71
Florida	26780	.43	.67
Michigan	22697	.43	.52
Ohio	19346	.33	.43
Indiana	15502	.30	.37
<b>U.S. Total</b>	<b>623,805</b>	<b>\$10.60</b>	<b>\$15.54</b>

—John Aubrey Douglass and Richard Edelstein, "The Global Competition for Talent: The Rapidly Changing Market for International Students and the Need for a Strategic Approach in the U.S."

participants agreed with many industry observers that higher education is in need of dynamic, committed leaders to address the challenges of the next decades—and fear that these leaders are in short supply. It will take a skillful navigator to steer unwieldy colleges and universities through the rocky shoals ahead, and these navigators seem to be increasingly hard to find.

Institutions often turn to business and politics for senior leaders on the assumption that skills in these arenas will translate to skills in academic administration. This belief has some merit—savvy leaders from outside the institution look at seemingly intractable problems with fresh eyes. Business leaders often have a performance mindset that encourages them to get things done, quicker. However, business leaders sometimes lack understanding of the nuances of academia. One expert,

writing in *The Chronicle of Higher Education*, predicts the rise of college and university presidents with corporate backgrounds will result in "an increase in the number of presidents who are more skilled at keeping their boards and the news media happy than they are at listening to faculty members, staying up to date with the changing state of research fields, or thinking deeply about the role of their institutions in society and the world."

Perhaps the optimal solution is a combination of leaders from both within and outside higher education. However, that means higher education organizations need to work harder to develop their own people. Thought Leaders symposium participants agreed with many industry observers that colleges and universities often do a poor job nurturing leadership from the inside. This seems to be an odd problem for higher education, since so many schools have built strong business programs that train expert leaders and managers. Colleges and universities should consider following the lead of a few savvy institutions that have created leadership institutes for their own staff.

Alternatively, they should look at involving promising candidates in external leadership programs. For example, the Council for Independent Colleges, in partnership with the American Academic Leadership Institute and the American Association of State Colleges and Universities, offers the Academic Leadership for the 21<sup>st</sup> Century program, which helps prepare chief academic officers for the role of college president. Similarly, the American Council on Education offers the ACE Fellows Program, in which vice presidents, deans, department chairs, faculty, and other emerging leaders spend a year in intensive leadership training.

Finally, participants at the Thought Leaders symposium agreed that leadership is necessary not only on individual college and university campuses but also nationwide. Higher education needs advocates who will both sing the praises of academics and research and urge appropriate transformation and reform. Institutions need to encourage their leaders to take on this role within their communities, states, provinces, and regions, and welcome the chance for their senior leaders to take a place on the national stage.

## Data Point: Developing higher education leaders

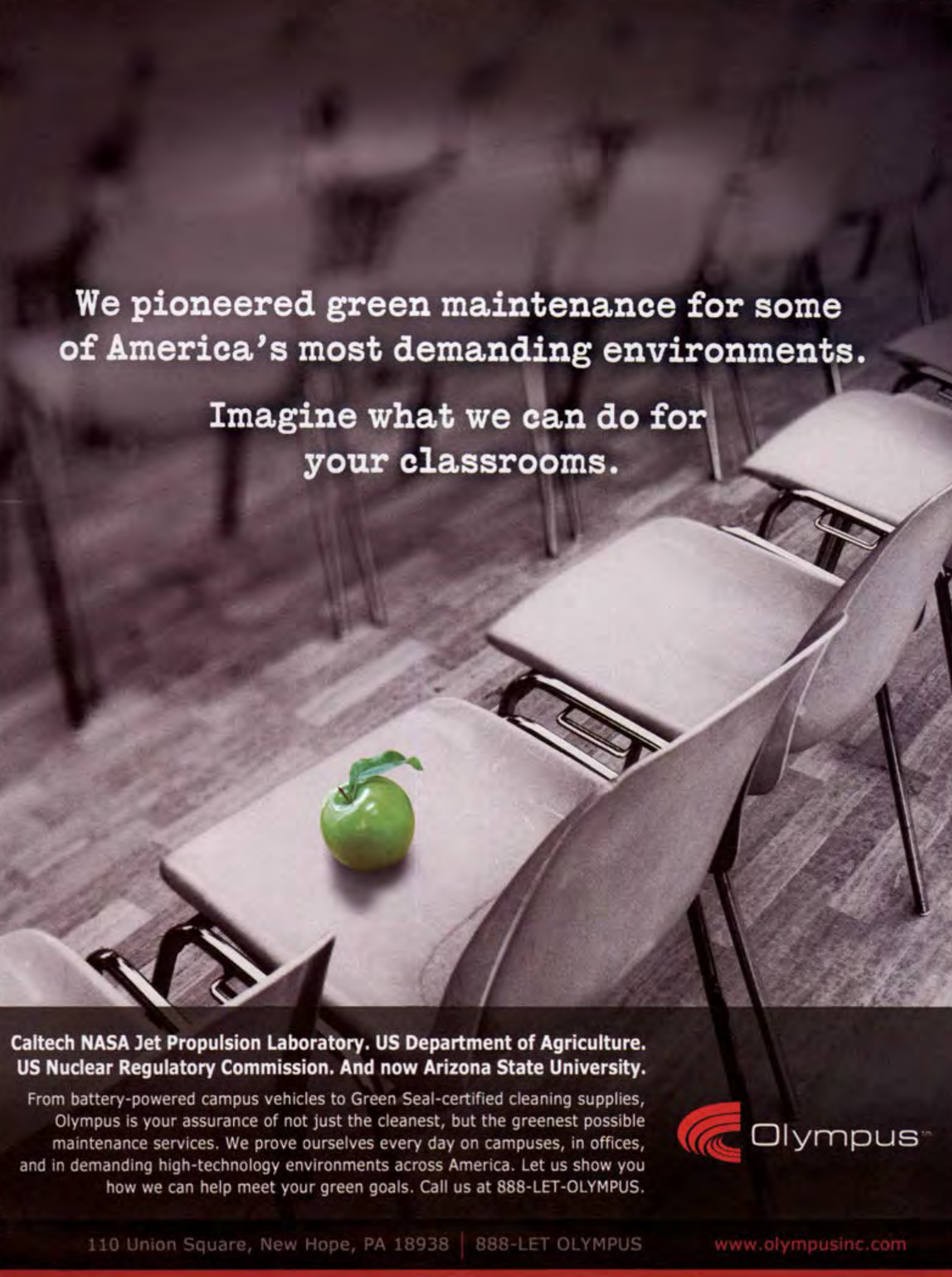
### *Growing from the inside at Emory's Excellence Through Leadership program*

One university confronted the challenge of institutional leadership head-on by developing a program to strengthen leadership performance across the institution and establish a leadership pipeline for succession planning. Emory University's Excellence Through Leadership program was established in the fall of 2006 in response to the shifting landscape of higher education and a concern about the scarcity of top-quality leaders.

Up to 15 participants, drawn from various schools and departments, are selected through a rigorous screening process. Then over the course of a year, they attend courses taught by business-school professors and Emory administrators. Classes cover a wide range of topics, including strategic planning, marketing, branding, and higher education finance. Participants also receive individual leadership mentoring.

Participants also complete a group project, in which they address major challenges facing the university and make recommendations for solutions. The work is hands-on and often gets the aspiring leaders involved in areas of the institution that are completely new to them. To date, about half of the recommendations made by group project teams have been put into place.

The program is getting results. As of June 2009, 16 percent of participants have received promotions, 5 percent have changed division, and all graduates consistently receive higher merit-pay increases than their colleagues. "Our evolving Excellence Through Leadership initiative is supporting our aim to develop leaders with the competencies that we believe will best serve them and the university in the future," says Peter Barnes, Emory vice president of human resources.

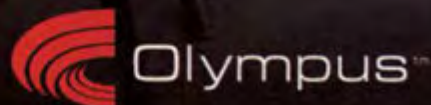


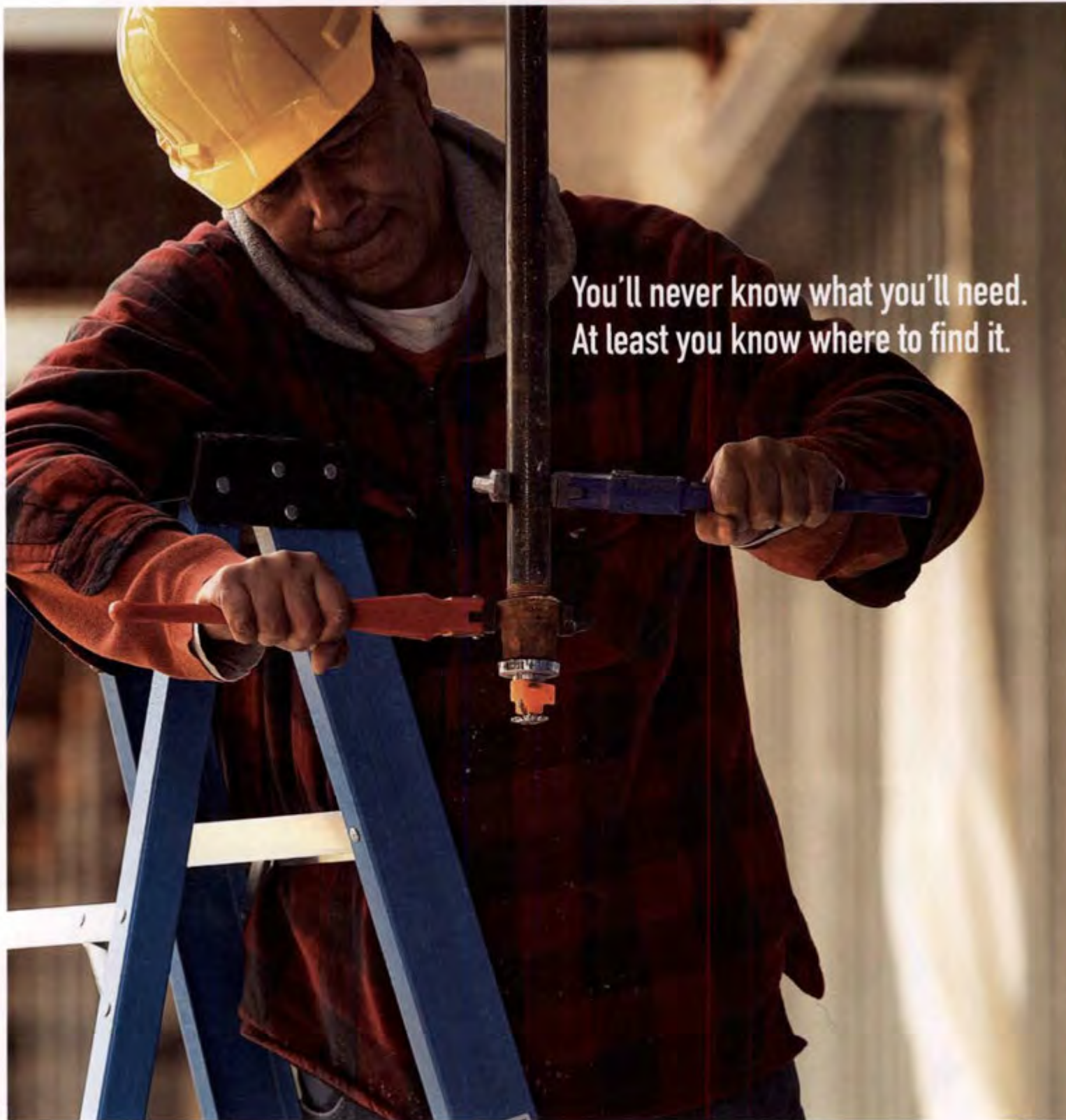
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